

Exploring the Education of Mathematical Thinking in Mathematics Teaching

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Abstract: Mathematics teaching runs through the process of mathematical thinking. To cultivate students' mathematical thinking mode in mathematics teaching is a necessary means and an important prerequisite to improve students' cognitive level. The level of thinking is to divide the depth of thinking that students can reach. The higher level thinking includes the lower level thinking. Each level of thinking is determined by the number of times that things or events are connected in the middle. Mathematics teaching should focus on improving students' mathematical thinking ability, which is one of the basic concepts of mathematics education curriculum. To cultivate students' thinking ability, it is necessary to explore the level of thinking ability and explore the depth of thinking that students are required to achieve. In the teaching practice of higher mathematics, how to cultivate students' thinking ability is worthy of in-depth study and exploration by every college educator.

1. Introduction

Thinking is the summary and indirect reflection of the human brain on the essential attributes of objective things and the internal relations between things. Mathematics teaching runs through the process of mathematical thinking activities [1]. To cultivate students' mathematical thinking mode in mathematics teaching is the necessary means and important premise to improve students' cognitive level. Mathematics teaching should pay attention to improving students' mathematical thinking ability, which is one of the basic objectives of mathematics education and one of the basic ideas of the new mathematics curriculum [2]. Mathematical thinking has the classification characteristics and intellectual quality of general thinking, but it also has its particularity. The formation of mathematical thinking is not a day's work. In the usual teaching process, we must not only understand the rules and meanings of the teaching content itself, but also the overall concept as a guide [3]. In educators and educated people, the understanding is not completely consistent. Some teachers think that there is not much need, and some students use it as a burden. In educators and educated people, the understanding is not completely consistent [4]. Some teachers think that there is not much need, and some students use it as a burden, which will directly affect the progress and effectiveness of this teaching work.

Mathematical thinking takes the quantitative relationship and the spatial form as the thinking object, the mathematical language and symbol as the carrier of thinking, and a kind of thinking aiming at understanding and developing mathematical laws. Due to the important role of deductive method in mathematics, there is a tendency in recent times to emphasize deduction [5]. This is not conducive to the development of students' creative thinking. To cultivate students' thinking ability, we should explore the level of thinking ability and explore the depth of thinking that students are required to achieve. This is convenient for educators based on the specific reality of the students [6]. Many colleges and universities have offered higher mathematics courses in liberal arts majors one after another, which is a very gratifying thing and also a major event related to the cultivation of high-quality cross-century talents [7]. According to the different objects reflected by mathematical thinking, mathematical thinking can be divided into functional thinking and spatial thinking. It has better operability to formulate quantitative ability objectives, and also provides theoretical basis for teaching evaluation and propositions at all levels. We should constantly excavate the material for cultivating mathematical thinking, and regularly carry out subtle training so that students can gradually consider problems in an all-round way.

2. The Formation Characteristics of Mathematical Thinking

Abstract thinking is a kind of thinking that can get rid of the concrete content of the object of study in order to benefit the research of its general nature. Mathematical Abstract thinking can be further subdivided into analytical thinking, logical thinking and spatial thinking. With the progress of the times, the cause of reform and opening up promotes the rapid development of socialist market economy. There are also many direct applications in liberal arts such as education statistics, education evaluation, psychology, economic management, marketing and other specialties. Therefore, it is considered necessary to offer advanced mathematics courses in these majors. To have a strong ability to distinguish and judge various phenomena in society, we must have a good quality of critical thinking. The factors involved in thinking ability are very wide, and there are many factors that influence the level of thinking. When defining the level of thinking, the factors should be refined and the secondary factors ignored. Inductive thinking is the Abstract thinking of finding common and essential things from many things. More directly from the simple and specific examples, inductive methods are used to anticipate the conclusions of general nature of progress.

Mathematical teaching provides an important means for students to grasp the overall knowledge of mathematics, enabling students to form a unified concept. When students are thinking about mathematics, especially complex mathematics, they can present a holistic image in their minds. Only recognize the reality of reason, do not recognize the reality of experience, thinking that only rationality can be relied upon. The feeling of experience is unreliable, and the mistake of this fact is to reverse the facts. Mathematics is not simply a tool for dealing with practical problems. Mathematics education is a kind of cultural quality education. The agility of thinking, also known as sensitivity, is a factor in describing the speed of thinking response [8]. It can be measured by the time from the problem to the result. Mastering mathematical methods will shorten the process of thinking, make it jump, and reduce the process of mathematical reasoning. Induction is a method of reasoning that some objects of a class of things have certain attributes and all of them have such attributes. In people's understanding and teaching practice, it is easy to overlook the irrational factors in mathematics education.

