

REFLECTIONS ON THE SOLUTION OF THREE CONTRADICTIONS IN HIGH SCHOOL MATHEMATICS TEACHING BASED ON CORE LITERACY

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ABSTRACT

Core literacy is the essential character and key ability that high school students gradually form in the process of receiving mathematics education to meet the needs of personal life-long development and social development. As a teacher, we should be keen to discover, catch in time, think deeply and analyze the three major contradictions in mathematics teaching in an all-round way so as to help students improve their cognitive structure of thinking and improve their core qualities in mathematics.

Keywords: Core Literacy, High School Mathematics, Three Contradictions, Teaching Thinking

INTRODUCTION

Mathematics discipline's "cultivating morality and cultivating people" refers to taking the core quality of mathematics discipline as the main objective, relying on the internal strength of the discipline, strengthening curriculum consciousness by means of mathematics, enhancing the effectiveness of mathematics education and improving the quality of mathematics. The core task of high school mathematics curriculum reform is to improve students' core accomplishments of six mathematics disciplines: mathematical abstraction, logical reasoning, mathematical modeling, mathematical operation, intuitive imagination and data analysis, and to implement them concretely in all aspects of mathematics teaching.

The disciplinary nature of mathematics is manifested in three inherent properties: formalization, strategy and symbolization. Abstract mathematical knowledge points often make many high school students difficult to understand, although they can accept realistic and intuitive mathematical scenarios, but they can not be integrated into abstract formal thinking; there is no vitality between mathematical exercises and too rational mathematical thinking is difficult to reconcile; high school students' thinking development level has a great impact on the mastery of fine Abstract and huge mathematical symbolic language^[1].

These three contradictions are the important reasons that lead to high school students' difficulties in mathematics learning. The process of mathematics teaching should focus on solving contradictions. Therefore, the central task of middle school mathematics teaching based on core literacy is to solve the contradictions between realistic background and formal model, between strategic wisdom and logical rigidity, and between symbolic language and thinking level. To organize relevant teaching activities in order to better embody the idea of cultivating mathematical core literacy in the process of solving the three major contradictions.

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ANALYSIS OF CONNECTION PROBLEMS AND CAUSES THE SOLUTION OF THE CONTRADICTION BETWEEN REALISTIC BACKGROUND AND FORMAL MODEL

The so-called formal model is one of the main characteristics of mathematics which is different from other disciplines^[1]. Mathematical formulas and theorems such as hyperbolic standard equation, one-variable quadratic equation and Vieta's theorem can be regarded as mathematical models. In mathematics teaching, we should organically link realistic prototype and formal mathematical model, so that students can understand their characteristics and laws, which is crucial to the formation and development of their mathematical thinking consciousness. It is helpful for senior high school students to understand the abstract formal concept by introducing the topic from the corresponding practical background, and it is essential to gradually show the formation process of the mathematical model from the actual background in the link of teaching design.

In order to resolve the contradiction between realistic background and formal model, we advocate the realisation of mathematical theory, which requires attention to the characteristics of mathematical development and avoid the wrong tendency of abstract mathematics in mathematics teaching. Teachers should make clear the basic direction of teaching. By creating realistic background related to mathematical abstract model, they should use some more intuitive and vivid situations, even multimedia animation and other forms. It is close to students' thinking and living habits to show the process of formal abstraction to solve the difficult problem of understanding caused by mathematical theory. Help students to clarify their thinking, establish an intuitive and abstract link, so that students can learn mathematics more efficiently and improve their self-satisfaction. It embodies the core qualities of mathematical modeling, mathematical abstraction and intuitive imagination. The acquisition of mathematical objects should pay attention to the connection between mathematics and reality, as well as the inherent consistency and logical coherence of mathematics, so that students can experience the process of induction and generalization of the essence of things, and improve the quality of mathematical abstraction and intuitive imagination.

SOLUTION OF THE CONTRADICTION BETWEEN STRATEGIC INTELLIGENCE AND LOGICAL STEREOTYPES

While traditional mathematics teaching emphasizes strict logic, it seems a little rigid to over-strengthen the practice of procedural reasoning steps. The conceptual deviation brought by exam-oriented education is also the manifestation of education's eagerness for quick success and instant benefit. Those who think it is a fixed problem-solving and monotonous imitation procedure ignore the exploratory and innovative nature of mathematics learning, totally ignoring the interest, vividness and image of mathematics activities. Over time, students will have the mentality of "what's the use of learning mathematics, and shopping in life will not find derivative function" and so on, which is tired of the complicated mechanical programs of mathematics.

