International Journal of Culture and Modernity
ISSN 2697-2131, **Volume 8**
https://ijcm.academicjournal.io/index.php/ijcm

Training Future Primary School Teachers to Teach Equations to School Students

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Abstract:
We all know that from 2021-2022 academic year, teaching in all primary grades of the Republic is carried out on the basis of the "National Program".

In this article, we would like to share some of our thoughts on the organization of primary mathematics lessons in accordance with the requirements of the "National Program", which is currently being discussed.

As noted in the article, we have tried to express some of our own ideas on how to teach small school-age students equations and how to find solutions based on students 'daily practical lives. At the same time, we will try to give some of our own ideas on the distribution of equations by classes and their solution.

Keywords:
Equality, inequality, identity, equation, solution of an equation, root of an equation, numerical expression, literal expression, definition, rule, natural number, arithmetic operations.

In order to observe, study, analyze, and influence, at least in part, the processes that take place in nature and society, we need to know the mathematical expression of these processes, that is, their mathematical formulas.

Therefore, in the process of studying the occurrence of natural phenomena, people have long known that they occur according to certain laws. For example, they realized that the alternation and constant repetition of day and night, the rotation of the earth around its axis, or the appearance of the seasons in nature, the rotation of the earth around the sun. As a result of such developments, mathematics and other natural sciences, their basic concepts and their own formulas were studied.

These are just some of the goal setting shareware that you can use.

Among the basic concepts of mathematics, the concepts of ‘equal’, ‘big’ and ‘small’ are also mathematical concepts that organize people’s daily lives, as mentioned above.

It is known from many years of pedagogical observations that the topic of “equations and their study” in primary education mathematical materials is one of the topics that is a bit difficult for young school children to master. The main reasons for this are:

- Some elementary school teachers find it difficult to define the concept of equations;
- Lack of definition of equations that can be easily mastered by students of primary school age;

International Journal of Culture and Modernity
ISSN 2697-2131, **Volume 8**
https://ijcm.academicjournal.io/index.php/ijcm

- Lack of skills and abilities of primary school students to solve problems in an algebraic way, that is, to solve problems using equations, using the essence of each of the four arithmetic operations and their properties;
- the inability to identify the invisible relationship between the data needed to compose the text of the problem and the unknown to be found when the content of the text problem is given in the form of equations, numerical and literal expressions, tables, diagrams.

As you know, first grade math classes in elementary school begins with the study of equations naming verbal and written names of natural numbers, arithmetic operations between these numbers and their properties, "big", "small" and equal interactions between these numbers. We hope that 2nd graders will have a better understanding of the definition of the equation we are now giving because their level of mathematical knowledge allows it.

Definition 1: An equality that always retains the sign of equality in the acceptable values of all its letters is called identity.

For example:

1) a+a=2a ; 2)a+b=b+a ; 3)a+(b+c)=(a+b)+c;

and so on.

Definition 2. An equation that retains the sign of equality in some of the acceptable values of all the letters in it is called an equation.

For example:1)2a+6=8(At a = 1, the equation retains its sign of equality) 2) a+21=30 (At a = 9, the equation retains its sign of equality) 3)3a+20=35 (At a = 5, the equation retains its value) and so on.

Definition 3. An equality is called an inequality if it does not contain an equals sign in any of the acceptable values of all the letters in it.

For example:

1) 2a+5=2a+3; 2)(a-a) ×5=6; 3)4a-9=(3a+a)+8 and so on.

These inequalities can also be written as follows:

1) 2a+5>2a+3 2) (a-a) ×5<6 3)4a-9<(3a+a)+ 8

Let us now turn directly to the types of equations studied in elementary school mathematics, their general forms, and the rules for solving such equations.

If we analyze the current elementary mathematics textbooks in terms of the concept of "equations", we will see that their study is planned to be carried out in 4 stages:

1) in the first stage, the preparatory work, which mainly leads to the concept of equations, is carried out mainly in the first grade mathematics lessons;

2) in the second stage, equations that can be solved using a single arithmetic operation and equations whose solution can be solved arithmetically, that is, the solution can be expressed numerically or literally, depending on the content of the problem;

3) the third stage is unique in that it is the opposite of the work studied in phase 2, when the content of the problems is given in the form of numerical and literal expressions, one-action

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equations, tables, diagrams, it is intended to study the textual problems that logically correspond to them. They also work on solving problems from arithmetic to algebra.

4) in the fourth stage, all the planned equations will be studied in the primary education due to the mathematics program. The main goal should be to increase students' interest in learning mathematical materials and to connect mathematics with everyday life of students and to bring theoretical knowledge closer to practice in accordance with the requirements of the newly adopted "National Program".

Let us take a look at what each of these steps is designed to do in elementary math classes.

Expressions leading to the concept of equations for first graders on page 28 of the textbook Mathematics [2]

4 + □ = 6   4 + □ = 7   8- □ = 4

begins with examples.

Even if students are not told the concept of an equation here, the student is well aware that an equation is formed by pouring an unknown number into empty cells.

More specifically, such examples are equations that can be found by choosing a solution. From Lesson 5 on page 38 of the textbook [2]

4 + □ = 6   □ + 1 = 8   □ -3 = 3   8- □ = 5

Examples that are close to the equation look are processed.

Here, using the properties of the components of addition and subtraction, the equals sign is preserved by substituting the appropriate numbers that retain the equality instead of the cells.

