

Research on the Cultivation of Education Master Candidates Based on Improvement of Mathematical Abstract Literacy Cultivation Ability

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Abstract

Mathematical abstract literacy is one of the six components of the core quality of high school mathematics, which runs through the whole process of student learning. The middle school teachers should have mathematical abstract literacy and mathematical abstract literacy cultivation ability. Education master candidates are the future math teacher. Therefore, for the cultivation of education master candidates, colleges and universities should strengthen the teaching of mathematical abstract knowledge, improve the teaching practice ability, improve the ability to find and solve problems and cultivate the mathematics culture so that they have the ability to cultivate the abstract quality of mathematics.

Keywords

Mathematical Abstract Literacy, Cultivation Ability, Education Master Candidates

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1. Introduction

In recent years, the issue of "mathematics literacy" has received widespread attention from the education community. The revision of the high school curriculum standard puts forward six core qualities of high school mathematics: mathematics abstraction, logical reasoning, mathematical modeling, mathematical operations, intuitive imagination, and data analysis. Mathematical abstraction ranks first in the six core qualities. It is not only the basic idea of mathematics, but also an important foundation for the formation of rational thinking. It runs through mathematics and is essential [1]. So what is mathematics abstract literacy? In order to cultivate students' mathematical abstract qualities, what literacy and competence should middle school mathematics teachers have? And how should colleges develop education master candidates? The research of these problems is of great significance to the achievement of the goals of core qualities of high school mathematics.

2. Mathematical Abstraction and Mathematical Abstract Literacy Cultivation Ability

2.1. The Connotation of Mathematical Abstract Literacy

The word "abstract", derived from the Latin "abstracio", means "extracting, extracting". It is generally accepted that "abstraction is the logical method of abstracting one or more attributes of things (scientific abstraction requires the extraction of a particular attribute or essential attribute of things) and removing the other attributes of things in the mind" [2]. "Mathematical abstraction" literacy is a kind of literacy that obtains mathematical research objects through the abstraction of quantity relation and spatial form. It mainly includes: concepts and the relationship between mathematical concepts abstracted from the relationship between quantity

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and quantity and the relationship between figures and figures, the general laws and structures abstracted from the specific background of the object, using mathematical language to characterize it [3].

2.2. The Connotation of Mathematical Abstract Literacy Cultivation Ability

Competence is a combination of stable psychological literacy that guarantees an individual's success in accomplishing certain tasks or performs certain activities. It is a skill that one can test or judge the correctness of facts and turn them into actions. In other words, it is the ability to complete certain activities [4]. The cultivation ability of mathematics abstract literacy means that in classroom teaching, based on the knowledge level and ability level of students, teachers use knowledge as a carrier to allow students to experience the entire process of observation, analysis, abstraction, and generalization established by new knowledge and guide students through the phenomenon to abstract the nature of the problem, so that students learn to learn, learn to think, and then improving the students' ability of mathematical abstract literacy.

3. Requirements for Middle School Mathematics Teachers About Mathematics Abstract Cultivation Ability

3.1. The Teaching Ability of Concepts

The concept of mathematics is a process that through abstracting the nature of mathematical objects in the process of mathematical research. Its refinement often goes through the process of abstraction and generalization from concrete to abstract to concrete. The concept of mathematics is an important carrier for the formation and development of students' mathematical abstract literacy, and the concept learning itself is the process of cultivation of abstract ability. Therefore, in order to cultivate students' mathematical abstract qualities, middle school mathematics teachers should have good concept teaching ability [5].

3.2. The Teaching Ability of Theorems or Rules

The theorem or law of mathematics is a logical system that has been thoroughly tempered. It reflects the internal link between concepts. And it is a compressed knowledge chain. Its discovery and promotion process imply a rich mathematic abstraction process such as plausible reasoning, inductive conjecture and exploration and innovation. It implies the creative methods of solving problems by scientists. It is an important material for students to learn problem-solving, and

it is also an important carrier for student to promote the formation and development of mathematical abstract literacy. Therefore, middle school mathematics teachers should have the teaching ability of theorems or rules [5].

3.3. The Teaching Ability of Application Questions

In the current middle school textbooks, most of the application questions are presented in some real-life situations. In the process of solving problems, students are required to remove interfering sentences, accurately grasp the internal relations of mathematical objects and abstract necessary conditions. Therefore, the process of solving the problem is the process of cultivating students' mathematical abstraction. So, middle school mathematics teachers should have the teaching ability of application questions, so as to improve the students' mathematical abstraction qualities [6].

3.4. The Ability of Mathematical Abstract and Summary

In order to better train students' mathematical abstraction ability, mathematics teachers in middle schools should have a good ability of abstraction and abstraction of mathematics. In this way, teachers can presuppose problems that students may encounter as far as possible. In addition, teachers who have good mathematical abstraction ability can establish a prestige among students and be able to more smoothly carry out teaching [7].

