

Research and Practice on the First Lesson Classroom Teaching Mode Based on the Characteristics of Mathematics Subject

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Abstract:

Mathematics has rigorous logic and abstraction. It is a science that studies the quantitative relationships and spatial forms of the objective world, and it also contains rich beauty. Based on the characteristics of mathematics, exploring the research and practice of the first lesson classroom teaching mode is of great significance for improving students' learning interest, cultivating their mathematical thinking ability, and enhancing teaching quality.

Keywords:

Mathematics Subject, First Lesson, Classroom Teaching Mode

1. Analysis of the Characteristics of Mathematics Discipline

1.1. Logical coherence

Mathematics is a rigorous discipline, and its knowledge system is built on a rigorous logical foundation. Therefore, cultivating students' logical thinking ability is one of the core tasks in mathematics teaching. This requires teachers to focus on guiding students to understand the internal logic of mathematical concepts and master the methods of logical reasoning during the teaching process.

The logicity of mathematics is one of its prominent features, which is reflected in various aspects, including the reasoning process, proof methods, and symbolic expression of mathematics.

Mathematical reasoning is the process by which mathematicians derive new conclusions from known conditions through a series of logical steps. This reasoning process strictly follows the basic laws and logical rules of mathematics, ensuring that every step is accurate and error free. Whether it is algebra, geometry, or probability theory, mathematics follows a consistent logical structure when expressing and solving problems. This rigorous reasoning process enables mathematics to establish a rigorous theoretical system, providing strong support and guidance for other disciplines.

Mathematical proof is an important manifestation of mathematical logic. The truth or error of a mathematical proposition needs to be proven through logical reasoning and deduction. Mathematical proof aims to connect propositions with known mathematical theorems through a chain of reasoning, thereby establishing a rigorous logical framework. In mathematical proofs, rigor and accuracy are the primary requirements. A mathematical proof must undergo repeated scrutiny and rigorous logical deduction, without any omissions or contradictions. At the same time, mathematical proofs also need to follow certain proof structures and methods, such as mathematical induction, proof by contradiction, direct proof, etc. Through reasonable proof structures and methods, mathematicians can effectively solve various mathematical problems, providing a solid foundation for the development of the discipline.

Mathematical thinking mode refers to the way of thinking and mindset that learners apply to mathematical problems. The mathematical thinking mode has the characteristics of abstraction, integrality, logicity, and creativity. The core of mathematical thinking is logical reasoning and abstract thinking. Logical reasoning is the process of analyzing problems, summarizing and generalizing, deductive reasoning, and other methods to arrive at solutions to problems. Abstract thinking is the process of abstracting concrete mathematical problems and identifying their essence and patterns. Through logical reasoning and abstract thinking, mathematicians are able to quickly capture the key points and essence of problems, thereby solving complex mathematical problems. In addition, mathematical thinking also has integrity and creativity. Integrity refers to viewing mathematical problems as a whole, and through holistic thinking and comprehensive analysis, finding solutions to the problem. Creativity refers to the use of non-traditional ideas and methods, through divergent and diverse thinking, to find new problem-solving ideas and methods.

1.2. Abstraction

Many concepts, theorems, and formulas in mathematics are highly abstract. This abstraction is not only the charm of mathematics, but also the difficulty for students to learn. Therefore, we need to use a variety of teaching methods to help children understand mathematics and enhance their interest in learning mathematics. Abstraction in mathematics refers to extracting common essential features from concrete things, ignoring secondary and non essential details, and forming general and universal concepts and theories. This abstract process enables mathematics to go beyond concrete examples and explore broader and deeper mathematical laws.

The abstraction in mathematics is reflected at multiple levels, such as numbers, symbols, functions, sets, etc., all of which are abstract concepts. These concepts are not dependent on specific physical objects, but are derived through the refinement and generalization of practical problems. For example, the number “3” can represent three apples, three books, or three people, abstracting the common characteristic of quantity while ignoring the differences in specific things.

The abstractness of mathematics requires learners to possess the ability of abstract thinking. Abstract thinking refers to the ability to extract the essential features of specific things through analysis and synthesis, forming a general understanding and problem-solving ability. In mathematics learning, cultivating abstract thinking is crucial.

In order to cultivate abstract thinking, learners need to learn to extract mathematical concepts and laws from concrete examples, understand the essential characteristics of these concepts and laws, and be able to apply them to solve new problems. [1] In addition, learners also need to have the ability of logical reasoning and deductive reasoning in order to conduct rigorous reasoning and deduction in mathematical proofs and problem-solving processes.

The abstraction of mathematics has played a crucial role in the development of mathematics. With the continuous development and improvement of mathematical theories, mathematicians continuously refine higher-level and more abstract concepts and theories through abstract thinking, promoting the continuous progress of the mathematical discipline.

The abstraction of mathematics is not only of great significance in the study of mathematical theory, but also plays an important role in practical applications. Through abstract thinking, people can simplify complex practical problems into mathematical problems and apply mathematical methods and theories to solve and analyze them.

