*IOSR Journal of Research & Method in Education (IOSR-JRME)*
*e-ISSN: 2320–7388, p- ISSN: 2320-737x Volume 13, Issue 1 Ser. I (Jan. – Feb. 2023), 34-38*
*www.iosrjournals.org*

# Core literacy-oriented mathematics review teaching strategies

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***Abstract**: Mathematics review course is an important lesson type in mathematics teaching. The mathematics review directed by core literacy mainly includes two aspects: knowledge combing and knowledge application. Teaching strategies of knowledge grooming: students comb independently before class, students work in small groups to sort out in class, and teachers ask questions to sort out knowledge in class. Teaching strategies for knowledge application: organize students' hands-on practice and promote the accumulation of students' experience in mathematical activities; Design variant exercises to promote students' thinking to a deeper level; Infiltrate mathematical thinking methods and lead students to understand the charm of mathematics.*
***Key Word**: core literacy; Math Review; Teaching strategies.*

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Date of Submission: 27-12-2022 Date of Acceptance: 07-01-2023

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## I. Introduction

With the advent of the information age, the development of students' core literacy has become an important topic in education research. The core literacy of mathematics is condensed into "three skills", that is, they can observe the real world with mathematical eyes, think about the real world with mathematical thinking, and express the real world in mathematical language. The cultivation of mathematics core literacy requires students to master mathematical knowledge and the ability to solve real problems as the starting point and ending. Therefore, the teaching activities carried out by teachers should grasp the basic essence of cultivating the core literacy of mathematics. Mathematics review course is a complex mental activity that uses higher-order thinking such as analysis, synthesis, evaluation and creation to deeply process and generate meaning to previously learned knowledge. The review process directed by core literacy is committed to promoting the profound transformation of mechanical memory and fixed thinking in students' cognitive structure to systematic understanding, flexibility and flexibility. [1] In mathematics teaching, review courses are a common and important type of lessons, and the general teaching content mainly includes two parts: knowledge combing and knowledge application. In the knowledge combing of review courses, there are often single methods, and the method of knowledge combing cannot be flexibly selected based on the knowledge content and student characteristics; In the teaching of knowledge application, there is too much attention to the training of question types, problem-solving skills and methods, and neglects the experience of students' mathematical activities, the improvement of higher-order thinking and the penetration of mathematical thinking methods. [2] [3] In the teaching of mathematics review courses, only by mastering more teaching strategies of knowledge sorting and knowledge application can teachers make the teaching of review courses play a role in checking and filling gaps, reflecting and improving, improving abilities and developing students' core literacy.

## II. Knowledge grooming strategies under core literacy

In students' learning, the structuring of knowledge is very important, as the famous educator Bruner once pointed out: "No matter what subject we choose to teach, it is important that students understand the basic structure of the subject". In the teaching of mathematics review courses, knowledge sorting helps students' knowledge to "form a network and connect into pieces", so that students' knowledge structure is more systematic and stable. From the perspective of etymology: combing is to categorize and analyze things to make them organized. Combing is different from "tidying", for example, there are a lot of items in the cabinet messily, tidying is to put things right, and combing is to put the items right while classifying them according to the function, size or value of the items. [4] General knowledge combing is to use specific methods and tools to systematically organize and reflect, and finally form a structured knowledge system. Knowledge combing can be carried out at multiple levels, including knowledge skills and thinking methods, and the entire knowledge combing needs to narrate the process of "from thick to thin" and "from thin to thick". Therefore, no matter what kind of combing method, we should use various charts and tables as much as possible to systematically process knowledge to achieve the requirements of visualization of knowledge structure and clear knowledge context. [5]

*2.1 Students comb independently before class*

Students are the main body of learning, and student learning should be a lively, active and individualized process, and constantly developed in the process of actively participating in learning activities. [6] Warming up the past and learning the new is the expression of students' consolidation and deepening of knowledge, and students' acquisition of knowledge must be based on their own thinking. Modern cognitive psychology believes that only by participating in teaching practice and problem exploration can students establish their own cognitive structure, flexibly apply the knowledge they have learned to solve practical problems, and make discoveries and innovations. [7] Therefore, teachers need to let go of students to experience some learning processes in the teaching process, and in the review course teaching, students can first sort out their own knowledge system, summarize the easy points, etc., which not only helps to mobilize students' enthusiasm and initiative in learning, but also stimulates students' interest in learning.