3.5. Systematic Mathematical Knowledge

Cultivating students' mathematical abstract ability is a long-term process, which shows that the cultivation of mathematical abstraction is a systematic project. This also requires that mathematics teachers must be responsible for the architecture of the mathematical concept, understand how mathematics concepts occur and how they develop step by step and grasp the development of mathematical concepts. [8] At the same time, teachers should also clarify the upper and lower knowledge of the mathematical concepts. They should also clarify the status of the mathematical concepts that they are currently learning and grasp the development characteristics of knowledge in the entire knowledge system and local knowledge systems. Therefore, they can understand the development process of mathematical abstraction, comprehend the connotation of mathematical abstraction and grasp mathematical abstraction [9].

3.6. Mastering Multiple Teaching Modes and Strategies

The cultivation of mathematical abstraction cannot rely solely on teaching, and more importantly, on the initiative of students. Therefore, in order to cultivate students' abstract ability,

teachers should update teaching models to stimulate students' exploration and abstract desires. To this end, in the new situation, middle school mathematics teachers can adopt methods such as teaching blanks, problem teaching modes and group cooperative inquiry mode to revitalize the atmosphere of classroom teaching and improve students' desire to explore, thus improving classroom teaching quality [10].

In addition, in the specific teaching, middle school mathematical teachers need to pay attention to the introduction of knowledge to inspire students to analyze, synthesize and abstract the researched objects. At the same time, in the process of designing the situation, the teacher should start from the original cognitive structure of the student and fully consider the factors such as the student's perceptual experience and abstract ability. The design is in line with the actual learning situation of the students. So, students are likely to resonate in the experience and enter the state, which is very important for the students to understand and master the knowledge [11].

3.7. Mathematical Cultural Literacy

To cultivate students' abstract literacy, teachers often need to create situations and need certain materials. Among these materials, mathematics culture occupies a very important status. On the one hand, mathematical culture contains a large number of mathematicians, mathematics history, mathematics thoughts and viewpoints and so on. It provides rich materials for training students' abstract ability. On the other hand, mathematical culture has a certain interest. It is easy to arouse the interest of students and lay a foundation for cultivating students' mathematical abstract literacy [12].

3.8. The Ability to Solve Problems

In the teaching process, teachers often encounter students with low mathematical abstract literacy. These students will have different problems. For example, it is difficult for these students to grasp the essence of things. And it is difficult to abstract the concepts and essences autonomously and find the relationship between numbers and graphs. This requires teachers to find out why students are difficult to abstract, solve problems for students in time and improve students' mathematical abstraction.

4. The Cultivation of Education Master Candidates in Colleges and Universities

The education master candidates refer to the high-level talents who are facing basic education and teaching. Most of the education master candidates are students of this major during the undergraduate period. Through the school theory study,

they have mastered theoretical knowledge and educational management methods. And through a certain amount of professional practice inside and outside the school, they have a certain degree of educational practice ability. However, there are still some education master candidates who are interdisciplinary students. They do not receive systematic and professional related learning and training. Therefore, colleges and universities should set up related disciplines to improve their knowledge and ability. At the same time, with the development of society, the new high school mathematics curriculum standards put forward six core qualities. And in order to cultivate students with six qualities, teachers also need to have relevant knowledge and capabilities. Therefore, as a future teacher, the education master candidates should strengthen the learning of relevant subjects and improve the six literacy cultivation abilities. Based on mathematical abstract literacy, colleges and universities should set up related courses so that education master candidates have mathematical abstraction cultivation abilities.

4.1. Strengthening the Teaching of Mathematical Abstract Knowledge

4.1.1. The Relationship Between Mathematical Concepts and Concepts

Good mathematical abstraction, one of which is to obtain performance concept. Therefore, in order to guide students to obtain concepts, the Education master candidates must in-depth grasp the concepts and the relationship between concepts to form a conceptual system. Therefore, colleges and universities should strengthen the teaching of middle school mathematics related concepts, the development of concepts and the relationship between concepts, so that students can systematically grasp the concept of middle school system.

4.1.2. The Relationship Between Quantity and Quantity

Defining the relationship between quantity and quantity is a prerequisite for improving mathematical abstraction. The Education master candidates must have a deep understanding of the relationship between quantity and quantity, so as to accurately grasp the essence of mathematical objects and improve the mathematical abstraction ability. Therefore, colleges and universities should enable students to master the quantitative relationships that are common in middle schools, and on this basis develop the students' ability to discover quantitative relationships, thus improving students' mathematical abstract ability [13].

4.1.3. The Relationship Between Graphics and Graphics

Like the relationship between quantity and quantity, the relationship between graphics and graphics is also a

prerequisite for improving mathematical abstraction. In order to cultivate students' good geometrical thinking in the future and the ability of abstracting the essence from the graph, the education master candidates must accurately grasp the relationship between graphs and graphs. Therefore, colleges and universities need to set up geometric related courses, such as "Analytic Geometry", etc., to cultivate educational masters to clear the relationship between graphics and graphics [14].

