WORKING ON THE BASIS OF MATHEMATICS TEACHING METHODS

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Abstract:
Elementary mathematics is also a subject with an independent content, which is built on the basis of elementary information obtained from various branches of higher mathematics, namely theoretical arithmetic, number theory, higher algebra, mathematical analysis and the logical course of geometry.

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Education is understood as a conscious and goal-oriented cognitive activity between a teacher and students. Any education sets two goals:

1) to give students a system of necessary knowledge that must be learned according to the program;

2) to form the student's logical thinking skills by providing mathematical knowledge. In order for these two goals in the educational process to be realized, the teacher must explain each taught concept based on psychological, pedagogical and didactic laws. As a result, a psychological process called cognition is formed in the minds of students. We know from the philosophy course that the process of cognition is “from living observation to abstract thinking and from it to practice”. From this it can be seen that the process of cognition depends on thinking. “Thinking is the active reflection of objective reality in the human mind” (Yu.M. Kolyagin. “Methodology of teaching mathematics, M., 1980, p. 57). From a psychological point of view, the process of cognition is of two types:

1) Sensory cognition (sensation, perception, and imagination). A person's sensory cognition finds its expression in his sensations and imagination. A person interacts with the real world through his sensory organs. Along with sensations, perception also participates in the process of cognition. As a result of sensations, a subjective image of the objective world is formed, and the complete reflection of this subjective image in the human mind is called perception. Objects and phenomena in the external world leave a certain trace in the human cerebral cortex through perception and perception. After a certain time, these traces can intensify and be

restored as an objective image of an object or phenomenon. The process of restoring this objective image of the objective world after a certain time is called imagination.

2) Logical cognition (concept, judgment, and conclusion). Any logical knowledge is realized through sensory knowledge, therefore, the objects in each studied mathematical object are perceived, perceived and imagined from an abstract point of view, and then a certain mathematical concept is formed about the object in this studied object. Definition. A mathematical concept is a form of thinking that reflects the main properties of objects in a mathematical object.

Each mathematical concept is characterized by its two sides, namely its content and scope.

Definition. The content of a concept is the set of main properties that express this concept. For example, let's take the concept of a right rectangle. The content of the concept of a right rectangle consists of the following set of main properties:

1) The diagonal of a right rectangle divides it into two triangles.

2) The sum of the interior opposite angles is 180°.

3) The diagonals intersect at a point and are divided into two equal parts at this point.

Definition. The volume of a concept is the set of all objects included in this concept.

For example, the volume of the concept of a rectangle consists of all types of rectangles included in this concept of a rectangle, namely a parallelogram, a square, a rhombus and a trapezoid. From this it can be seen that the volume of the concept of a rectangle consists of all large and small rectangles with different lengths of sides.

The word mathematics is derived from the ancient Greek word mathema, which means "knowledge of sciences". The object (object) of mathematics is the spatial forms of objects existing in matter and the quantitative relationships between them. At present, mathematics is conditionally divided into two:

1) elementary mathematics,

2) higher mathematics.

Elementary mathematics is also a science with an independent content, which is built on the basis of elementary data obtained from various branches of higher mathematics, namely theoretical arithmetic, number theory, higher algebra, mathematical analysis and the logical course of geometry. Higher mathematics is concerned with finding mathematical laws that fully and deeply reflect the spatial forms of the real world and the quantitative relationships between them. Elementary mathematics forms the basis of the school mathematics course. The purpose of the school mathematics course is to convey to students a system of mathematical knowledge, taking into account their psychological characteristics, using a certain method (methodology). (The word methodology is a Greek word meaning "to do".) Mathematical methodology is one of the main sections of pedagogy and didactics, an independent discipline

that studies the laws of teaching and learning mathematics that correspond to the goals of education at the level of development of our society.

Mathematical methodology answers the following three questions related to the educational process:

1. Why should mathematics be learned?
2. What should be learned from mathematics?
3. How should mathematics be learned?

The concept of mathematical methodology was first described in the work "On the Demonstrative Study of Numbers" by the Swiss pedagogue and mathematician G. Pestalozzi in 1803. From the first half of the 17th century, issues related to the methodology of teaching mathematics were addressed by Russian scientists, including Academician S.E. Gurev (1760-1813), and from the first and second half of the 18th century, N.I. Lobachevsky (1792-1856), I.N. Ulyanov (1831-1886). L.N. Tolstoy (1828-1910) and the outstanding methodologist-mathematician S.I. Shokhor-Trotsky (1853-1923), A.N. Ostrogradsky and others were engaged in this, and they looked at the science of mathematics from a scientific point of view and developed its progressive foundations. For example, A.N. Ostrogradsky wrote that “Consciousness arises after observation, consciousness is based on the real, existing world.” Later, N.A. Izvolsky, V.M. Bradis, S.E. Lyapin, I.K. Andronov, N.A. Glagoleva, I.Ya. Dempinan, A.N. Barsukov, S.I. Novoselov, A.Ya. Khinchin, N.F. Chetverukhin, A.N. Kolmogorov, A.I. Markushevich, A.I. Fetisov and others were engaged. Since 1970, the content of the school mathematics course has been changed based on a new program, as a result of which the methodology of its teaching has also been developed. Professors V.M. Kolyagin, R.S. Cherkasov, P.M. Erdniev, J. Ikramov, N. G ‘aybullayev, T. Tulaganov, A. Abdukodirov and other methodologists have been and are engaged in the methodology of school mathematics taught based on the current program. The methodology of teaching mathematics is taught in the III-IV courses of pedagogical universities. According to the nature of its structure, it is conditionally divided into three.

