Research on the application of transformation thought in junior middle School mathematics teaching

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Abstract—The idea of transformation is that when learning new knowledge or encountering new problems, the association is based on the old knowledge and problems, the connection between the old and new problems is found, and the old knowledge is used as an auxiliary to solve the new knowledge and new problems.Although the mathematics knowledge learned in junior middle school is gradually complex, it is still the combination of number and form in the final analysis, which is the process of continuous evolution from shallow knowledge to deep level.This paper introduces the significance of applying the thought of transformation to junior high school mathematics teaching, and analyzes the concrete embodiment of the thought of transformation combined with algebra knowledge in junior high school mathematics teaching materials.

Index Terms—Transforming ideas, Application ability, Algebra, The knowledge structure

I. INTRODUCTION

The idea of transformation is to transform complex problems into simple ones, so as to solve problems quickly and accurately. In the process of transformation, we need to use a lot of mathematical thinking and methods. The introduction of transformation into junior high school teaching is conducive to the formation of students' mathematical thinking and the improvement of their mathematical learning ability. [1-2].

Adopting the idea of transformation in mathematics teaching can not only improve students' comprehensive quality level to a great extent, but also improve their learning efficiency and promote the development of students' thinking.. [3-4].

II. THE SIGNIFICANCE OF APPLYING THE IDEA OF TRANSFORMATION TO JUNIOR MIDDLE SCHOOL MATHEMATICS TEACHING

A. The idea of transformation is helpful for students to understand the connotation of concepts and theorems

The knowledge in each chapter of mathematics is interrelated, usually one concept verifies another concept, and one theorem deduces another theorem. If the relationship between concepts and theorems is not explained, the knowledge learned by students is bound to be scattered and desultorily. The teacher only through complete analysis and research to the teaching material, to find the correlation between knowledge points, establish mutual transformation, confirm the relationship between all kinds of knowledge, students can, in the process of exploration of the concept of thorough understanding of its connotation, can stand at the height of a system to study mathematics, and learn to the migration of knowledge.

B. The thought of transformation is helpful for students to form a complete knowledge structure

The thought of transformation is one of the most basic thinking methods in middle school mathematics. Understanding and applying the thought of transformation well plays an important role in promoting students to form a complete knowledge structure. A prominent characteristics of middle school mathematics teaching content is the knowledge of the chapters and sections are closely linked, they influence each other, mutual penetration, this knowledge freely crisscross constitute a complete network of mathematics knowledge, using the method of transforming to chapter each day to learn the knowledge of digestion, refining, sorting, can get the system of knowledge structure, Weave the scattered pieces of knowledge into an orderly and prioritized knowledge network..

Take the equation as an example, after learning the equation of one variable, gradually learn the equation of multiple times. Multivariate equation is a new knowledge. On the basis of unitary equation, multivariate equation can be transformed into unitary equation for solving, which is a concrete embodiment of the thought of reduction, as shown in the figure below.
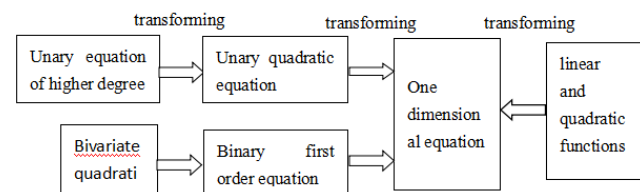

Fig. 1. Area partition diagram of a curved trapezoid

C. The idea of applying is helpful to improve students'

self-application ability

The idea of transformation comes from students' profound perception in real life, which is easy to understand and use. For example, Cao Chong used a lot of stones to replace the elephant and make the elephant produce the same amount of effect as the stone. By weighing the stone one by one, he turned the "big problem" into "small problem" and solved the problem successfully. Is the core of this story will be the weight of the elephant into the weight of the stones, transforming students understand this idea, you can measure the volume of an irregular potato and put it in the containing enough amount of water immersion potato barrels, irregular rise of water level in the volume of a potato then into part of the volume, through the study of such application, It can improve students' ability to solve problems by themselves.