Mathematics is a science to cultivate students' thinking mode. People are eager for an excellent mathematics teaching. In addition to requiring it to endow the educated with a reasonable knowledge structure, mathematics teaching is also required to maximize the development of students' intellectual level. Divergent thinking is also called diffusion thinking, radiation thinking and seeking differences thinking. In the process of thinking about creating and solving problems, we should not stick to a single point or a clue. Starting from the information we have, we should choose many angles and expand in many directions. The classification of human subjective consciousness structure includes rational and irrational factors. Both logical thinking and Abstract thinking are rational factors. Image thinking, inspiration thinking, etc. are irrational factors. Mathematics mainly explores and studies the objective world from the side of quantity, and any object or thing in the objective world is nothing but the unity of opposites of quality and quantity. In this infinitely complex world, any one or several sets of axioms cannot exhaust all relationships between things. This is not a philosophical conjecture, but a mathematical theorem.

3. Promoting the Development of Students' Thinking

Teachers' teaching methods, teaching modes and teaching arts are different, and students' thinking levels are also different. Thinking itself is bidirectional, and the two opposite directions of thinking are from one to the other and from the other to the other. From the perspective of the law of human thinking activities, human subjective thinking activities can be divided into logical thinking, image thinking and inspiration thinking. Mathematics in the application of the results continue to emerge, the application of increasingly prominent functions. Over time, the inherent character of the tool and the function of the skill education in mathematics education become more and more prominent. A good teaching atmosphere can stimulate students to think positively, improve the teaching effect and improve the enthusiasm of learning. When it is difficult to explore

the possibility, consider exploring the impossibility. Because reverse thinking breaks through the framework of habitual thinking and overcomes the constraints of mindset, it is creative. Learning mathematics requires both logical thinking and image thinking and inspiration. Sometimes it is even more important to make scientific and reasonable assumptions than to give proof, because this scientific hypothesis points out the correct direction in which efforts should be made.

With the development of scientific research and the advancement of technical means, human beings have made great progress in the study of how the brain conducts thinking. In order to cultivate students' creativity, students must understand the essence of mathematics, which requires education in thinking methods when conducting mathematics education. A simple and effective way to analyze the relationship between mathematics learning and mathematical thinking is the hypothesis testing of two independent sample methods. A university math teacher also teaches the same course in three classes. In the student assessment, the teacher's assessment data is shown in Table 1.

Table 1 Student evaluation data of two independent sample means

| Sample size | The average score | Sample standard deviation |
|-------------|-------------------|---------------------------|
| 68 | 83 | 4.8 |
| 62 | 75 | 4.2 |
| 59 | 82 | 5.1 |

Teachers can boldly improve and innovate in the process of teaching. We can insert the irrational thinking factors which are easy to understand in the classroom teaching. Some teachers are accustomed to asking students many questions. On the surface, they stimulate students' thinking. In fact, because the problems are too many and too detailed, there is no time and space for students to think. Teaching is based on the materials and questions provided by teachers or textbooks, through students' own active thinking activities. Explore and discover mathematical concepts, theorems, formulas, and problem-solving methods in person. The way of thinking about the rigorous induction and deduction of mathematics should be carefully cultivated, so that students should be able to clarify the ins and outs of mathematics as a whole. To develop students' rigorous logical thinking skills through some typical proofs.

Human beings first have image thinking, and then gradually form logical thinking after long-term practice training. Inspirational thinking is the thinking activity that connects the media through the intuition of the subject and can acquire new knowledge or creatively apply the original knowledge. No matter which way of thinking to look at the same thing or event, there is a common starting point. We will define the depth of thinking about the reappearance and retelling of things or events at the starting point as first-order thinking. In teaching, we should change closed teaching into open teaching. In the exploration of knowledge, cultivate students' strong interest in finding and solving problems. On the other hand, we should be good at using the art of language, combining with the teaching content, and activate the classroom atmosphere. Let students discuss in class and allow students to express different opinions and opinions. Mathematical methods can also give people inspiration and wisdom in many cases. Logical thinking is a process of indirect generalization of the objective world by using concepts to judge and reason on the basis of perceptual knowledge. In the process of logical thinking, thinking tools play a leading role.

4. Conclusions

Mathematics, as an important basic course, is offered not only to enable students to acquire basic knowledge of mathematics. More importantly, it is necessary for students to acquire corresponding mathematical ideas from different mathematical knowledge to deal with problems. In the teaching of higher mathematics, besides cultivating students' ability of induction, analogy, Abstract generalization, logical thinking and reverse thinking, there are many other aspects. How to better cultivate students' mathematical thinking ability in higher mathematics teaching requires us to constantly explore and practice in the teaching process. This is a long and arduous task. Students

need to have good thinking ability to ensure that teachers should improve teaching methods and promote the development of students' mathematics, Abstract thinking and divergent thinking. Thereby achieving the fundamental purpose of mathematics education. Mathematical teaching activities must achieve the purpose of cultivating innovative talents, rather than cultivating students into machines that can only be calculated. To design a reasonable thinking span, it should be based on the content of the teaching and the actual situation of the students. It can be introduced with a larger thinking span and then gradually reduce the span of thinking.

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