General methodology of teaching mathematics. This section reveals the purpose, content, form, methods and its means of teaching mathematics, based on the laws of pedagogy, psychology and didactic principles.

1. Special methodology of teaching mathematics. This section shows the ways of applying the laws and rules of the general methodology of teaching mathematics to specific subject materials.

3. Specific methodology of teaching mathematics.

This section consists of two parts:

1. Specific issues of general methodology.
2. Specific issues of special methodology.

For example, if we talk about the methodology of planning and conducting mathematics lessons in the VI grade, this is considered a specific issue of general methodology.

The purpose of teaching mathematics in secondary schools is determined by the following three factors:

1. General educational goal of teaching mathematics.
2. Educational goal of teaching mathematics.
3. Practical goal of teaching mathematics.

1. The general educational goal of teaching mathematics sets the following tasks:

a) to provide students with a system of mathematical knowledge based on a specific program. This system of knowledge should provide students with sufficient information about mathematics, prepare them for studying higher sections of mathematics. In addition, based on the program, students should learn to check the reliability of the knowledge they have acquired in the process of studying, that is, master the basic methods of proof and control;

b) to consolidate students' oral and written mathematical knowledge. The study of mathematics should help students master the skills of speaking in their native language without errors, expressing their thoughts clearly, clearly and concisely. This means achieving the ability of students to correctly pronounce each mathematical rule in their native language and comprehensively forming their ability to correctly write the mathematical expression of this rule using formulas;

d) teaching students to know real truths based on mathematical laws. Here, it is intended to provide students with knowledge in a volume that allows them to understand the spatial forms of everything that occurs in the real world, from the simplest to the most complex phenomena, and the quantitative relationships between them. By providing such knowledge, students' spatial imagination is formed and logical thinking is further developed.

2. The educational goal of teaching mathematics is to:

a) form a scientific worldview in students. This idea is implemented on the basis of the theory of knowledge;

b) cultivate students' interest in learning mathematics.

It is known that in mathematics lessons, students learn to draw conclusions independently from the first days of study. They draw conclusions first as a result of observations, and then as a result of logical thinking. These conclusions are confirmed by mathematical laws. The task of a mathematics teacher is to develop independent logical thinking skills in students, as well as to cultivate their interest in studying the laws of mathematics;

d) to form mathematical thinking and mathematical culture in students. Each mathematical conclusion studied in mathematics lessons requires consistency, which in turn is expressed by a large number of mathematical concepts and laws. As students gradually learn these laws, their logical thinking develops, and a culture of mathematical inference is formed. By teaching

students to correctly express their thoughts in symbolic language, which they want to express a mathematical law, and vice versa, to express a mathematical law expressed in symbolic language in their native language, mathematical culture is formed in them.

3. The practical goal of mathematics education is to:

a) teach students to apply theoretical knowledge obtained in mathematics courses to solve elementary problems encountered in everyday life, mainly by developing students' ability to apply theoretical knowledge to practice, forming skills in performing operations on various numbers and mathematical expressions, and teaching them to solve specially designed practical problems to strengthen them;

b) develop skills in using technical means and visual aids in teaching mathematics. This includes developing students' skills in using technical means, mathematical visual aids, tables, and calculation tools in mathematics lessons;

d) teach students to independently acquire mathematical knowledge. This mainly involves developing students' skills in reading and studying independently from textbooks and popular science mathematics books.

As is known, the discipline of mathematics teaching methodology is a specific section of pedagogy, which is engaged in the study of the rules for teaching mathematics. In the process of studying the laws of teaching mathematics, mathematics teaching methodology is inextricably linked with the disciplines of pedagogy, logic, psychology, mathematics, linguistics and philosophy. In other words, the problems of teaching mathematics at school are solved inextricably linked with the disciplines of logic, psychology, pedagogy, mathematics and philosophy. The methodological basis of mathematics teaching methodology is based on the theory of knowledge. The discipline of mathematics methodology studies the purpose, content, form, method of mathematical education and the laws of applying its tools to the teaching process. Mathematics is also inextricably linked with the disciplines of physics, drawing, chemistry and astronomy. The discipline of mathematics is closely linked with other disciplines in the following two ways:

1) adapting the programs of neighboring disciplines without violating the integrity of the mathematical system;

2) use in the mathematics course of materials related to the study of mathematical laws, formulas, theorems in other subjects.

At present, the issue of harmonizing the mathematics program with other subjects has been resolved quite successfully. For example, students begin to study some information about functions and their graphical representation used in physics from the 7th grade.

A lot of knowledge about geometric constructions, which is given in the 8th grade, will be rich material for the subject of drawing, the task of drawing is to consolidate this knowledge by performing various drawing works. It is difficult to clearly indicate the issue of using other

subjects in mathematics lessons in the program, this is done by the teacher himself, that is, it should be taken into account when planning educational material and preparing for the lesson. For example, during the study of equations, one can also solve equations that reflect the relationships between physical quantities, i.e. the heat balance equation, the linear expansion equation from heat, and equations similar to the stn. It is advisable to use chemistry and physics problems when studying percentages* proportions and other chapters of the program (mixtures, castings, and the like), for example:

1) How much of the solute should be added to 240 g of water to make a 2 0% solution? 2) A 400 g solution of 5% was boiled and reduced to 200 g. What is the acidity of the solution now? Using materials from related subjects in mathematics lessons further strengthens the interdisciplinary connection.

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