

Research on teaching strategies based on core literacy of mathematics subject in colleges and universities

Linxiang Guo

Gansu University of Political Science and Law, Lanzhou 730070, China

Abstract: In the background of today's higher education, improving students' comprehensive literacy and core competence has become one of the important tasks of education. As a basic science subject, mathematics plays an important role in higher education. However, there are still some problems in the current teaching of mathematics, such as paying attention to memory while neglecting ability training, and lacking of connection with practical application. Therefore, it is very urgent and important to study how to improve the core quality of mathematics subject in colleges and universities through teaching strategies. The purpose of this study is to explore the teaching strategies based on the core literacy of mathematics in colleges and universities, so as to improve students' comprehensive literacy of mathematics and problem-solving ability. Through in-depth research on the effects of different teaching strategies, we can provide targeted teaching methods and guidance for mathematics education in colleges and universities, and promote the all-round development of students' mathematical ability.

Key words: colleges and universities; Mathematics; Core literacy; Teaching strategy

1. The theoretical framework of mathematics core literacy

1. The definition and connotation of Mathematics core literacy

Core literacy of mathematics discipline refers to a series of basic abilities and knowledge structure that students need to have in the process of learning mathematics. Its concept and connotation mean that students should have the ability of mathematical thinking, mathematical problem solving ability, mathematical modeling ability and mathematical application ability. These qualities not only include the mastery of mathematical knowledge, but also involve the application and innovation of mathematics, which can cultivate students' mathematical inquiry consciousness and problem solving ability. Students need to have the basic mathematical ability and knowledge, as well as the attitude towards mathematical thinking in the study of mathematics.

The definition and connotation of mathematics core literacy can be explained from three aspects: discipline category, cognitive level and learning process. From the perspective of the subject category, the core literacy of mathematics includes the basic mathematical concepts and operation ability, as well as the ability to solve mathematical problems. Students need to master the basic knowledge of mathematics, such as number concepts, algebraic operations and geometric shapes, and at the same time, they also need to have the ability to analyze and solve mathematical problems, such as problem modeling, reasoning and proof. Secondly, from the perspective of cognitive level, the core literacy of mathematics requires students to have a solid basic knowledge of mathematics and be able to conduct in-depth mathematical thinking and reasoning. Students need to have clear mathematical logical thinking ability, be able to use mathematical methods and principles to solve practical problems, and abstract and popularize. From the perspective of learning process, the core quality of mathematics requires students to have a positive learning attitude and learning methods. Students need to be able to take the initiative to participate in the learning activities of mathematics, develop the ability of independent learning, and have the ability to solve learning problems and difficulties.

2. The components of core literacy in mathematics

The components of core literacy in mathematics include mathematical knowledge, mathematical thinking and mathematical ability. Mathematics knowledge is the basic content of mathematics concepts, theorems and methods that students need to master in the study of mathematics. Mathematical thinking includes mathematical logic thinking, mathematical problem solving thinking and mathematical model building thinking. Mathematical ability refers to the practical ability that students need to have in the study of mathematical subjects, such as calculation ability, reasoning ability and proof ability.

3. Principles for the development and cultivation of the core literacy of mathematics

The development and cultivation of core literacy of mathematics subject need to follow certain principles. First of all, cultivate students' interest and love for mathematics subject, and improve their learning effect by stimulating students' learning motivation. Secondly, we should pay attention to students' solid grasp of basic knowledge of mathematics to lay a foundation for cultivating core literacy. At the same time, we should pay attention to cultivating students' mathematical thinking and problem-solving ability, and cultivate students' innovative spirit and ability by carrying out mathematical exploration and practical activities. Finally, students are encouraged to cooperate in learning and communication, and to promote the development of students' literacy through teamwork and discussion. The cultivation of mathematics core accomplishment is of great significance to the improvement of college students' comprehensive quality and employment competitiveness. The core literacy of mathematics can help students cultivate logical thinking, problem analysis ability, improve students' ability to apply mathematics and solve practical problems. In real life, the core literacy of mathematics also has a wide range of application prospects, such as the application of mathematics in finance, engineering, computer science and other fields need to have a certain core literacy of mathematics.

Through the above discussion, we can deeply understand the theoretical framework of mathematics core literacy, and provide theoretical guidance and practical reference for teaching strategies based on mathematics core literacy in colleges and universities. In the following research, we will further explore the specific teaching strategies, as well as the problems and solutions that may be encountered in the implementation process, so as to improve the teaching quality and effect of the core literacy of mathematics in universities.

2. The theoretical basis of teaching strategies based on the core literacy of mathematics in colleges and universities

1. The concept and classification of teaching strategies

Teaching strategy refers to the specific methods and means adopted by teachers in order to achieve educational goals. In the teaching process, teachers can choose different teaching strategies according to different goals and characteristics of students. According to the characteristics and uses of teaching strategies, they can be divided into direct teaching strategies and indirect teaching strategies, as well as some commonly used specific teaching strategies, such as induction, deduction, heuristic and so on.

2. The relationship between mathematics core literacy and teaching strategies

The core literacy of mathematics refers to the basic ability and way of thinking that students should have in mathematics. The teaching strategy is the means to achieve the teaching goal, and the mathematics core accomplishment is the embodiment of this goal. Teaching strategies should match the needs of students' core literacy. Through appropriate teaching strategies, students can be promoted to cultivate and improve core literacy in mathematics, so that they can better develop mathematical thinking and problem-solving ability.

