Education Reform and Development, 2024, Volume 6, Issue 6
https://ojs.bbwpublisher.com/index.php/ERD
Online ISSN: 2652-5372
Print ISSN: 2652-5364

Research on Optimization of High School Mathematics Teaching Strategies from the Perspective of Core Literacy Cultivation

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Abstract: Currently, cultivating students' core subject literacy has become an important direction of high school education reform and the main teaching goal of various subjects in high school. As a subject of the college entrance examination and a highly practical high school subject, high school mathematics teachers should also keep up with the advancement to optimize classroom teaching activities, adjust teaching strategies, and cultivate students to form good core mathematical literacy. This article will explore the importance of high school mathematics teaching from the perspective of core literacy, and propose optimization teaching strategies, in order to provide corresponding references for high school mathematics teaching reformation.

Keywords: Core competencies; High school mathematics; Teaching strategies

Online publication: July 12, 2024

1. Introduction

With the deepening of quality education, high school education should not only impart subject knowledge to students but also attach importance to the cultivation of their core competencies. Core literacy encompasses many aspects such as knowledge, skills, emotions, attitudes, and values, and is an essential literacy for promoting students' comprehensive development and adapting to social life. Therefore, in high school mathematics teaching, teachers should not only teach students mathematical knowledge and operational skills, but also cultivate their core mathematical literacy in six aspects: data analysis, logical reasoning, intuitive imagination, mathematical modeling, mathematical operations, and mathematical abstraction. While improving the quality of mathematics learning for students, it also lays a solid foundation for their future learning and life [1].

2. The importance of high school mathematics teaching from the perspective of core literacy

2.1. Enhance students' mathematical learning ability

From the perspective of core literacy, high school mathematics teaching not only focuses on teaching

mathematical knowledge but also pays attention to the internal connections between mathematical concepts. Through this teaching model, students have a deeper understanding of the interrelationships between mathematical concepts. By cultivating core qualities in high school mathematics such as mathematical abstraction, students can have a deeper understanding of abstract mathematical concepts and principles. By possessing this mindset, students can respond more calmly to complex mathematical problems and engage in innovative thinking. Teachers can guide students to apply mathematical knowledge when solving practical problems in life, so that they understand the value of mathematical knowledge in daily life, further enhance their mathematical learning ability, and cultivate good habits of lifelong learning [2].

2.2. Cultivate students' innovative thinking awareness

The cultivation of core literacy in mathematics emphasizes that students should break away from conventional mathematical learning thinking patterns and learn and master mathematical knowledge with innovative thinking. In the process of high school mathematics teaching, teachers should pay attention to cultivating students' logical thinking and critical thinking awareness, guiding them to discover, analyze, and solve problems, thereby improving their mathematical learning efficiency. In addition, teachers should naturally integrate the cultivation of high school mathematics core competencies such as mathematical modeling and data analysis into classroom teaching activities, to cultivate students' ability to solve various complex problems in real life. At the same time, to better improve students' innovative thinking awareness, teachers should also encourage teachers to think independently and explore independently in mathematics learning, thereby improving students' comprehensive quality. In addition, high school teaching from the perspective of core competencies should also guide students to think across disciplines, thereby enhancing their ability to apply mathematical knowledge to solve complex and diverse problems [3].

2.3. Stimulate students' interest in learning mathematics

In high school mathematics, much mathematical knowledge is relatively abstract and difficult to understand, which makes some students find it very difficult to learn. In this regard, teachers should combine mathematics teaching with students' daily lives based on the cultivation of core competencies, so that students can better understand the practical value of mathematical knowledge. For example, teachers can use diverse teaching methods such as situational teaching, group cooperation, and problem-driven approaches to enable students to learn mathematical knowledge in a familiar and life-oriented mathematical context or problem. This will make high school mathematics classroom activities more attractive and can better stimulate students' interest in learning mathematics. At the same time, different students have different personality traits, learning methods, and ability levels. Therefore, teachers should pay attention to teaching according to their aptitude, such as through layered teaching which provides suitable learning content and methods for different students, allowing them to feel the joy and challenges of learning mathematics, and thereby enhancing their enthusiasm and motivation to learn mathematics [4].