Students' independent combing of knowledge is that students independently sort out chapter knowledge through methods or tools such as mind maps, structure diagrams, and concept maps. This method of grooming requires teachers to assign specific tasks some time before the review class, so that students can use the after-class time to sort out the knowledge of the units they have learned. In this process, students can draw their own knowledge structure map by hand or software. For the tools that may be used in knowledge combing, teachers can encourage students to learn by themselves, or they can explain in the classroom, for example, some students are used to using mind maps to sort out, teachers need to make a certain introduction to the types, characteristics, applicable objects, etc. of mind maps before, so that students with conditions can use them effectively. Compared with other forms of combing knowledge, students have more time to sort out knowledge independently, and the space is more open, in this process, students can re-read textbooks, can also consult teaching materials, and can also collect useful information through the Internet if possible, so this combing method will have a good exercise for students' independent learning ability and ability to summarize and summarize.

When students complete the knowledge sorting independently, teachers should use it as an important teaching resource in the review class teaching and evaluate it appropriately. First of all, because the students' combing of knowledge is completed individually, affected by the individual's understanding of knowledge and the overall grasp of knowledge, it is inevitable that inaccuracies or incompleteness will occur in the combing of knowledge. Secondly, students' independent grooming often shows personalized colors, and in the review class, teachers can choose the content and form characteristics to display in the classroom to play a role in motivation and demonstration. Finally, while showing students' combing works, it is best for teachers to give their own combing of the knowledge of this unit, so that students can find themselves overlooked or omitted in the combing process through comparison, so as to help students better connect the knowledge they have learned and form a systematic, networked and structured knowledge system.

*2.2Students in class work in small groups*

Cooperative learning is an important learning method advocated by the new mathematics curriculum, which is a learning method that works in small groups to achieve learning goals through interaction between individuals and groups. Cooperative learning is not only conducive to promoting the cultivation of students' sense of cooperation and critical awareness, but also improves students' cooperative communication ability and promotes the construction of students' mathematical knowledge. [8] In the classroom, students' group cooperation to sort out knowledge is one of the important forms of cooperative learning in mathematics. It is based on the group, on the basis of independent thinking of the group members, the group determines the combing tools, and all the team members review and sort out the knowledge together.

In class, group cooperation to sort out knowledge generally goes through the following steps: First, the teacher puts forward the content of the combing and puts forward requirements for the group. Before the group works to sort out the knowledge, the teacher should put forward clear tasks for each group, including time, the scope of knowledge combing, the presentation form, etc., so that each group member is clear about the tasks and goals of their group. Second, the group members think independently before discussing and communicating. The famous mathematician Chen Shengshen said: "Mathematics is the product of one's own thinking, first of all, you must be able to think and exchange your own opinions with the opinions of others, in order to have good results." Therefore, before cooperating in grooming, each team member should have their own thinking and propose the grooming tools and content framework that they think are appropriate. Through the collision of different ideas, comparison, analysis and exchange are formed to form the knowledge combing system of this group. Finally, the group debriefed and exchanged. After each group completes the grooming work, the teacher asks each group or part of the group to show the results of their group, and after one group report, other groups can ask questions or comment, and the teacher makes a final summary on the basis of the group report.

Student group cooperation to sort out knowledge not only cultivates students' ability to cooperate and communicate, but also systematizes scattered knowledge through mutual exchange and promotes the formation

of a learning community. When using student group cooperation to sort out knowledge, teachers should give the group enough time so that each member can have enough time for discussion and communication. At the same time, during the discussion of students, teachers should carefully observe the progress of each group and give timely guidance. Some groups use words when summarizing the triangle congruence determination theorem, while others use concise mathematical symbols similar to "SAS", compared with the latter that not only saves time but also is clear and intuitive. When teachers find various problems in the group's combing knowledge, they should remind other groups to learn from it in time to improve the efficiency of group cooperation in sorting out knowledge.