3. The characteristics of teaching strategies based on the core literacy of mathematics in colleges and universities

The teaching strategies based on the core literacy of mathematics subject in colleges and universities are comprehensive, personalized, practical and reflective. In mathematics education in colleges and universities, teachers can design and choose appropriate teaching strategies according to these characteristics, improve students' mathematics core literacy level, cultivate their mathematical thinking and innovation ability, and lay a solid foundation for their future study and research.

(1) **Comprehensiveness:** The teaching strategies based on the core literacy of mathematics in colleges and universities should focus on the cultivation of students' comprehensive abilities, including the understanding and application of mathematical concepts, the ability to solve problems, and the development of mathematical thinking.

(2) **Personalization:** Teaching strategies should be designed according to students' personality characteristics and learning needs, and pay attention to cultivating students' independent learning and innovation ability, so that each student can give play to their own advantages and potential.

(3) **Practicality:** The teaching strategy based on the core quality of mathematics subject in colleges and universities should pay attention to the combination of mathematical knowledge and practical problems, and cultivate students' mathematical application ability and the ability to solve practical problems through practical activities.

Reflective: The teaching strategy should encourage students to reflect on and summarize the learning process, stimulate students' self-evaluation and self-adjustment ability, and promote students' initiative and learning motivation.

3. The design of teaching strategies based on the core quality of mathematics in colleges and universities

1. Clear learning objectives

In the design of mathematics teaching strategy, an important step is to clarify the learning objectives and ensure that these objectives can meet the requirements of the core quality of mathematics in colleges and universities. Learning objectives should include knowledge, skills and attitudes, and be in line with the actual needs of students. By setting clear learning goals, students can be guided to fully develop in mathematics subjects and improve their core literacy level. The improvement of mathematics teaching strategies in colleges and universities also needs the joint efforts of teachers and schools. Schools can provide corresponding training and support to create a good teaching environment for teachers. At the same time, teachers also need to constantly learn updated mathematics teaching knowledge and skills, and actively participate in teaching research and communication. Teachers should also actively participate in educational research, pay attention to the development of frontier areas of education, and constantly broaden their educational horizons. In addition, teachers can strengthen cooperation with their peers to discuss educational issues, share teaching experience and jointly improve their professionalism. The transformation of teacher's role and the improvement of professional accomplishment are the cornerstones of mathematics teaching in colleges and universities under the core accomplishment. Teachers need to change from knowledge imparts to students' learning guides, and constantly improve their educational theory and teaching ability to meet the needs of mathematics teaching in colleges and universities. From the perspective of pedagogy, this kind of role change is a manifestation of the constructivist educational theory, which aims to stimulate students' learning initiative and creativity, and cultivate their critical thinking and problem-solving abilities.

2. Curriculum and teaching content organization

The design of teaching strategy based on the core quality of mathematics in colleges and universities needs reasonable course setting and teaching content organization. Teachers should design teaching plans that meet the requirements of core literacy according to students' learning background and ability. At the same time, the organization of teaching content should reflect the goals and requirements of core literacy, pay attention to the combination of theory and practice, so that students can understand and apply mathematical knowledge from

different perspectives, and cultivate their innovative thinking and problem-solving abilities. Teachers should focus on cultivating students' ability to cooperate and communicate. Mathematics teaching in colleges and universities should create opportunities and environments for cooperative learning. Through group cooperation, team projects and other forms, students can learn and communicate with each other in interaction and improve each other's mathematics learning level.

3. The selection of teaching methods and teaching resources

The choice of teaching method is very important for the design of teaching strategy based on the core quality of mathematics in colleges and universities. Appropriate teaching methods can stimulate students' interest in learning and improve their learning effect. Teachers should constantly update their teaching ideas and focus on cultivating students' mathematical thinking ability and creative consciousness. They can try novel teaching methods and teaching resources, such as using information technology means to assist teaching, designing challenging and inspiring math problems to encourage students to think and explore independently. When choosing teaching methods, they can adopt diversified teaching strategies, such as lecturing, discussion, experiments, case studies, etc., to meet the needs of different students. By adopting diversified teaching methods, such as heuristic teaching, case teaching and problem solving teaching, students' interest in learning can be stimulated and their mathematical thinking ability and problem-solving ability can be cultivated. In addition, teachers play a key role in the teaching process. They should play the role of facilitators and facilitators, guide students to take the initiative to participate in learning, and establish an interactive and cooperative learning environment. In addition, modern educational technologies and teaching resources, such as multimedia teaching and Internet resources, can also be utilized to provide a richer and more diverse learning experience.

4. Evaluation and feedback strategies

Evaluation and feedback strategies should be considered in the design of teaching strategies based on the core literacy of mathematics in colleges and universities. Teachers should use a variety of assessment methods, including assignments, exams, projects, etc., to evaluate students' learning outcomes. The evaluation results should be fed back to students in a timely manner, and personalized guidance and suggestions should be provided to help them improve their learning methods and solve existing problems. Through effective evaluation and feedback, teaching strategies can be constantly adjusted and improved to improve students' learning effect and core literacy level.

4. Conclusion

College mathematics teaching strategy plays an important role in cultivating students' mathematics core accomplishment. In this study, we mainly focus on the teaching strategies based on the core literacy of mathematics in colleges and universities. Although we have made some valuable research findings in this study, there are still some problems that need to be further explored. In future studies, we can further explore the relationship between core literacy of mathematics and other teaching fields, such as Chinese, English, etc., and further study the intersection and integration of different disciplines, which will help improve students' comprehensive literacy across disciplines.

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