3. Optimization strategies for high school mathematics teaching from the perspective of core literacy cultivation

3.1. Using situational teaching to enhance students' data analysis abilities

At present, more and more teachers realize that indoctrination teaching can no longer meet the mathematical learning needs of contemporary students. Teachers need to innovate teaching concepts, use situational teaching, and integrate mathematics teaching with students' daily lives so that students can more intuitively feel the practicality of mathematical knowledge. Teachers should understand the things they are currently interested in

and incorporate them into the design of teaching contexts, allowing students to naturally complete the learning of mathematical knowledge through situational thinking. This can not only stimulate students' interest in learning mathematics, but also help them efficiently understand and master mathematical knowledge, and apply it to solving practical problems [5].

For example, when teaching the chapter on "Plane Vectors and Their Applications", teachers can lead students in a physics experiment in the classroom, such as exploring the motion trajectory of throwing objects and introducing the concept of plane vectors into experimental analysis, explaining to students how vectors are used to reflect direction and size. Next, the teacher needs to have students collect and record experimental data through physics experiments, such as the distance, direction, and speed of object movement, and guide them to think about using plane vector knowledge to represent this data. Finally, in organizing students to explore the application of vector addition and subtraction in this context, teachers can guide students to use vector methods to solve the shortest path, analyze motion trajectories, etc. Through physics experimental scenarios, students not only gain a deep understanding of the basic sense and properties of plane vectors but also develop their data analysis skills and interdisciplinary thinking through practical scenarios, thereby further enhancing their interest in learning mathematics [6].

3.2. Using the problem-driven approach to cultivate students' logical reasoning ability

In high school mathematics teaching, logical reasoning is a core link that plays a positive role in helping students master deeper mathematical concepts and solve more complex mathematical problems. Cultivating students' logical reasoning ability is crucial for their mathematical learning and even their future life development. In high school mathematics classrooms, using a problem-driven approach is an effective teaching method. Teachers assign challenging mathematical problems to guide students to think and use their learned mathematical knowledge to explore and solve problems. During the problem-solving process, students will unconsciously develop their logical reasoning abilities [7].

For example, when learning arithmetic sequences, teachers can ask students several questions that are closely related to daily life during the classroom introduction: "Do you know about bank savings products?", "How to develop a progressive sports training plan?" and so on. Then, teachers can encourage students to have discussions with classmates and encourage them to apply knowledge of arithmetic sequences to analyze and solve practical problems. During the exploration process, teachers should also provide a systematic and comprehensive explanation of the definition, properties, and formulas of arithmetic sequences. In addition, teachers should also provide examples to illustrate the calculation method of arithmetic sequences and their application in solving problems. For example, by using a set of gradually increasing or decreasing data and requiring students to calculate the total amount at a certain time or the value at a certain location. On this basis, it will stimulate students to think and explore the relationship between arithmetic sequences and other mathematical concepts, such as the correlation between sequence summation and the concept of integration. Throughout the entire teaching process, students can not only understand the basic concepts and properties of arithmetic sequences but also exercise and improve their logical reasoning abilities in practice [8].

3.3. Introducing information technology to enhance students' intuitive imagination ability

In the Internet era, high school mathematics teaching methods and means are also improving. The introduction of multimedia, network teaching resources, online teaching platforms and other modern teaching methods can effectively improve and enrich the quality of high school mathematics teaching. Introducing information technology into high school mathematics teaching can make abstract mathematical concepts more intuitive, thereby enhancing students' enthusiasm for learning. At the same time, by using various multimedia interactive teaching methods, it is also possible to better attract students' attention, thereby improving teaching

effectiveness and achieving the goal of strengthening students' intuitive imagination ability [9].

3.4. Using group collaboration to guide students in mathematical modeling thinking

In today's era, mathematical modeling is a very important skill. In this regard, teachers can guide students to learn how to apply mathematical knowledge to solve more complex problems through project-based teaching, so that they can achieve comprehensive development in their future learning and life. In high school mathematics teaching, project-based teaching is highly favored by teachers and students. It can not only enhance communication and interaction between teachers and students but also provide a platform for solving practical problems. By solving specific mathematical project problems, students can understand mathematical concepts in project exploration and apply them to solve practical problems, thereby deepening their understanding and mastery of these mathematical concepts knowledge [10].