1.3. Systematic

The mathematical knowledge system is an organic whole, and there are close connections between various knowledge points. [2] This requires teachers to pay attention to the systematic nature of knowledge during the teaching process, guide students to grasp the overall framework of mathematical knowledge, and understand the inherent connections between various knowledge points.

The systematicity of mathematics is one of its important characteristics, which is reflected in various aspects such as the construction of mathematical theories, the organization of knowledge structures, and the application of mathematical methods.

The construction of mathematical theory is a highly systematic process. Mathematicians gradually establish a mathematical knowledge system through rigorous logical reasoning and proof. This system starts from basic mathematical concepts and gradually derives more advanced and complex mathematical theories through definitions, theorems, axioms, and so on. These theories are interconnected and mutually supportive, forming an organic whole.

The knowledge structure of mathematics is also highly systematic. From basic arithmetic in elementary school to advanced mathematics in university, mathematical knowledge gradually unfolds according to the principles of shallow to deep and easy to difficult. Each knowledge point is built upon the foundation of the previous one, forming a tight logical chain between them. The organization of this knowledge structure helps learners systematically grasp mathematical knowledge and form a complete knowledge system. [3]

The application of mathematical methods is also a systematic manifestation. Mathematics provides a rigorous and precise methodological system that can be applied to various real-world problems. Mathematical methods play an important role in physics, economics, computer science, and other fields. These methodological systems include algebraic methods, geometric methods, probabilistic statistical methods, optimization methods, etc. They complement and integrate with each other, forming a complete mathematical methodology system.

In mathematics teaching, systematicity is also particularly important. Teachers need to systematically organize teaching content and methods based on the inherent logic of mathematical knowledge and students' cognitive laws. Through a gradual and in-depth teaching approach, guide students to gradually master mathematical knowledge and form a complete knowledge system. At the same time, teachers also need to pay attention to the coherence and consistency of mathematical knowledge, ensuring that the knowledge learned by students is interrelated and mutually supportive.

1.4. Applicability

Mathematics is not only a theoretical subject, but also a widely applied discipline. Therefore, in mathematics teaching, teachers should focus on cultivating students' application awareness, guiding them to combine mathematical knowledge with practical life and production practice, and solve practical problems.

The applicability of mathematics in primary and secondary schools is extensive and profound. It not only provides students with basic mathematical knowledge and skills, but also cultivates their logical thinking ability, problem-solving ability, and practical application ability. The following elaborates on the applicability of mathematics in primary and secondary schools from several aspects.

The basic calculation skills taught in primary and secondary school mathematics, such as addition, subtraction, multiplication, division, and fraction operations, are frequently used in daily life. These skills help students quickly and accurately solve mathematical problems in daily life, such as finding change while shopping, calculating daily expenses, and creating budgets. By learning measurement units such as length, area, volume, weight, and their conversions, students can better understand and apply these concepts to daily life, such as measuring room size, estimating item weight, calculating food calories, etc. Time and Date: Mastering the calculation methods of time and date can help students arrange their schedules reasonably, calculate time differences, and make plans. [4]

Mathematics in primary and secondary schools provides necessary mathematical tools and language for natural sciences such as physics and chemistry. For example, through mathematical formulas and charts, students can gain a deeper understanding and explanation of physical phenomena and chemical changes. The connection with social sciences such as geography and history: Mathematics is used in geography to calculate distances, areas, and scales, while in history, mathematics can help students understand historical data such as population growth and economic changes.

Students can use their knowledge and skills in primary and secondary school mathematics to manage their personal finances, such as creating budgets, recording income and expenses, calculating interest, etc. Many games and entertainment activities involve mathematical elements, such as puzzle games, board games, math competitions, etc. These activities not only entertain the body and mind, but also exercise students' mathematical thinking and problem-solving abilities.

Primary and secondary school mathematics cultivates students' logical thinking ability through problem-solving and proof processes. Students need to learn to analyze the conditions of problems, identify patterns, reason and make judgments in order to draw correct conclusions. Mathematics learning requires students to constantly face problems, analyze them, and seek solutions. This process exercises students' problem-solving skills, enabling them to face challenges in life with greater confidence.

Primary and secondary school mathematics is the foundation for subsequent mathematics learning and scientific research. Mastering the knowledge and skills of mathematics in primary and secondary schools helps students better understand and master more advanced mathematical concepts and methods, laying a solid foundation for future learning and career development.

2. Design of First Lesson Classroom Teaching Mode Based on the Characteristics of Mathematics Subject

2.1. Introduction of problem scenarios

In the first lesson of mathematics teaching, teachers can create problem scenarios that are close to students' real-life situations based on the teaching content, guiding students into a learning state. Mathematical stories can be used to create problem scenarios that stimulate students' interest and desire for knowledge, laying a solid foundation for subsequent knowledge learning.

Teachers can take advantage of students' love for listening to stories and integrate mathematical problems into the stories, allowing students to naturally come into contact with mathematical knowledge during the process of listening to stories. For example, when learning about the area of rectangles and squares, you can tell a story about an advertising designer who introduces the concept of area by calculating the size of the advertising paper required for the advertising board.

