

# Research on the Design Strategy of Junior High School Mathematics Unit Assignment under Core Literacy

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**Abstract** – Mathematics homework is an extension of the mathematics classroom and a feedback of the teaching effect. Under the influence of the teaching concept of large units, it is found that junior high school mathematics unit assignments can help students establish a knowledge framework, deepen students' understanding of the knowledge system from a holistic perspective, and help students cultivate their core literacy. This paper analyzes the current situation of the design of junior high school mathematics unit assignments through literature method and other research methods, sorts out the principles that need to be followed in the design of unit assignments, and puts forward the strategies for the design of junior high school mathematics unit assignments.

**Keywords** – Mathematics Core Literacy, Junior High School Mathematics, Unit Assignment Design.

## I. INTRODUCTION

The Compulsory Education Mathematics Curriculum Standards (2022 Edition) (hereinafter referred to as the "New Curriculum Standards") clearly points out that students' mathematics core literacy should be cultivated in the teaching process such as curriculum content design, and the curriculum objectives also clearly put forward the development of students' core literacy and give full play to the educational value of mathematics courses<sup>[1]</sup>. The purpose of education is not only to teach students knowledge, but also to teach students how to solve problems and develop students' ways of thinking. Mathematics is a subject with strong abstraction and logic, and in junior high school, students' mathematical thinking can be improved by cultivating students' abstract ability, spatial concept, reasoning ability and other core literacy. China is currently in a new stage of rapid development, the demand for innovative talents is increasing, and the quality training of students is not only conducive to the needs of students' lifelong development, but also conducive to the harmonious development of society.

Mathematics homework is an extension of the classroom, an important part of students' learning and consolidation, and the main carrier of teachers' teaching evaluation and reflection. The "double reduction" policy requires reducing students' academic burden, improving the quality of teaching, and reducing the difficulty and duration of homework<sup>[2]</sup>. Therefore, it is imperative to optimize the design of junior high school mathematics homework. The new curriculum standard suggests that the textbooks should be equipped with exercises that are conducive to the development of literacy, pay attention to the essence of mathematics, and pay attention to the general methods between exercises, which also provides guidance for the design of junior high school mathematics learning problems. At present, the large-unit teaching advocated can connect relevant knowledge, grasp the essence of mathematics, help students build a knowledge framework, and develop students' core literacy. Mathematics unit assignments can not only help students consolidate what they have learned, but also form knowledge into an organic whole, so the research on the design of mathematics unit assignments is even more important.

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## II. PROBLEMS IN THE DESIGN OF JUNIOR HIGH SCHOOL MATHEMATICS UNIT

### ASSIGNMENTS

Homework is an important part of teaching, a continuation and supplement to the classroom. Math homework is not only used to help students consolidate their knowledge, but also to provide important feedback for teachers. With the reform of education and the implementation of the "double reduction" policy, teachers pay more and more attention to the design of homework, but there are still some problems<sup>[3]</sup>.

#### *A. The Objective of the Assignment is Not Accurate Enough*

At present, teachers mainly assign homework from textbooks and workbooks, and most of the workbooks only list the topics of relevant knowledge points, in order to use a lot of training to improve students' performance. However, the objectives of such assignments are not clear enough, and the correlation and logic between knowledge are ignored, which is not conducive to students' overall control of unit knowledge. When designing assignments, we should not only consider the goal of mastering knowledge, but also determine specific goals by analyzing curriculum standards, teaching materials, and learning situations, including goals in terms of meaning understanding and learning transfer. If the objectives of the assignment are not clear, it will not be conducive to the mastery of the knowledge system.

#### *B. The Form and Content of the Assignment are not Rich Enough*

In the traditional education mode, teachers often use the tactic of sea of questions to improve students' performance, but using a large number of practice questions as homework will lead to an increase in the repetition rate of homework content, and the form of homework is relatively simple, which will lead to students' fatigue and reduce students' enthusiasm to complete homework seriously. The boring homework content is not conducive to the cultivation of students' sense of innovation, and the core literacy of mathematics cannot be fully integrated into mathematics homework, and the teaching link of homework cannot play a role in improving students' ability. Moreover, the assignment lacks levels, does not take into account the individual differences between students, cannot adapt to students of all levels, and does not follow the principle of teaching students according to their aptitude.

#### *C. The Assignment Evaluation Link is not Perfect*

The homework evaluation link of junior high school mathematics is not very well designed. First of all, the main body of evaluation is too simple, and most of them are directly corrected by teachers, and students have no sense of participation in this process. Secondly, the evaluation method is not novel enough, and the evaluation of the homework is still at the level of judging right and wrong, and there is no in-depth analysis of the homework to find out the causes of errors. Finally, there are no specific evaluation criteria and scales, and there are some difficulties in evaluating individuals. These problems will not give full play to the effectiveness of the job.