D. *Applying the idea of transformation can enhance students' interest in learning and establish a correct view of mathematics*

There are a lot of activities related to mathematics in life. Whether students can observe and analyze the phenomena of daily life and solve the problems in daily life with mathematical ideas and methods requires students to convert the problems in life into mathematical problems to solve them. Using mathematical thought to solve practical problems can make students deeply feel the role of mathematics and fun, enhance the confidence of learning mathematics. Realize the social value of mathematical thinking and methods, develop the self-consciousness and habit of thinking to observe, analyze and solve practical problems in daily life with mathematical views and methods, and form a mathematical view with application consciousness.

For example, in many competitions, when calculating judges' scores, one highest score and one lowest score are removed, and then the average score is taken as the final score of players. The actual problem is the truncated average in preliminary statistics.

E. *The consciousness of applying transformation is beneficial to the improvement of teachers' teaching methods*

Many teachers often have such confusion: the topic talks a lot, but the students always stay in the primary stage of learning, that is, the imitation stage, slightly change the topic students will not do, students can not have a strong ability to solve problems, let alone the formation of innovation ability. The reason lies in the fact that the teacher only focuses on the topic in teaching and does not help students to analyze the relationship between new problems and old knowledge. Only when students learn mathematical ideas and methods can they benefit from learning transfer, especially the transfer theory in transformation thoughts, which can greatly improve the quality of learning and mathematical ability. In the exploration teaching of mathematical problems, it is important to let students truly understand the mathematical thinking and methods hidden in the exploration of mathematical problems, so that students can master the knowledge of mathematical thinking and methods, and make

this "knowledge" digest and absorb into "individual" mathematical thinking. Therefore, when we teach, apart from carrying on the necessary operation activities and arranging the appropriate exercises, it is more important to improve and improve the teaching method of teachers.

III. THE REFLECTION OF ALGEBRA IN MATHEMATICS TEACHING MATERIAL OF JUNIOR HIGH SCHOOL

The embodiment of the idea of transformation in algebra mainly involves three aspects: the operation of numbers, the operation of formulas, and the knowledge of equations.

A. *The number of operations*

Junior high school mathematics involves rational number and its operation content, integer and fraction are collectively called rational number. Unlike elementary school math, negative numbers are used. The definition of rational number is established on the basis of integer (or natural number). The basic idea of rational number operation rules and size comparison is to transform it into integer operation and size comparison. It is to realize the transformation of rational number to positive number with the help of absolute value.

In the teaching of rational number subtraction, the concept of negative number can be used to reduce subtraction to addition, that is, subtracting a number is equal to adding the negative number of this number (rational number subtraction law); In the teaching of division of rational numbers, we should first introduce the concept of reciprocal, the product of two rational numbers is 1 reciprocal to each other, so, using the concept of reciprocal, we can divide the rational number into rational number multiplication, that is, divide by a number is equal to multiply by the reciprocal of this number; The power of rational number is the operation of finding the product of several same factors. From the definition of power, it can be seen that the power problem can be reduced to the multiplication problem. In this way, as long as you understand the concept of negative numbers and absolute values, the mixed operation of rational numbers can be reduced to the four operations learned in primary school. That is, the operation of rational numbers is the expansion of the four operations learned in primary school.

B. *Correlation operation of algebraic expression*

Algebra operation includes integral operation, fraction operation and radical operation. So we start with the whole thing. And then we're going to do real numbers and fractions, and we're going to introduce square roots and cube roots, and we're going to do radical operations in problem sets.

Algebraic knowledge is developed on the basis of arithmetic knowledge. After representing numbers with letters, junior high school students are exposed to the concept of algebraic expressions. Algebraic expressions are produced by replacing numbers with letters. Due to different letters in the algebra, thus can get different algebraic expression, rational expression of integral expression is not included in the denominator letters, rational expression of fractional denominator contains letters, square root of the enclosed

letter for irrational expression, within the square root of excluding letters for rational expression, algebraic abstract the concept of number and its algorithms and formulation. In fact, the essence of formula is number, and number is a special form of formula (a single number or a letter is also algebraic). This relationship between general and special is the difficulty for students in the first grade of junior middle school. Although the letter does not represent a specific number, but the essence of the equation is still number, which is an important breakthrough for students to learn algebra. Therefore, the operation of algebraic expression is closely dependent on the operation of number. Simply speaking, the operation of number is the basis of the operation of formula, so the essence of algebraic operation is to reduce algebraic operation to number operation.

