

METHODOLOGY OF TEACHING SOLVING SINGLE-VARIABLE EQUATIONS IN MODERN PRIMARY CLASSES

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Abstract. *This article discusses the theoretical and practical aspects of the methodology for teaching solving equations in one variable in modern primary schools. It analyzes the issues of forming the concept of an equation, developing thinking based on problem situations, and effectively using interactive methods, taking into account the age and psychological characteristics of primary school students. It also shows ways to develop mathematical competencies in students through information and communication technologies, didactic games, and visual aids. The article is of practical importance for primary school teachers and methodologists.*

Keywords: *primary education, one-variable equation, equation solving methodology, modern pedagogical technologies, interactive methods, mathematical competence, didactic games.*

Relevance of the topic. The formation of mathematical literacy in the modern primary education system requires the development of students not only computational skills, but also logical, analytical and generalizing thinking skills. From this point of view, teaching complex problems that can be solved using equations with one variable is one of the important and relevant areas of primary mathematics education. Solving problems through equations forms students' skills to understand mathematical relationships more deeply, identify cause-and-effect relationships, and build a general solution model.

Practical experience and pedagogical observations show that , although primary school students relatively easily master simple arithmetic problems, they

have difficulty solving problems that are complex in content and require several logical stages. In particular, the process of transforming the condition of the problem into a mathematical model - an equation - is a complex intellectual activity for students , and when this process is not organized on a sufficient methodological basis, superficial and mechanical mastery is observed. Therefore, the development and improvement of a methodology for teaching complex problems solved using equations with one variable on a scientific basis is an urgent pedagogical problem .

Working with equations with one variable takes students' mathematical thinking to a new level. In the process of formulating and solving an equation, the student performs complex mental operations such as determining the unknown quantity, analyzing the relationship between the given and sought quantities, and arriving at a general solution . If this process is not organized correctly at the initial stage, serious difficulties may arise in mastering algebraic concepts in subsequent grades. Therefore, teaching equation problems in primary education in a manner appropriate to age and psychological characteristics, based on demonstrative and logical consistency determines the relevance of the topic of this course work.

In mathematics, the concept of an equation is one of the main fundamental concepts , which serves as a means of expressing mathematical relationships, determining unknown quantities, and generalizing quantitative connections. The concept of equation is interpreted not only as a central category of algebra, but also as a general mathematical model that combines arithmetic, logical and functional thinking. Therefore, determining the scientific and theoretical essence of the equation is of great importance, especially in developing a methodology for teaching it at the primary education stage . In primary mathematics education, the concept of equation is formed not through formal algebraic definitions, but on the basis of substantive and logical relationships. This situation requires an explanation of the scientific essence of the concept of equation in an interpretation adapted to primary education. This section will cover the mathematical essence of the concept of

equation, its role in the cognitive process, and the theoretical foundations of thinking through equations. As for the mathematical definition of the concept of equation, in scientific literature the concept of equation is defined as a mathematical notation expressing the equality relationship between two expressions. The equation contains an unknown quantity, and the equality is true only for a certain value of this unknown. From this perspective, an equation is a conditional expression of a mathematical relationship. Mathematically, an equation consists of the following basic elements:

1. two expressions connected by an equal sign ;
2. at least one unknown quantity;
3. an equality condition that holds for certain values of the unknown.

This structure distinguishes an equation from a simple equality. A simple equality is always true, while an equation is only true when a certain condition is met. This difference is one of the main aspects that determines the theoretical essence of the concept of an equation.

In modern mathematics and mathematical methodology, the equation is interpreted as a mathematical model. A mathematical model allows us to express quantitative relationships in a real situation in an abstract form. The equation performs this task, translating the condition of a real problem into a generalized mathematical language. From the point of view of primary education, this aspect is of particular importance. Because by expressing the condition of the problem in the form of an equation, the student :

1. distinguishes between given and sought quantities;
2. understands the relationship between them ;
3. builds a general model leading to a solution.

Therefore, the equation is not only a means of calculation, but also an important instrument of logical analysis and generalization. Therefore, the process

of teaching the concept of equation is inextricably linked to the development of the student's mathematical thinking.

one variable is an equation with only one unknown, and is the most commonly used type of equation in elementary mathematics. In these equations, the unknown quantity usually represents a single quantity and is the main element of interest in the problem. Elementary grades, equations with one variable have the following properties:

1. has an algebraically simple structure ;
2. is directly related to arithmetic operations ;
3. Allows for visual and meaningful interpretation.