In the process of capturing such and similar examples in a first-grade math textbook, we observed that a lot of time was set aside for these tasks.

By narrowing them down a bit, direct addition and subtraction operations can be solved instead

a + x = b   (x + a = b)   a-x = b   x-a = b (1)

it would be expedient to teach the equations in appearance to the students by introducing them into the first-grade mathematics curriculum.

To find the solution of the equation a + x = b as an example, we can give the following equation 10 + x = 15. An example of the equation x-a = b is the equation x-14 = 37.

From the results of observations and some experiments, it became clear that first-graders can easily solve the above equations based on the components of the equation, based on the given rules.

When the time comes to continue the above ideas logically, and in the second grade to study the operations of multiplication and division and their properties, the difficult solution is to give the rules for solving the following equations using the connections between the components of these operations. it will be possible to begin the study.

x×a=b   (a×x=b)   a:x=b   x:a=b   (2)

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It is known that each of the six equations in Figures (1) and (2) has its own rules to finding a solution.

Anyone who has read this in every elementary school knows this well.

Nevertheless, we give the solution rule for one of each of equations (1) and (2).

Before giving the rules, let us consider finding the solutions of the three equations (1) by looking at their uniqueness and in which sets they are defined.

1) Equations of the form a + x = b and x + a = b always have a natural solution without any restrictions when a and b are natural numbers, and this solution is unique.

2) we cannot say such general rules for the equations a-x = b and x-a = b. When a and b are arbitrary natural numbers, the solution of these equations may not be a natural number.

Therefore, the solution to this equation is based on the content and essence of the textual parable, we need to focus on what set of numbers the solution is sought from, and allow the students to understand the situation.

Our next work (2) is to look at each of the equations separately.

1) Let us proceed to the equations of the form x × a = b and a × x = b. When a and b are natural numbers, the solutions of these equations are natural numbers without any restrictions. In the first and second and even in the third grade, care must be taken when choosing equations whose solution is not a natural number, as well as textual problems whose solution requires an integer.

Because after going through the topic of fractional numbers, it is necessary to study equations whose solution consists of fractional numbers.

The solution of our next work is to look at the equations of the form x ÷ a = b and a ÷ x = b, which can be found using the operations of division and multiplication.

x: a = b the solution of this equation is found by the formula x = a × b. When a and b are natural numbers, the solution of the equation is also a natural number, which is unique. a: x = b the solution of this equation is in the form x = b ÷ a, and even if a and b are natural numbers, the solution can be a fractional number without a natural number. When the teacher gives an example of an equation or finds a solution based on the content of the problem text, the solution is to solve the equations of the form x = b: a and avoid the situation where a = 0.

Because an equation of this kind has an infinite number of solutions.

But the solution of all the problems encountered in Gayot requires that the equations be of the same value.

In general, the solution to such problems would be to recommend that equations with two-digit numbers be studied in the second and third grades, and equations with three-digit numbers be studied in the third and fourth grades.

It would be expedient to teach equations given by multiplication and division operations from the end of the second and third grades and in the fourth grade, respectively, depending on their weight level and the number of arithmetic operations involved in them.

If we look at the equations given in the third and fourth grade math textbook, we can see that the equations given by one and two operations are given.

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Depending on the level of mathematical knowledge of the students, it is possible to include in the fourth grade mathematics textbook equations with three operations, in which case we think that only the numbers involved in the equation should not be too large.

Teaching primary students to solve textual problems requires some preparation.

The teacher should ensure that the teaching students to solve the problem from numerical and literal expressions to equations is a gradual process.

As our great Methodist scholars have said, follow the advice of " Solving 1 example in 20 different ways is more beneficial to students than solving 20 examples in the same way ".

In this case, a special problem is chosen so that the solution can be solved both arithmetically and algebraically, but to solve the problem arithmetically, additional-auxiliary concepts are selected. In this situation, the teacher, in collaboration with the students (using questions and answers), begins to look for other ways to solve the problem. Then the student sets the unknown number in the solution of the problem to x and finds the root of the equation. He also explains that it is easy to find the number we are looking for by solving the equation, and that solving the problem in this way is an algebraic method. Here is an example of this.

EXAMPLE. If a number and the part of 3/4 of it is 21, find out what that number itself is equal to.

From the content of the problem, it is clear that this problem can be solved in both arithmetic and algebraic methods.

If we try to solve the problem arithmetically, we will have to use the notion of a ratio that is not yet well mastered by primary school students.

Therefore, as mentioned above, if we denote the number sought to find the solution of this problem by x, then, depending on the condition of the problem,

$$x + 3 / 4x = 21$$

This equation is familiar to 3rd graders and can be easily solved:

$$\frac{4x+3x}{4}=21 \quad ; \quad \frac{7x}{4}=21 \quad ; \quad 7x=84 \quad ; \quad x=84/7 \quad ; \quad x=12$$

When solving examples with numerical and literal expressions and equations, the teacher should give information about parentheses and explain the rules of their use.

The role of parentheses in mathematical calculations is great. With this in mind, we need to focus on prizenting assingments, designed to give students a better understanding of when and in what sequence to use small, medium, and big parentheses.

You will need to prepare for the publication of an article on the use of parentheses and their place in elementary school math lessons.

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International Journal of Culture and Modernity
ISSN 2697-2131, **Volume 8**
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