Primary School Students' Mathematical Abstract Thinking Ability and Its Training Strategy--Taking "Number and Algebra" as an Example

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Abstract: Primary school students are in a period of rapid development of thinking. Primary school mathematics is particularly important for the cultivation of students' abstract thinking ability. The section of *number and algebra* is the most basic and important content in mathematics. This paper takes *number and algebra* as an example to analyze the abstract thinking ability of primary school mathematics and its training strategies, so as to provide some practical guidance for teaching.

Keywords: Mathematical Abstract Thinking; Number and Algebra; Mathematical Thinking; Primary School

Introduction

Mathematics is a scientific language and tool gradually formed by abstract generalization of objective phenomena. It can be seen that mathematics is abstract. It is not only the basis of natural science and technological science, but also plays an increasingly important role in the humanities and social sciences.

For many students, mathematics is the most difficult course in primary school. The cognitive ability of primary school students is mostly in the transition stage from image thinking to abstract thinking. The course of mathematics is highly logical and requires high abstract thinking ability. At this stage, teachers should pay attention to cultivating students ' abstract thinking ability and constantly guide and strengthen it.

Professor Shi Ningzhong believes that the basic idea of mathematics is the idea on which the development of mathematics depends. The development of mathematics depends on three ideas in essence : abstraction, reasoning and model, among which abstraction is the most core. Through abstraction, mathematical concepts and algorithms are obtained in real life, mathematical development is obtained through reasoning, and then the connection between mathematics and the outside world is established through models. [1] It can be seen that the importance of cultivating abstract thinking ability in primary school mathematics. Mathematics has relatively abstract characteristics, so teachers want to systematically cultivate students ' abstract thinking, and a more effective way is to learn mathematics. The core of learning mathematics is to let students learn to master and use mathematical thinking flexibly, and abstract thinking is one of the most important thinking in mathematical thinking.

"Number and Algebra" is one of the most basic course contents in the stage of compulsory education, which runs through the whole process of primary school mathematics learning. This article will take the content of " number and algebra" as an example to analyze the abstract thinking ability of primary school mathematics and its training strategies.

1. Thinking and mathematical thinking

Thinking is the research object of many disciplines. As a psychological phenomenon, thinking is also a high-level form of reactive thinking, which is a dynamic reflection of psychology. Cultivating students ' thinking ability is of great significance in the reform of mathematics teaching in China.

In psychology, thinking is the human brain's generalization and indirect reflection of objective reality, which reflects the essence and internal regularity of things.[2]Mathematical thinking is defined for mathematics, for the scope of mathematical activity. It should

contain the characteristics of general thinking, and should also have special characteristics and relevance different from general thinking. [3]

It is of great significance to cultivate students ' thinking ability in the reform of mathematics teaching in China.

2. Abstract thinking in primary school mathematics

Mathematics is an important part of human culture, and there is mathematics everywhere in life. As one of the important subjects in primary school, the teaching quality of primary school mathematics greatly affects the quality of primary school education.Mathematical literacy is the basic literacy that every citizen should have in modern society. The cultivation of the ten core qualities reflects the importance of abstract thinking both in terms of teaching content and teaching methods.

From the perspective of curriculum content, the essence of mathematics is abstract, and the emergence and development of mathematics is based on abstraction. [4] Cultivating students ' abstract thinking ability is an important goal of primary school mathematics teaching. To cultivate primary school students' abstract thinking ability, through mathematical abstraction, generalization to understand, understand and grasp the essence of things, constantly accumulate experience from concrete to abstract, develop the habit of general thinking problems, and can take the initiative to use mathematical abstraction to solve problems in daily life and learning. [5] From the perspective of teaching, the acquisition of mathematical concepts, the summary of theorems, and the exploration of laws in primary school are inseparable from abstraction.

To sum up, it is especially important to grasp the abstract thinking of primary school mathematics and seize the key period of primary school to cultivate students' abstract thinking ability in primary school mathematics.