These properties make it possible to use single - variable equations as the main methodological tool in teaching students to solve complex problems at the elementary level.

The concept of equation and unknown. The central element of the concept of equation is the unknown quantity. The concept of unknown plays an important role in the formation of the student's abstract thinking. In primary education, the unknown quantity is often introduced through meaningful expressions such as "number to be found", "number to be missing".

From a scientific point of view, it is unknown:

1. represents the quantity being sought;
2. has a logical relationship with the given quantities ;
3. is determined by solving the equation.

In this regard, the formation of the concept of the unknown is an integral part of mastering the concept of an equation. Students with a low level of understanding of the unknown tend to solve the equation mechanically and cannot fully understand its logical essence.

The process of working with equations encourages the student to organize a thinking process, rather than to perform a separate mathematical operation. Thinking through equations involves the following mental operations :

1. condition analysis;
2. distinguish between unknown and known quantities;
3. determine the relationship between them ;
4. build a general solution model.

This process develops the skills of analysis, synthesis and generalization, which are important components of mathematical thinking , in students . Therefore, the concept of an equation should be considered not only as a subject in primary education, but also as a developmental tool. A deep understanding of the mathematical essence of equations with one variable requires a scientific analysis of their structure and functional properties. Understanding the structure of an equation means not only knowing the algebraic form, but also understanding the logical and quantitative relationships between the elements that make up the equation . In the context of primary education, this aspect is of particular importance, because in the process of working with an equation, students choose a problem-solving strategy based on its structure.

This section systematically covers the structural components of single-variable equations, their mathematical properties, and their methodological significance for primary education .

One variable consists of three main components:

1. unknown quantity (variable),
2. two mathematical expressions connected by an equal sign ,
3. a quantitative relationship that defines the condition of equality.

The unknown quantity is the central element of the equation , representing the quantity being sought. In elementary grades, the unknown is usually represented not

by a letter, but by an empty cell, symbol, or question mark. This approach provides a gradual transition for students to abstract thinking .

The equal sign represents the balance between two expressions . Scientifically, the equal sign represents not only the result of a calculation, but also the equal relationship between the quantities on both sides . Therefore, the semantic interpretation of the equal sign plays an important role in studying the structure of an equation .

Between the sides of an equation helps students develop the following important concepts:

1. preservation of equality;
2. the same impact of changes on both sides ;
3. the need to avoid imbalance when determining the unknown.

These concepts later serve as an important methodological basis for the conscious mastery of the rules for solving equations. Mathematical properties of equations with one variable. Equations with one variable have a number of important mathematical properties that determine the process of solving the equation. The most important of these properties are the following: First, the concept of a solution to an equation. A solution to an equation is a value of an unknown quantity that makes the equation a true equation. In elementary grades, the concept of a solution is interpreted as “a number that makes the equality true.” have the same solution . Although this property is not directly given at the terminological level in primary education, it is acquired by students intuitively in the process of practical activity. For example, the concept of preservation of equality is formed by adding or subtracting the same number to both sides of the equation. The relationship between arithmetic operations and the structure of the equation. Equations with one variable are taught at the initial stage in direct connection with arithmetic operations. The structure of the equation is based on the inverse relationship of the operations in it. Simple and complex forms of the equation. In primary education, equations with one

variable are found in simple and relatively complex forms. Simple equations usually contain one operation and allow direct determination of the unknown. In more complex equations, there is a sequence of several arithmetic operations. This differentiation develops the skills of students to analyze the equation and choose a solution strategy. The teacher's attention to the structure of the equation helps students move from a mechanical solution to a conscious solution.

Working with equations takes students' arithmetic thinking to a new level. Now the student is not limited to finding the result of the operation, but analyzes the operation, determines its inverse relationship and comes to a general logical conclusion. This process plays an important role in the development of mathematical thinking and creates the necessary foundation for algebraic thinking at the next stages.

In conclusion, it should be said that the conscious formation of the logical connection between the equation and arithmetic operations is one of the important tasks of primary education methodology. The teacher should present the equation not as a separate topic, but as a logical continuation of arithmetic knowledge. This approach helps students solve problems with equations consciously, logically, and independently. The continuous education system assumes the gradual, consistent, and logical development of knowledge and skills. Equations in one variable are one of the central concepts in this system, serving as an intellectual foundation that unifies the content of mathematics from elementary school to higher grades. Through the concept of equations, students acquire the skills of generalizing, modeling, and analyzing mathematical relationships.

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