

Research on the Cultivation of Mathematics Core Literacy in "Mathematics Wide-angle" Teaching

-- Take the Lesson of "Tree Planting" as An Example

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Abstract

Facing the call of the times, mathematics teachers should actively cultivate students' mathematics core literacy in classroom teaching. Although "mathematics wide angle" in primary school is an excellent position to cultivate students' mathematics core literacy, the current situation of the cultivation of mathematics core literacy in "mathematics wide angle" teaching is not optimistic. Here, taking the lesson of "tree planting" as an example, this paper analyzes the current situation and problems of the cultivation of mathematics core literacy in "mathematics wide-angle" teaching from four aspects: teaching objectives, teaching contents, teaching methods and teaching evaluation. In view of this, teachers can only base on the core quality and formulate the teaching goal of "mathematics wide-angle"; Deeply study the teaching materials and fully infiltrate the teaching of core literacy; Flexible choice of teaching methods to promote the cultivation of core literacy; Only by improving the contents and methods of teaching evaluation and considering the indicators of core literacy can we better cultivate students' mathematics core literacy in "mathematics wide-angle" teaching.

Keywords

Mathematics core literacy; Mathematical wide angle; Current teaching situation; Training strategy.

1. Introduction

In the document "core literacy of Chinese students' development" in 2016, core literacy is defined as the necessary character and key ability for people to meet the needs of lifelong development and social development. Facing the call of the times, teachers should cultivate students' subject core literacy in the teaching of various subjects. Primary school "mathematics wide angle" can provide rich mathematical knowledge and mathematical thinking methods, and has sufficient exploration space and thinking value. Its teaching content permeates the core literacy of mathematics and contains the core literacy of Chinese students' development. This paper will take a normal class "tree planting" taught by Z teacher in Grade 5 of Jingzhou x primary school as an example, analyze the current situation and problems of the cultivation of mathematics core literacy in "mathematics wide-angle" teaching, and put forward the corresponding training strategies.

2. The Necessity of Cultivating Mathematics Core Literacy in "Mathematics Wide-angle" Teaching

2.1. New Requirements of the Times and Society for Talent Training

Socialism with Chinese characteristics has entered a new era. We are facing greater domestic development challenges and more fierce international competition. Now there is an urgent

need for high-quality talents with the ability of application and innovation. With the deepening of the reform of basic education, the word "core literacy" has attracted much attention. The times and society require the cultivation of students' core literacy, that is, mathematics teachers should undertake the cultivation responsibility, cultivate students' mathematics core literacy in mathematics teaching, and gradually cultivate their mathematical thinking quality and key ability, so as to meet the needs of development.

2.2. "Mathematics Wide Angle" Is An Excellent Position to Cultivate Students' Mathematics Core Literacy

The core literacy system of primary school mathematics discipline consists of two levels (Mathematical Thought and method, mathematical content field) and six literacy (abstraction, reasoning, model, computing ability, spatial concept and data analysis concept). "Mathematics wide angle" has rich content and is an important way to help students accumulate experience in mathematics activities and cultivate students' awareness of application and innovation. The "mathematics wide angle" of each theme can develop students' various core qualities and improve students' comprehensive ability in an all-round way. For example, the "tree planting problem" in the first volume of grade 5 takes the life problem of tree planting as the carrier to guide students to independently explore the quantitative relationship in tree planting through observation, conjecture and drawing line segment diagram. In the process of solving practical problems, it can cultivate students' mathematical core literacy such as abstraction, reasoning and computing ability, and spread students' Thinking on the basis of abstract understanding, Through the establishment of mathematical model for knowledge transfer, the problem-solving ideas of "planting trees" are applied to more problems.

3. The Current Situation of the Cultivation of Mathematics Core Literacy in "Mathematics Wide Angle" Teaching

Although "mathematics wide angle" has strong educational value, the current situation of the cultivation of mathematics core literacy in "mathematics wide angle" teaching is not optimistic. Taking a normal class "tree planting" taught by teacher Z as an example, this paper analyzes its training status and problems from the following four aspects.