3. Abstract thinking ability and its cultivation strategy

The cultivation of abstract thinking ability is carried out throughout the process of cultivating core literacy, which is closely related to the content of learning areas, and the core literacy of number sense, symbolic awareness and arithmetic ability are directly related to the field of "number and algebra".

3.1 Number awareness

Number and number perception are formed in the process of number cognition, which is the basis of mathematics. We can understand from two aspects, one is the process of abstracting the number into the number, and the other is to connect the abstract number with the real situation to understand the meaning of the number.

For example, in the textbook of the Humanistic Teaching Edition, there is no concept of number in the minds of students when they are teaching "Knowledge of 1~5". Although most students know numbers before they start school, it takes a process for students to build up abstract concepts of numbers and relate numbers to the quantities they represent. Teachers use different quantities of objects to stimulate students' interest in learning through the content of the textbook and in the context of reality.

In low-level teaching, the degree of abstraction is low and students are easy to understand. Teachers should combine the learning situation and content to design teaching plans related to life. Students should learn to abstract numbers from specific numbers and exercise abstract thinking ability.

3.2 Number Operations

The operation of numbers is a study based on the understanding of numbers, and the operation of numbers is the operation on abstract numbers.

Students should first understand the arithmetic and grasp the essence of the four arithmetic operations, which should be based on the understanding and understanding of the operation symbols. The symbol is more abstract. Mathematical symbols contain the basic properties of mathematics, are highly abstract, and are the product of mathematical abstract thinking. It can be seen that learning the operation of numbers is of great significance to the cultivation of students ' abstract thinking ability.

For example, in the teaching of " 12 × 3 " in " pen arithmetic multiplication, " teachers can start with simple life problems, turn the color pen into a dot map, and use the dot map and table to guide students to explore the calculation method of " 12 × 4 " independently and deeply, so that students can think independently, communicate and summarize a variety of algorithms. Finally, combined with the difference between the addition formula and the multiplication formula, students gradually clarify the meaning of

each step of the multiplication vertical formula under the multi-angle comparison of the two vertical operations. In the process of independent thinking, students gradually form the abstract thinking of " knowing little things, " which also promotes the integrity of knowledge learning.

3.3 Quantitative relationships

In primary school mathematics, there are two types of important quantitative relationships also known as mathematical models, one is the total model, the other is the distance model.It can be seen that the quantitative relationship is based on the understanding of numbers and the operation of numbers.

The equation is the most abstract concept in primary school. Most textbooks define the equation as an equation with unknown numbers. For this concept, there are two meanings, one is the unknown number, the other is the equality. From number to algebra is a leap in mathematical representation. Number is abstract for the concrete things it represents, and using letters to represent numbers is another abstraction.

For example, in the textbooks of the People's Education Press, in the teaching of " expressing numbers with letters " teachers let students feel the concreteness of " numbers " in the process of counting through the children's songs activities of " counting frogs " that students like and vivid. Students' arithmetic thinking gradually develops into more abstract algebraic thinking, completing the abstraction from quantity to number, and then achieving the abstraction from " number " to " symbol".

4. Summary

As we all know, mathematics is the golden key to cultivating abstract thinking. Teachers should concentrate on teaching. In the classroom of primary school mathematics, they should avoid the use of indoctrination teaching methods. Instead, they should link mathematics with life and inspire students to think independently, which is conducive to the development of students ' abstract thinking ability.

The formation of abstract thinking in primary school mathematics teaching is inseparable from the specific cognition of representation. Through the intuitive perception of image thinking, it finally rises to the understanding of mathematical laws and concepts. In the teaching of primary school mathematics, teachers should make full use of students ' image thinking and present it to students in the form of visualization, so that students can establish a reflection relationship from image to abstract thinking, and their abstract thinking ability can be developed.

No matter what the learning content is, teachers should respect the law of students ' development, design scientific learning tasks, exercise students ' abstract ability, enrich students ' classroom experience, and encourage students to constantly innovate. The cultivation of abstract thinking ability must start from an early age, which can not only provide a shortcut for primary school students to understand mathematics, master mathematics and apply mathematics, but also lay the foundation for cultivating students ' innovation ability, so as to promote the development of students ' core literacy in mathematics.

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