## III. PRINCIPLES OF HOMEWORK DESIGN FOR JUNIOR HIGH SCHOOL MATHEMATICS UNITS

According to the problems existing in the design of junior high school mathematics unit assignments, the following principles of unit assignment design are proposed:

### *A. The Principle of Purpose*

The operation goal is the basis for the operation design, and the designed operation is more reasonable when there is a clear goal orientation. Junior high school mathematics teachers should have a deep understanding of the curriculum standards at the junior high school level, grasp the general direction of mathematics, and then implement the national education policy in the teaching process. The second is to point to the unit teaching objectives, which are the core parts derived from the analysis of the overall content of the unit, and can efficiently construct the unit homework objectives based on the core problems of the unit. However, teachers need to make appropriate changes according to the learning situation of students, for example, the parts of the class that students have mastered very well do not need to be set as homework goals. The third is to point to the core literacy. The cultivation of students' core literacy in mathematics runs through the whole teaching process, and the process of students completing homework is also a process of continuous thinking and exploration, so a good design of homework objectives can also help students cultivate their core literacy.

### *B. The Principle of Wholeness*

The idea of mathematics unit assignment design is a holistic idea, and in the process of unit assignment design, it is necessary to comprehensively consider the relationship between various elements. Mathematics unit homework is not a superposition of each class assignment in the unit, but needs to consider the unit homework objectives and class homework objectives as a whole, strengthen the connection between class time and class time, class time and unit, and then help students construct the framework of mathematics unit <sup>[4]</sup>. In addition, we also need to think from the perspective of students' overall development, such as the ability to read, explore, and think independently, which students need in the process of learning, and the cultivation of these core literacies needs to run through the entire learning career of students. Therefore, it is necessary to follow the principle of integrity when designing unit operations.

### *C. The Principle of Diversity*

Therefore, in the process of unit assignment design, teachers should try to avoid too much repetitive content, and should try to reflect various forms of homework in the limited homework content. On the one hand, it does not increase the burden of homework on students, and on the other hand, it increases the interest of homework and stimulates students' enthusiasm for learning. Mathematics unit assignments are an examination of the objectives of the same unit, and in order to avoid mechanical repetition of the same problems, we can optimize and integrate the lesson assignments, modify, delete and add them according to the appropriate level of difficulty, and we can also design non-written assignments. Exposing students to a variety of question types and carrying out a variety of homework activities is of great benefit to the cultivation of students' core literacy.

### *D. The Principle of Difference*

According to Vygotsky's "Theory of Proximal Development Zone", each student has his or her own potential, and we can use the student's zone of proximal development to carry it into the next development zone <sup>[5]</sup>. However, there are different differences between individuals, and students may have different ways of learning, thinking about problems, and the degree of intellectual development. Therefore, when designing homework, we can set gradients, and assign homework with different gradients according to the differences of students, so that each student can have a process that can be completed and explored independently. Reflecting differences in

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unit assignments and taking into account each student's recent development zone can increase students' interest in learning and improve students' mathematical literacy.

### E. Evaluative Principles

Evaluation is an indispensable part of the teaching process, which is not only the feedback of students' learning, but also the feedback of teachers' teaching. Both teachers and students can make adjustments based on the results of the assignment feedback, so more attention should be paid to the evaluation of the assignment in the mathematics unit. Teachers can establish a complete unit assignment evaluation system by starting with the evaluation subject, evaluation content, evaluation criteria, etc. Then, the problems of students in knowledge acquisition, learning attitude, learning methods, teachers' teaching design and homework design are discovered, so as to find out and adjust them in time.

## IV. STRATEGIES FOR DESIGNING ASSIGNMENTS IN JUNIOR HIGH SCHOOL MATHEMATICS UNITS

### A. Design Multi-dimensional Objectives and Establish a Framework for Mathematics Unit Assignments

First of all, the curriculum standards should be analyzed, and the curriculum standards are an important basis for the compilation of teaching materials and the evaluation of examinations, so the design of teaching objectives needs the guidance of curriculum standards. The curriculum standards provide a broad framework for the instructional design of the junior high school unit. Secondly, the learning situation should be analyzed, different age groups of students have different levels of cognitive development, and the content that has been learned is also different, on the basis of fully understanding the students' mastery of each knowledge point, teachers should set goals according to the level of physical and mental development of students. Then, the teacher should analyze the teaching content, organize the connections between the lesson content according to the unit theme (taking parallelogram unit teaching as an example, Figure 1), and then determine the objectives of the mathematics unit assignment <sup>[6]</sup>.