4.1.4. Mathematical Modeling

Abstracting practical problems into mathematical models is an important way to improve mathematical abstraction. Therefore, colleges and universities should cultivate mathematical modeling ability of education master candidates by setting up mathematical modeling related courses and carrying out mathematical modeling contests.

4.2. Combining Various Teaching Methods

4.2.1. Flip Classroom Teaching Mode

At the beginning of learning, students learn about mathematical knowledge through self-study, and then use their own knowledge to apply it in a preliminary way. Once there is a conflict in the application process, knowledge is re-recognized through self-reflection or communication with classmates and teachers. In the classroom, teachers put forward conflict points for students' understanding based on the students' self-study, and arouse students' discussion. In discussions and guidance from teachers, students abstract knowledge, which is a process of deep understanding of knowledge. Finally, students apply knowledge. In this process, students can apply abstract knowledge to practice to consolidate and deepen abstract knowledge [15].

4.2.2. Inquiry Teaching

When students learn concepts and theories, teachers give some examples and questions to allow them to actively explore through thought, observation, experiment, discussion and discover and master their own principles and conclusions. In this teaching mode, students through autonomously abstract the attributes of objective things, discover the connections among them, find out the laws from them, form concepts and establish their own knowledge frameworks, thereby improving the ability of mathematical abstraction.

4.2.3. Project Learning Methods for Teaching

Project learning is a teaching method to solve problems. In the process of project learning, students need to abstract specific issues and then apply abstract thinking and mathematical methods to solve problems. In the course of practice, the situation is more complicated, because the tasks given by the project may need to be completed by multi-disciplinary

cooperation, which has higher requirements for students' abstract thinking [15].

4.3. Improving the Teaching Practice Ability of Education Master Candidates

4.3.1. Improving the Ability of Writing Instructional Designs

Instructional design can improve teaching efficiency and teaching quality. And it is the basis for teaching practice. In order to better cultivate students' mathematical abstract qualities in the future, the education master candidates must first have the ability to write instructional designs and implement the cultivation of mathematical abstraction in teaching. In the design of teaching, the education master candidates first determine the teaching content according to the textbooks and outlines. And then they select the appropriate teaching method according to the teaching content and carefully design each link to form a systematic and logical teaching design. Finally, they ask the instructor for help review changes to determine the final design of teaching [16].

4.3.2. Setting up Simulation Classroom Teaching Courses

After the instructional design has been written, it is necessary to conduct a trial teaching to sublimate the theoretical knowledge into practical ability. In class, let a student play as a teacher and a teacher makes a comment. In this way, the student's teaching ability can be significantly improved, which will lay the foundation for the future entry into the classroom.

4.3.3. Increasing Educational Internship Opportunities

In order to cultivate students' abstract literacy, it is not enough to rely solely on the knowledge and abilities acquired in the school. The most important thing is to look for a training method in the real classroom. Therefore, colleges and universities should give education master candidates opportunities for internships. They can organize education master candidates to come to primary and secondary schools to experience the true atmosphere of the classroom and understand the basics and characteristics of students and allow them to think in time about issues that may be encountered in the teaching process and to think how to deal with them. At the same time, during the internship, the Education master candidates can consult senior teachers, accumulate experience and prepare for future teaching.

4.4. Improving the Ability of Finding and Solving Problems

In practical teaching, there will be many problems. For example, students cannot accurately grasp the concept. Students find it difficult to independently discover the quantitative relationship.

It is difficult for students to establish a conceptual system. Thus, teachers need to find out the problems that students have in their study, identify the nature of problems and provide targeted solutions. Therefore, colleges and universities should train the education master candidates to find and solve problems. Colleges and universities can allow students to put forward their own opinions and countermeasures against certain social issues so as to train students' insights so that they are good at finding and solving problems.

4.5. Cultivating the Literacy of Mathematical Culture

In order to cultivate students' mathematical abstract literacy, teachers need to provide students with certain materials, so that students abstract the essence. And mathematics culture is a very good material, not only increase knowledge, but also improve students' enthusiasm. This requires teachers to have a mathematical cultural quality. Therefore, colleges and universities should set up courses related to mathematics culture, such as "Geometry", "Nine-Chapter Arithmetic" and so on, so that education master candidates can master the history of mathematics at home and abroad, mathematical thought, etc., so as to improve the mathematical literacy of education master candidates [17].

5. Conclusion

In short, based on the training of mathematical abstract literacy, it should be clear that what the ability and quality should be as a teacher and clarify how colleges and universities should cultivate education master candidates to adapt to future teaching. Therefore, from the connotation of mathematical abstraction, mathematical abstract literacy and the ability of mathematical abstract literacy cultivation, this article discusses in detail the abilities and qualities that middle school mathematics teachers should have and how universities should guide education master candidates, in order to cultivate teachers with the cultivation ability of mathematical abstract literacy.

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