3.1. The Formulation of Teaching Objectives Has Deviation

"Mathematics wide angle" is not a compulsory and compulsory content stipulated in the curriculum standard, and it does not carry the important task of "double base" goal. Therefore, some teachers do not pay enough attention to their teaching objectives, and there are some deviations in the formulation, as in this case:

Teaching segment 1: Teacher: just now we used the two formulas "total length \div interval length = interval number, interval number + 1 = tree". Please understand the reasoning and meaning of the formula and remember it. Teacher: OK, let's use the formula to solve the problem.

Lesson 2: Teacher: the problem of planting trees planted at both ends is closely centered on four quantities. Total length \div interval length = interval number, interval number + 1 = tree, and they can deduce another three equivalent relations. OK, let's remember Student: review the knowledge points and recite the formulas. Teacher: (check the knowledge) now please copy the equivalent relation to page 106 of the math book. It can be seen that teacher Z pays too much attention to imparting knowledge and skills in the teaching of "tree planting problems". The teaching goal is mainly for students to master the laws of tree planting problems and emphasize the memory and application of formulas. However, she ignores the core literacy value contained in "mathematics wide angle" and fails to guide students to fully think and independently establish mathematical models, In terms of mathematical thinking and activity experience, it needs to be strengthened, and there is no conscious development of students' mathematical

core literacy as one of the teaching objectives, and there is a deviation in the formulation of teaching objectives. In addition, the teacher didn't pay enough attention to the teaching objectives. There were few teaching objectives in teacher Z's teaching plan, and even copying.

3.2. The Interpretation of Teaching Content Is Not in Place and the Research Is Not in-depth

In this class, the textbook created a problem situation of "planting trees", and the whole process progressed layer by layer. The textbook writers were well intentioned, but some teachers' interpretation of the teaching content was not in place and the research was not in-depth, as in this case:

Lesson 3: Teacher: I'll finish my findings quickly. Later, the teacher will report to the students and take out his own draft paper to think about it. Teacher: OK, I'll ask the students to tell me how to get the formula. Students: interval number: $20 \div 4 = 5$, 6 trees; Interval number $20 \div 2 = 10$, 11 trees Teacher: good. Let me ask someone to tell you what you found? What is the relationship between the four quantities of "total length", "interval length", "interval number" and "tree"? Student: total length \div interval length = number of intervals Teacher: OK! Come on, let's verify the data in the table below. Ready, say. Sheng (Qi answer): $20 \div 5 = 4$, $20 \div 4 = 5$, $20 \div 2 = 10$. It can be seen that in the teaching of "tree planting problem", although teacher Z has completed the basic teaching task and is ostensibly guiding students to find, summarize and verify the law, he has not made substantive exploration, but only found the law from the characteristics of digital calculation. The purpose of creating situations in teaching materials is to cultivate the concept of data analysis, develop the ability of intuitive imagination, that is, geometric intuitive literacy, draw the conclusion that five trees can be planted at 20 meters from the drawing, continue to ask the number of trees that can be planted at 25 meters, penetrate the mathematical core literacy of reasoning and calculation, pave the way for summarizing laws, and finally let students abstract general laws, To solve similar problems with larger numerical value and reflect the mathematical core literacy of modeling. It can be seen that the teacher did not have a good understanding of the content and purpose of the textbook, did not interpret the textbook in place, did not make full use of the problem situation to let students accumulate experience in mathematical activities, and did not fully tap the core literacy value contained in the "mathematics wide angle".

3.3. Traditional Teaching Methods and Inflexible Choice

At this stage, in the teaching of "mathematics wide-angle", many teachers still adhere to the traditional teaching methods and cannot choose flexibly. They do not give students enough space to think and explore, which is not conducive to cultivating students' mathematics core literacy. As in this case:

Teaching segment 4: Teacher: This is a path with plants at both ends. What does this figure mean? S: the distance between the two trees is 5 meters. Teacher: OK, that is, the spacing or plant spacing is 5 meters. Look at the picture, two trees are planted every five meters, and another tree is planted every five meters... OK, is it planted here? Sheng (Qi a): plant. Teacher: Yes, now it's planted at both ends, so it's also planted at the end. OK, our total length is 20 meters and the interval length is 5 meters. How many intervals are there in the picture? Sheng (Qi a): four. Teacher: how do you get the number of four intervals? Student (Qi answer): $20 \div 5 = 4$ (PCs.) Teacher: there is an interval every 5 meters in 20 meters. There are several intervals in 20 meters. There are four 5 meters in 20 meters, so there are four intervals. How many trees are there in those four intervals? Sheng (Qi a): five trees. It can be seen that teacher Z has adopted the teaching method and multimedia demonstration method in the teaching of "tree planting problems", focusing on explanation and PPT display. The teacher directly displays the schematic diagram on the PPT to let the students understand the meaning of the diagram and

find the corresponding data through observation. There are too many parts taught and guided by the teacher, and the space really reserved for students to explore is insufficient. The students only accept knowledge in the traditional question and answer, lacking substantive mathematical exploration. In teaching segments 1 and 2, the teacher requires students to solve problems after memorizing formulas. Such a traditional single teaching method is easy for students to master rigid problem-solving methods, which neither respects students' subjectivity nor is conducive to cultivating students' mathematical core literacy.

3.4. The Content and Method of Teaching Evaluation Are Single, and the Core Literacy Indicators Are Not Considered

The teaching evaluation standard of "mathematics wide angle" is not perfect. In terms of evaluation content, teachers are most concerned about students' academic performance, hardly mention the factors of mathematics core literacy, and the evaluation method is also score. For example, when asked about the evaluation standard of teacher Z's "tree planting problem", she replied: "this part is not the focus of the examination, and the examination content is less. Our mathematics team has low requirements for this part, and the examination is good. After all, the core literacy is not easy to quantify and evaluate, but it is really important. We support the development of students' mathematics core literacy."

4. Cultivation Strategy of Mathematics Core Literacy in "Mathematics Wide Angle" Teaching

4.1. Based on the Core Quality, Formulate the Teaching Goal of "Mathematics Wide-angle"

"Teaching objectives have the functions of motivation, guidance and evaluation. Teachers should pay attention to teaching objectives, formulate them on the basis of in-depth interpretation and research of teaching materials in combination with the requirements of curriculum standards and the actual situation of students. The teaching focus of "mathematics wide angle" should be to participate in the process of mathematical activities, experience the process of mathematical knowledge formation, and feel the application of mathematical thinking methods, which requires the formulation of process objectives and the conscious development of students' mathematical core literacy in mathematical activities. For example, based on the core quality, the teaching objectives of "tree planting problems" can be set in the following aspects: knowledge and skills: enable students to understand the quantitative relationship of tree planting problems, experience the formation process of knowledge, and accumulate mathematical knowledge of tree planting problems; Mathematical thinking: in mathematical activities such as conjecture, experiment, abstraction and application, guide students to think independently and experience mathematical ideas such as "turning complexity into simplicity", "combination of numbers and shapes", "one-to-one correspondence"; Problem solving: cultivate students' ability to use mathematical knowledge to solve tree planting problems; Emotional attitude: stimulate students' interest in learning, develop students' key mathematical ability and mathematical core literacy such as reasoning, abstraction, mathematical modeling and operation ability.

4.2. Deeply Study the Teaching Materials and Fully Infiltrate the Teaching of Core Literacy

If teachers want to cultivate students' mathematical core literacy in teaching, they should consciously and comprehensively infiltrate the core literacy. First, teachers should understand the core quality of mathematics and drill deeply into the teaching content. Teachers should first interpret the connotation and framework of mathematics core literacy, read the curriculum