For example, when teaching on the chapter "Derivatives of Univariate Functions and Their Applications", teachers can design topics such as "Studying how objects change their motion speed over time" and "Exploring the growth rate of a company's profits." Teachers can assign specific tasks to students, such as data collection, function modeling, derivative analysis, etc. Before the course starts, they can explain some basic concepts of derivatives of univariate functions to students, such as the definition, calculation methods, and basic properties of derivatives. Then, teachers should guide students to collect information and data related to time, speed, profit, etc. while using this information and data to construct a mathematical model of a univariate function. At the same time, teachers should also teach them how to calculate the derivative of the model, and explain the importance of the speed and growth rate of the derivative in real-world problems. Finally, teachers can have students report project results in groups and engage in communication in the classroom. In the teaching process, teachers should also pay attention to evaluating the completion of projects in each group and provide corresponding feedback, so that students can better understand their shortcomings in mathematics learning, and thus consolidate and improve in a targeted manner [11].

3.5. Using layered teaching to enhance students' mathematical computing abilities

During the tense and competitive high school period, students' mathematical abilities also showed a clear "stratification." In this regard, teachers can use the layered teaching method to provide teaching and practice content that is suitable for different students' mathematical learning levels, so that each student can gain mathematical knowledge and improve their abilities. Taking the teaching of the chapter on "Arithmetic Sequences" as an example, teachers can design mathematical problems with varying degrees of difficulty to train students in mathematical operations. For students with relatively weak mathematical skills, they can focus on learning and mastering the basic concepts and formulas of arithmetic sequences. However, for students with moderate abilities, teachers should guide them to understand and comprehend formulas, and then solve problems on their own. On the other hand, for students with higher mathematics levels, teachers should encourage them to deepen their understanding of arithmetic sequences and how to use them to solve real-life problems through methods such as progression and transformation, based on mastering basic concepts and applications. In this way, each student can make corresponding progress, thereby achieving effective improvement in the mathematical calculation ability of the entire class [12].

3.6. Innovating mathematics homework design and developing students' abstract thinking in mathematics

In the traditional high school mathematics teaching process, teachers often use massive exercises to help students master some mathematical knowledge so that students can better master problem-solving methods.

This approach not only restricts the development of students' thinking but also makes it difficult for their mathematical abstract thinking to be effectively developed. So, teachers need to innovate in math homework design. In mathematics homework, it is possible to creatively add problem-solving assignments to guide students in learning how to speak. This learning method is highly efficient because when solving problems, students will fully express their thinking ideas and can mobilize their independent thinking and logical reasoning, thereby promoting the development of mathematical abstract thinking in students. At the same time, when answering questions, students will engage in in-depth thinking about mathematical problems, thereby achieving analogies, strengthening their understanding of the concepts and properties contained in mathematical problems, and effectively improving their mathematical abstract thinking. Therefore, solving problems is a feasible and effective way to cultivate students' mathematical abstract thinking. In practical teaching activities, teachers can encourage students to answer questions according to their ideas after completing them, and during the process of answering questions, they can think out of the box and find other ways to solve such problems. As the saying goes, "Problems speak." Only by focusing their attention on analyzing the conditions and problems can students understand the expression of the problem, streamline their thinking process, and develop their mathematical abstract thinking. Discussing problems helps students better understand the essence of mathematics. Regardless of the changes in mathematical problems, they can correctly grasp the methods to solve corresponding mathematical problems, thereby simplifying mathematical problems, and enhancing students' confidence and learning efficiency [13-15].

4. Conclusion

In summary, to effectively achieve the educational goal of cultivating students' core mathematical literacy, teachers should innovate and integrate six aspects of mathematical core literacy, including data analysis, logical reasoning, intuitive imagination, mathematical modeling, mathematical operations, and mathematical abstraction, into high school mathematics teaching syllabus. Through teaching strategies such as situational teaching, problem-driven learning, information technology, group collaboration, layered teaching, and innovative homework, students can achieve comprehensive development of their overall quality while learning mathematical knowledge.

Disclosure statement

The author declares no conflict of interest.

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