In response to the lively and active nature of primary school students, teachers can design some interactive problem scenarios to enable students to learn mathematical knowledge through activities. For example, when learning "measurement", students can measure the size of objects in the classroom and consolidate their measurement knowledge through practical activities.

By utilizing students' competitive mentality, teachers can design challenging mathematical problems to stimulate students' competitiveness and learning motivation. For example, when learning "multiples of 3", students can be organized to participate in a quick calculation competition to see who can calculate quickly and accurately.

2.2. Knowledge explanation and exploration

After introducing the problem scenario, teachers need to explain relevant knowledge around the teaching objectives.

Teachers should guide students to grasp the overall framework of mathematical knowledge and understand the inherent connections between various knowledge points. By sorting and integrating knowledge, help students build a complete knowledge system.

Mathematics is not only the imparting of knowledge, but also the training of thinking methods. Therefore, in the process of explanation, teachers should focus on cultivating students' abilities such as logical thinking and abstract thinking. By guiding students to analyze and solve problems, we aim to enhance their mathematical thinking abilities.

Teachers should fully leverage students' active role and encourage them to actively participate in classroom discussions and exchanges. Through collaborative

exploration, group discussions, and other methods, we aim to stimulate students' interest and creativity in learning, and enhance their ability for self-directed learning.

2.3. Consolidate practice and feedback

After explaining the relevant knowledge, the teacher needs to design some consolidation exercises to help students consolidate the knowledge they have learned. At the same time, through practice feedback, timely understanding of students' learning situation and adjusting teaching strategies. [5]

The design of practice questions should be hierarchical, with both basic questions to consolidate students' basic knowledge and improvement questions to cultivate students' comprehensive abilities. Satisfy the learning needs of different students through exercises at different levels.

Teachers should promptly correct students' exercises and provide targeted feedback. For common problems, concentrated explanations should be given in the classroom; Individual tutoring should be provided for individual students' problems. By providing timely feedback and adjusting teaching strategies, ensure that every student can keep up with the teaching progress.

2.4. Summary and Expansion

In the final stage of the classroom, the teacher should summarize and review the content learned in this lesson, helping students sort out the knowledge points and problem-solving methods. At the same time, it can guide students to expand and extend their learned knowledge, cultivate their innovation ability and application awareness.

Teachers can guide students to review the content learned in this lesson through questioning, retelling, and other methods. By summarizing and reviewing, help students consolidate their learned knowledge, deepen their memory and understanding.

Teachers can design some open-ended questions or projects to guide students to apply the knowledge they have learned to real-life situations. By expanding and extending activities, cultivate students' innovation ability and application awareness, and stimulate their learning interest and motivation.

3. Practical Cases

The following is a practical case of first class classroom teaching based on the characteristics of mathematics:

Case Name: "Preliminary Understanding of Scores"

Teaching objectives:

Enable students to have a preliminary understanding of the meaning of fractions and the names of their various parts.

Develop students' hands-on skills and language expression abilities.

Stimulate students' interest in learning mathematics and their desire to explore.

Teaching process:

3.1. Introduction of problem scenarios

The teacher presents an apple and a small knife and asks the students, “How should we divide this apple equally between two children?” Guide the students to think and answer. Then the teacher cut the apple in half with a knife and told the students, "This is the score we are going to study today - half

3.2. Knowledge explanation and exploration

The teacher introduces the meaning of scores and the names of each part, guiding students to understand the concept of “average score”.

The teacher presents some shapes (such as circles, squares, etc.) and asks students to try using scores to represent the colored parts of the shapes. By hands-on operation and discussion, help students further understand the meaning of scores.

3.3. Consolidate practice and feedback

The teacher designs some exercises for students to complete independently. Practice questions include various forms such as fill in the blank, selection, and judgment, aimed at consolidating students’ understanding of the meaning of fractions.

Teachers should promptly correct students’ exercises and provide targeted feedback. Focus on explaining common problems; Provide individual tutoring for individual students’ problems.

3.4. Summary and Expansion

The teacher guides students to review the content learned in this lesson, summarize the significance of the scores and the names of each section.

Teachers design some extension questions or projects, such as asking students to use scores to represent the age relationship between family members, to guide students to apply the knowledge they have learned to practical life.

4. Conclusions

The design and practice of the first lesson classroom teaching mode based on the characteristics of mathematics is an effective way to improve the quality of mathematics teaching. The design and implementation of teaching processes such as problem scenario introduction, knowledge explanation and exploration, consolidation practice and feedback, and summarization and expansion can stimulate students’ learning interest and thirst for knowledge, cultivate their mathematical thinking ability and self-learning ability. However, optimizing the teaching mode is a continuous process that requires teachers to constantly explore and improve in teaching practice. In the future, we will continue to delve into the relationship between the characteristics of mathematics and classroom teaching models, and strive to build a more scientific, efficient, and innovative mathematics classroom teaching model.

Conflicts of Interest

The author declares that there is no conflict of interest regarding the publication of this article.

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