standards in detail, clarify the teaching requirements, and internalize them into their own knowledge to guide the teaching practice of "mathematics wide-angle"; Secondly, carefully study the contents of the teaching materials, analyze the embodiment of the core literacy while grasping the teaching knowledge system, and tap the factors of the core literacy. For example, in the "tree planting problem", we can cultivate students' mathematical core literacy such as reasoning, model, geometric intuition and computing ability; Finally, think about how to infiltrate the core literacy of mathematics and to what extent. Second, teachers should actively create problem situations in teaching, activate and accumulate students' mathematical experience. Good materials and situations can activate students' mathematical thinking and induce students to carry out mathematical inquiry activities, so that the abstract core quality of mathematics is loved by students. Therefore, teachers should reasonably create valuable mathematical problem situations according to students' cognitive level in class to guide students to carry out substantive exploration. For example, in the "tree planting problem", we can take fingers as an example to clarify the "interval length" and "interval number". We can also transfer knowledge through modeling and spread our thinking to similar problems such as installing street lamps, sawing wood and building bus stops, so that students can use mathematical experience and new knowledge to solve more problems, so as to cultivate students' problem-solving and mathematical modeling literacy. Third, teachers should pay attention to mathematical activities and infiltrate the core literacy of mathematics in an all-round way. The formation of literacy depends on students' active participation in mathematical activities and students' self perception and thinking. Therefore, teachers should pay attention to students' independent thinking and problem solving. They must let students experience the process of mathematical activities and experience a process of facing confusion, stimulating thinking sparks, thinking about solutions and constantly exploring, so as to naturally develop the core literacy of mathematics. For example, in the lesson of "tree planting problem", the teacher should let the students experience the process of establishing a mathematical model by drawing a schematic diagram of line segments.

4.3. Flexible Selection of Teaching Methods to Promote the Cultivation of Core Literacy

Teachers should flexibly choose the teaching methods loved by students, stimulate their interest in active learning and promote the cultivation of core literacy. Teachers can add interesting elements such as video, audio and animation to attract students' attention, and guide students to explore new knowledge by organizing discussion, games and practice, so as to cultivate students' core mathematical literacy. Specifically, first, students should carry out independent cooperative inquiry learning. The value of "mathematics wide angle" will be brought into play in students' exploration. Teachers should actively guide students to carry out independent and cooperative exploration, let students experience mathematical activities such as conjecture, proof, discussion, communication and induction, and cultivate mathematics core literacy in the process of solving problems. The second is to appropriately strengthen intuitive teaching. Teachers should actively mobilize students' senses by using pictures, dynamic demonstration and physical operation. In the "tree planting problem", the teacher can first let the students draw a schematic diagram of the line segment by themselves, think about the number of trees, then invite someone to share on the stage, and then make a dynamic demonstration with the help of PPT to make the students' understanding more vivid. Then, the students can exchange and discuss how the tree will change and what the law is when the "interval length" changes, And ask the group representative to report, and the teacher will give appropriate comments and supplements, and finally get the mathematical model with joint efforts. In short, teachers should choose teaching methods flexibly and let go appropriately, so

that students can become the masters of learning, which is more conducive to the cultivation of students' core mathematical literacy.

4.4. Improve the Contents and Methods of Teaching Evaluation, and Consider the Core Literacy Indicators

Teaching evaluation can diagnose teaching activities and strengthen and supervise teachers and students. In the teaching of "mathematics wide-angle", we should improve the contents and methods of teaching evaluation and consider the indicators of core literacy. On the one hand, in terms of evaluation content, it pays attention to the evaluation of students' ability and literacy and the evaluation of learning process. The main content of "mathematics wide-angle" evaluation is not the mastery of knowledge, but the evaluation of ability and literacy. The evaluation should involve the development of students' mathematical thinking ability and mathematical core literacy as far as possible. Core literacy does not appear explicitly in teaching materials and teaching, but is contained in the learning process of teaching content. Students also mainly develop their core literacy in the learning process. Therefore, teachers should strengthen the evaluation of students' learning process based on core literacy. On the other hand, in terms of evaluation methods, we can not only evaluate with test scores, but also use the method of "grade plus comments". For example, in the "tree planting problem", we can grade evaluate the learning process of students exploring the quantitative relationship, including independent thinking, group communication and discussion, answering questions in class, enthusiasm to participate in mathematical activities, etc. In addition, the cultivation of mathematics core literacy is not achieved overnight, but a long-term and gradual process. Students' growth record bag can be established, in which excellent thinking records and comments at each stage can be put.

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