*2.3 Teachers ask questions in class*

In the new teaching of mathematics, the knowledge points of a lesson are more concentrated and distributed in points, but for mathematics review courses, it is necessary to integrate the relevant knowledge in a unit based on a certain logical main line to form a networked and structured knowledge system. In some review class teaching, some teachers consider that the knowledge content is relatively complex, and if it is more time-consuming for students to sort out, they take the method of asking questions to sort out the knowledge with students. In mathematics teaching, teachers are not only the imparters of knowledge, but also the organizers, guides, and collaborators of mathematics learning activities. By showing the rough knowledge framework and constantly refining and improving the knowledge structure through questions, teachers can not only check students' understanding and mastery of the knowledge of this unit, but also play a guiding role in students' thinking, help students effectively sort out the knowledge context of this unit, grasp the key points of learning, and greatly improve the efficiency of knowledge combing. In the process of teachers asking questions and students answering, in mathematics teaching, asking questions is an important way for teachers to interact with students, under the guidance and inspiration of teachers, students' understanding of knowledge will be more in-depth, and teachers can also supplement teaching in time for questions that appear in students' answers. At the same time, because the student's knowledge system is not very complete, its answer to the question may have a certain gap with the teacher's presupposition, which requires the teacher to evoke students' memories and connections to knowledge through follow-up questions, and promote students to structure the knowledge they have learned. Teachers guide students to sort out knowledge through questions, to achieve careful presupposition, design the basic framework of the knowledge structure diagram, and at the same time design the key content into question strings, and clarify the logical relationship and internal relationship between each part of knowledge by allowing students to answer several main questions. Teachers should help students grasp the knowledge structure and key content of this unit through asking questions, and discover the problems existing in the learning process of students in time, so that students' unclear concepts can be clarified and scattered knowledge can be systematized.

## III. Knowledge application strategies under core competencies

Mathematics teaching should not only develop students' "four basics", but also cultivate students' awareness of mathematical application, improve students' ability to find and propose problems, analyze and solve problems, in the review course teaching, knowledge combing and knowledge application are closely linked, students only master systematic knowledge is possible to flexibly apply knowledge to solve problems. In the teaching of knowledge application, in addition to organizing some typical examples for explanation, teachers should also organize hands-on practice, design variant exercises and reflection, so that students can accumulate more experience in mathematical activities and comprehensively improve in mathematical thinking methods and other aspects.*3.1 Implement deep learning in mathematics units, review knowledge and tease teaching strategies.*

*3.1 Organize hands-on practice to promote the accumulation of students' experience in mathematical activities*

The application of knowledge in mathematics review courses should not only pay attention to the improvement of students' problem-solving ability, but also pay attention to the accumulation of students' experience in mathematical activities. Math activity experience is a characterised experience that students gain through hands-on experience of math activity. Helping students accumulate experience in mathematical activities is an important goal of mathematics teaching, although there are various forms of mathematical activity experience in teaching practice, they must be gradually accumulated and accumulated in the process of "doing" and "thinking". [8] Compared with the new course, the review course has a certain comprehensiveness, providing a good time and space for students to accumulate experience in mathematical activities, teachers can design interesting mathematical activities around a certain knowledge or method, so that students can accumulate activity experience in hands-on practice and improve their understanding and awareness of the mathematical knowledge they have learned. For example, in the "triangle" unit review class teaching, when explaining the problems of a pair of congruent triangles, some teachers take out the two congruent triangle

cardboards prepared in advance and paste them on the blackboard, and constantly change the position of the two triangles by rotation, translation, etc. for students to observe, and at the same time, students are also required to cut two congruent triangles by themselves and try to place them to see what congruent triangles can be placed in common, and draw corresponding figures. The teacher's question immediately aroused the students' interest, and each student began to do the work and draw a variety of graphics. On this basis, the teacher also asked the students to place "co-lateral and co-angular" congruent triangles. Finally, the teacher summarized the congruent triangles drawn by the students with "common point, common side and common angle", so that the students had a more systematic understanding of common congruent triangle types.