Reduction of integral operation. The addition and subtraction operation of the integral is to merge the similar terms, and its algebraic basis is the distributive law of multiplication. Through the connecting point of the distributive law, the addition and subtraction operation of the integral is transformed into the addition and subtraction operation of the coefficient of the similar terms, and the addition and subtraction operation of the integral is reduced to the addition and subtraction operation of the number that has been mastered without the letter. The integral multiplication operation is divided into three cases, namely monomial multiplied by monomial, monomial multiplied by polynomial, polynomial multiplied by polynomial, and monomial multiplied by polynomial is the most basic and simplest of the three cases. Monomial multiplied by monomial is the comprehensive application of number multiplication and power properties. The law is divided into three points: First, multiply the coefficients, second, multiply the same letters, and third, multiply other different letters. In fact, it is the multiplication of coefficients and the multiplication of powers of the same base, which can also be simply understood as the operation of coefficients and exponents. In short, the operation expressed is still the operation of numbers, so the multiplication of monomials is also the operation of numbers, and the latter two cases can be converted into monomials multiplied by monomials.

Integral, fractional, and irrational forms can all be mastered using reductionization through simple knowledge already learned. To understand and master the operation knowledge of algebraic formula from the perspective of number operation can not only play a role in changing difficult to easy and complex to simple, but also help students to better grasp the connection between knowledge.

C. Equation

The fractional equation, irrational equation and simple equation of higher order are the extension of unary equation and unary quadratic equation.

After introducing the concept of real numbers, learn the quadratic equation of one variable. For the standard form of the unary quadratic equation $ax^2 + bx + c = 0$, if the left side of the quadratic trinomial equation $ax^2 + bx + c$ can be factorized into the form of $(mx+n)(px+q)$, then the unary quadratic equation can be converted into two unary linear equations $mx+n=0$, $px+q=0$. Two solutions of the original quadratic equation with one variable are obtained. In essence, the quadratic equation of one variable is transformed into the equation of one variable by the matching method according to the principle of the same solution of the equation. The binary equation of first order is calculated by adding and subtracting the method of elimination or substituting the method of elimination.

The basic idea of solving equations (or equations) is elimination and reduction. Elimination, that is, the equation of more unknowns into the equation of fewer unknowns, until there is only one unknowns; Reduction is the transformation of a higher power equation into a lower power equation, until the transformation into a first equation.

The idea and method of solving the fractional equation is to use the way of thinking, remove the denominator of the fractional equation, change the fractional equation into a simple, solved integral equation, and then use the method of solving the integral equation.

Irrational equation, integral equation and fractional equation are called rational equation. Equations with unknowns in the square root are called irrational equations. To solve irrational equation is to square both sides of the equation or use the substitution method to solve irrational equation into rational equation. [9] ensures of which the teaching, learning in addition to assessment methods are upwards to the amount of typically the course and are ideal to the attainment involving objectives and intended understanding outcomes of the program and the course. The particular policy requires that school members use recent in addition to variety of teaching, mastering methods and assessment methods.

It should be noted that the integral transformation of fractional equation, irrational equation has a physicochemical process, the new equation and the original equation may not be the same solution, because removing the denominator or the physicochemical process may lead to the increase of solutions, so when solving the fractional equation and irrational equation, the test step is essential. The essence of solving fractional equation, higher order equation and irrational equation is to reduce the original equation to the simplest one through proper transformation. Therefore, the thought of reduction is the dominant thought in solving fractional equation and irrational equation.

IV. CONCLUSION

Compared with the content learned in primary school, the mathematics curriculum in junior middle school is more abstract and complex. For junior middle school students, mathematics is a subject with high abstraction and difficult to understand. Transforming ideology is a more effective way of

mathematical thinking, can be intuitive knowledge in mathematics teaching, simplification, so teachers in the teaching process should be transforming thinking infiltrate into all kinds of teaching means, is widely used to cultivate students the ability to solve the problem of thinking, transforming improve junior middle school student mathematics learning efficiency. This paper analyzes the application significance of conversion thought in junior high school mathematics teaching, and analyzes the embodiment of conversion thought in algebra, hoping to help other junior high school mathematics teachers.

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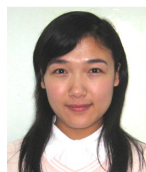
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