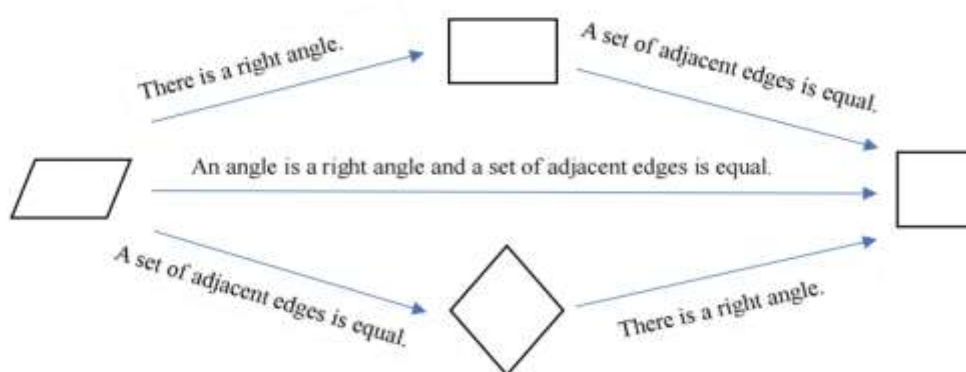


Fig. 1. Correlation between special quadrilaterals.

The goal of the first dimension: to master the basic knowledge of each lesson and be able to use it simply.

The goal of the second dimension: to understand the intrinsic meaning of knowledge, and to understand the connection between knowledge points, and to build a unit knowledge framework.

The third dimension goal: to improve the core literacy related to the unit content, and have a certain transfer ability.

### *B. Enrich the Form of Homework and Fully Integrate the Core Literacy of Mathematics*

The theory of the recent development zone inspires teachers to appropriately elevate students according to their actual abilities when assigning homework, so as to stimulate students' interest in exploration. The core literacy of junior high school is mainly manifested in: abstract ability, computing ability, geometric intuition, spatial concept, reasoning ability, data concept, model concept, application consciousness, and innovation consciousness. Written assignments alone cannot fully reflect these qualities.

Teachers should set up three types of homework when assigning homework, the first type is basic knowledge homework, the second type is skill-based homework, and the third type is inquiry homework, which can be cultivated in layers according to students' learning situation.

For example, when learning the expansion diagram of a cube, students can make several boxes of cubes by themselves, and then let students unfold them, guiding students to explore how many ways to expand the cube. This type of assignment will improve students' spatial concept and geometric intuitive literacy better than written assignments. You can also assign reading-type homework, select mathematical materials or mathematical problems related to the learning content, let students interpret according to their own knowledge reserves and understanding level, analyze the connotation of the article, and abstract the corresponding mathematical knowledge, and the reading process has experienced mathematical activities such as mathematical abstraction, intuitive imagination, logical reasoning, and data analysis, which also develops students' mathematical literacy.

### *C. Pay Attention to the Evaluation of Homework and Give Full Play to the Feedback Function of Homework*

The evaluation link is the link of diagnosing the operation quality of the unit, and the evaluation criteria should focus on two aspects. On the one hand, it is the design standard of the unit assignment itself, whether the design of the unit assignment is consistent and complementary to the teaching objectives of the unit, whether it is consistent with the objectives of the unit assignment, and whether the designed assignment content can include the basic problems of the unit. On the other hand, it is necessary to judge whether students have mastered the basic knowledge in the unit, whether they have formed a cognitive structure, whether they have formed mathematical thinking and ability, that is, whether they can use mathematical propositions to analyze mathematical phenomena with mathematical methods, and whether they have developed relevant core literacy<sup>[7]</sup>.

In the evaluation of students' learning effect, the evaluation subjects can be diversified, and the method of student mutual evaluation or group evaluation can make students more involved, and students' comparison psychology can be used to stimulate students to catch up with each other and promote learning. The traditional form of judging right and wrong is too common to stimulate students' interest, so it can attract students' attention to their homework through targeted comments, and then stimulate students' interest in doing their homework.

## **V. CONCLUSION**

The penetration and cultivation of core literacy is an inevitable trend in the development of education in the c-

-urrent era, and it is a necessary measure to improve the quality of teaching and promote the all-round development of students. A good unit assignment design can help students develop in a diversified way, while consolidating basic knowledge, it can also exercise students' ability to discover and solve problems through assignments of appropriate difficulty, so as to develop students' mathematical thinking ability and mathematical core literacy.

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