The teacher organized students to practice and draw congruent triangle type activities, so that students experienced the process of how one triangle can obtain another identical triangle by translation, flipping (symmetry) or rotation, deepening students' understanding of the concept of congruent triangle, improving students' understanding of triangle congruence and graphic transformation, allowing students to master the transformation characteristics of different types of triangle congruence, so that students have accumulated rich activity experience in triangle congruence and graphic transformation. The core mathematical literacy such as mathematical abstraction and intuitive imagination has been cultivated. More importantly, with these basic mathematical activity experiences, students can quickly find congruent triangles and their corresponding sides and angles through geometric intuition, reduce thinking resistance, and lay the foundation for subsequent calculations or proofs. In short, sharpening knives do not cut wood by mistake, teachers should dare to give students time for activities in the teaching of review classes, let students experience various hands-on practical activities, accumulate rich experience in mathematical activities, so that students can communicate the connection between different knowledge through review, and improve the ability to identify graphics, analyze graphics and solve problems.

### *3.2 Design variant exercises to promote students' thinking to a deeper level*

Variant practice is a teacher who makes appropriate changes to the conditions or conclusions of examples, exercises or some exam questions in the textbook on the basis of the original through research, and forms new problems for students to solve. The review class should not only consolidate the knowledge learned and strengthen the basic skills through the explanation of typical examples, but also design variant exercises to make students' thinking develop to a deeper level. [9] As some researchers have said, only the changing situation can realize the understanding of the immutable nature, only the form of change can achieve the consolidation of the stability technique, only the changed structure can realize the transfer of cognitive schema, and only the application of change can test the true growth of thinking intensity. [10] Compared with the original question, the transformed questions are often simple and complex, special and general, concrete and abstract, variant exercises can not only mobilize the enthusiasm of students at all levels, but also help students to deeply understand mathematical problems from different angles, levels, situations and backgrounds, so that students can identify the essence of the problem in the change. In the review lesson, the design of variant exercises, teachers can form different difficulty topics through changes in the problem situation, conditions and conclusions, etc., in addition to allowing students to see the connection between various types of knowledge in problem solving, but also consciously cultivate students' ability to find and ask questions. In addition, teachers should also let students form a new understanding of a certain type of knowledge or method through the comparison of the commonalities and differences of new and old problems, so that students can solve problems from easy to difficult and spiral, and make their thinking change from shallow to deep. [11]

### *3.3Infiltrate mathematical thinking methods and let students feel the charm of mathematics*

A special and important element of the structure of mathematical logic is mathematical ideas. The entire mathematical sciences were built on and developed in accordance with these ideas. Mathematical ideas are contained in the process of formation, development and application of mathematical knowledge, and are abstractions and generalizations of mathematical knowledge and methods at a higher level, and common mathematical ideas include mathematical abstraction, classification, model, etc. Mathematical methods are the steps, procedures and implementation methods taken by people in the process of solving mathematical problems, which are the expression and means of realizing mathematical ideas, and at the same time provide logical means and operating principles for mathematical ideas. [12] In mathematics learning, students' comprehension of mathematical thinking methods generally requires a process of repeated understanding, and review courses are a review of relevant content after learning for a period of time, and the teaching content and time have a certain degree of flexibility, which is a good time to infiltrate mathematical thinking methods to students. The application of knowledge in mathematics review courses should not only focus on the training of type problems, let students imitate the problem solving, but also continuously penetrate, summarize and refine the vivid mathematical thinking methods in the application of knowledge, so that the thinking methods hidden behind the knowledge and skills can be manifested and systematized. For example, through students' sorting of

triangles classified by sides and angles, they can experience the idea of classification and discussion; Through the discussion of various problems of the trilateral relationship of triangles, feel the idea of equations, and learn model ideas through the study of "common point, common side, common angle" congruent triangle. In short, through the review of mathematical knowledge, students can comprehensively improve their knowledge and skills, ideas and methods, so that students can truly understand the charm of mathematics. [13]

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Hong Wei Deng. "Core literacy-oriented mathematics review teaching strategies." *IOSR Journal of Research & Method in Education (IOSR-JRME)*, 13(01), (2023): pp. 34-38.