The unique educational function of mathematics subject under the core literacy is mainly to train students' thinking, especially logical thinking, so that students can learn to think, especially to think logically and creatively, so that students can become good at understanding and solving problems. Therefore, in mathematics teaching, teachers should try their best to show the formation process of mathematical theory, gradually enable students to understand

and master the skills and methods of solving problems and thinking strategies, and organically combine the basic level of logical reasoning with the leading level of creative strategies. In the study of mathematical objects, we should pay attention to discovering laws and obtaining conjectures under the guidance of "general concepts". Through the process of mathematical reasoning, argumentation, proving conclusions, theorems and properties, we can improve the quality of logical reasoning and mathematical operation.

To solve problems with mathematical knowledge, we should pay attention to using mathematical concepts to analyze problems, learn to analyze data, mine information from data, and embody the whole process of mathematical modeling literacy^[2]. In addition to the support and development of logic, the characteristics of mathematics include the rigorous and meticulous description of theory and the complete and accurate proof of conclusion. Problem solving is the primary motive force for the development of mathematics. In this process, new ideas emerge, new methods are explored and new mathematical thinking emerges. It can be seen that the combination of mathematical strategy creation and deductive reasoning is an important feature of mathematics teaching.

RESOLVING THE CONTRADICTION BETWEEN SYMBOLIC LANGUAGE AND THINKING LEVEL AND IMPLEMENTING CORE QUALITY

Mathematics is a language with similar characteristics as Chinese. It has its own set of independent symbol system and rigorous expression. Symbolized mathematical language expression with generality, abstractness and conciseness contains rich and profound mathematical thoughts. However, teachers do not pay attention to the cultivation of the ability of using mathematical symbolic language, and pay no attention to the psychological characteristics and thinking rules of high school students in using mathematical language, which often lead to students' cognitive difficulties.

According to the survey, most of the students' difficulties in mathematics learning are due to the cognitive barriers of symbolic language, especially the meaning of newly defined symbols in innovative types of questions. Senior high school students' thinking is in the stage of transforming from experiential level to theoretical level, that is, they still tend to simplify and visualize, their logical thinking level is not high, and their abstract generalization ability is not strong^[3].

In order to better solve the contradiction between symbolic language and thinking level, teachers need to pay attention to the long-term characteristics of the cultivation of mathematical language. They should not rush to achieve it. If students do not fully understand the situation, they should memorize a lot of expressions by rote. This can only cause a heavy burden on memory, but also counterproductive. It should accord with students' cognitive law of thinking from intuition to form and from concreteness to abstraction. Teachers explain it in a spiral-ladder way, stimulate the corresponding problem situation, analyze the source of symbols and the reason of quotation, so that students can get the connection between new symbols and old knowledge, and ultimately achieve the purpose of understanding the essence of symbols and apply them differently^[4]. For example, in the teaching of the concept of function, don't get into the complex problem-solving training too quickly. Emphasis is placed on discrimination: the same correspondence but different definitions are two different functions. Through simple examples, the average walking speed is 5 kilometers and the unit price of goods is 5 yuan. It is easy for students to understand that it has nothing to do with the symbols used, only to see what results the independent variables correspond to. Then they can understand that $y = x^2 (x \in \mathbb{R})$

and $y = u^2(u \in R)$ are the same function, $y = \cos^2 x + \sin^2 x(x \in R)$ and $y = 1, x \in R$ are the same function.

CONCLUDING REMARKS

Mathematics has universal thinking structure and symbolic form of communication. It is logical, concise and precise. It is a way of thinking to understand and deal with the surrounding environment. Mathematics teaching under core literacy is constantly improved and popularized through abstraction, using symbols, establishing models, logical analysis, reasoning and calculation, so as to gain a deeper insight into the inherent relationship of mathematics. Contradictions in teaching activities are inevitable. Teachers should combine teaching content with students' existing thinking characteristics, reflect more, question more, renew mathematics teaching ideas, and base on practical reflection and reflective practice, so as to deal with these contradictions creatively and promote the continuous development of teaching process. What we pursue in mathematics teaching is that when a person walks out of the school, at least the following things remain: application consciousness, innovation consciousness, ideal and belief, imagination and thinking ability, which are integrated into the body and cultivated in the mind.

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