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Conceptualization of mathematical expression in students

IBRAHIM RUSTAMOV
Assistant Professor
Nakhchivan State University
Azerbaijan

Abstract:

The article says that one of the most important concepts learned in the elementary course of mathematics is the concept of mathematical expression. This concept is used since the first lessons of the first class. Therefore, a special attention should be given to the teaching methods of the concept of mathematical expression.

It is explained that the concept of mathematical expression is learned well when it is associated with mathematical problems.

It is also mentioned in the article that the formation of mathematical expressions and the use of them in problem solving have good influence on the development of mathematical thinking of primary-school-age children.

At the end it is concluded that expression in third and fourth classes must be chosen in such a way that you mustn't only calculate the value of expression, but also must repeat and strengthen the knowledge and skills here.

Key words: mathematical expression, student, problem, operation, concept, class, number.

One of the most important concepts learned in the elementary course of mathematics is the concept of mathematical expression. This concept is used since the first lessons in the

first class. Therefore, a special attention should be given to the teaching methods of the concept of mathematical expression.

Mathematical expression is learned well when it is associated with mathematical problems. For example: There are 45 passengers in a bus. 8 out of them get off the bus in the station and 12 passengers get on the bus. How many passengers are in the bus now?

This problem can be solved in two ways. 45-8+12. The requirements of the problem can be met by performing operations shown through this formula. Such formula of problem solving is called mathematical expression.

Mathematical expressions can be ordinary and complex. Ordinary mathematical expressions are formed by entering addition, subtraction, multiplication and division signs between two numbers (for example: 3+2, 10-4, 14 · 12, 12: 3 etc.). And complex mathematical expressions can be formed by entering two or more operational signs among several numbers: for example: (15:3-8·12) · (125:5-36:9)+212.

The problems made up by the participation of four calculation operations are enough for elementary classes. The mathematical expression is called by name of the last operation to be performed there. The operation of addition will be performed finally in the expression 13·3-12+4, so this expression is called sum expression, and the expression 71-26-2 is called difference expression etc.

The number obtained after performing the operations shown in mathematical expression is called numerical value of mathematical expression. Numerical value of mathematical expression 12:4+17 is 20. In particular context the numerical expression may consist of a number. In this case, the value of the numerical expression is itself the same number.

There can be expressions without numerical values. For example: the expression 14:(8-8) has no numerical value. Because the expression requires divide-by-zero. But this is not possible. It is necessary to consider the majority while calculating the value of numerical expression. The calculation

not possible in the majority can be conducted in the other majority.

Congruence relations of numerical expressions have the properties of reflectivity, symmetry and transitiveness. Therefore, the majority of numerical expressions can be divided into classes. The same class includes the numerical expressions with the equal numerical values.

Elementary school students study mathematical expressions since the first class. They firstly study ordinary numerical expressions such as 1+1; 2+1; 3+1. The students, here mostly study written numbering.

The first class students study mathematical expressions like 1<2; 2>1; 2=2 by comparing figures or numbers given in the textbook since the first lessons. In addition to the written expressions, they also learn spelling and meaning of symbols here.

In the following lessons, symbols are given to form a numerical expression and the students are required to write numerical expressions matching the symbols.

For example, the symbols such as □+□=□;□-□=□;□>□;□<□ are given. And these symbols are the first step to form a numerical expression.

It is recommended to form the first numerical expressions by adding them one by one and subtracting one by one. These also contribute to the formation of concept of numbers.

In the textbooks for the first class students the images of various colourful chickens, hens, and figures are given and the students are required to form numerical expressions by using them. Numerical expressions gradually become more complicated. And the numerical expressions with the equal numerical values are formed step by step.

After teaching the numerical expressions by increasing one unit and decreasing one unit within 10, they are taught by increasing and decreasing in groups. This operation is completed by the formation of addition and subtraction table

within 10. After that, the numerical expressions such as 2-1<2; 2+1>2 are compared. In order to clarify how the first and second class students have learnt numerical expression, the tables where missed symbols and numbers given below are required to be written:

5 > 2	**16 12**	**9 13**
4 8	**9 12**	**20 11**
17 13	**10 10**	**14 19**
6 14	**16 14**	**16 15**

Exercise. Type the symbols < or > that match the empty boxes.

8 [>] 5+2	**6+3 □ 15-5**	**20-2 □ 16+1**
9-1□ 7	**7+4 □ 9+3**	**19-3 □ 18-3**
9 □ 12-2	**14-1 □15-3**	**15+1□ 15+2**

Once the students in upper classes have adopted certain concepts related to the mathematical expressions, they are directed to form mathematical expressions by entering unknown numbers:

x+8=10 x+3=9 5+x=7 7+x=10

The expressions which are more complex and related to multiplication and division within 100 are taught at the second and third classes. The expressions containing letters are used from the first days and variables are entered in expressions. So, the concept of equation appears. Here the aim is to calculate the value of mathematical expressions, as well as to teach the

method of finding the values to be written in place of "symbols" in the expression.

Along with the methods of finding the values of components, the students also learn to find the unknown number given in the mathematical expression by way of comparison. For example, commutative property of multiplication is used to find the unknown number in the expression $x \cdot 17=17 \cdot 35$: Here it is found that $x=35$ by comparison.

In order to further strengthen the knowledge on mathematical expression in the third and fourth classes, the expressions are formed while solving problems. So, the students study the procedures for the use of letters in the spelling of mathematical expressions, calculation of numerical values of these expressions in the values of letters given and solve the simple equations ($x+1=12$; $10+x=15$; $x-3=6$; $10-x=2$) about finding unknown addend, subtrahend, minuend expressed with letter by testing method.

As noted above, formation of mathematical expressions and use of them in solving problem serve to the development of mathematical thinking in the young students.

In this case, it is very useful to form an issue in accordance with the expression given. For example, the task of "form a problem in accordance with expression 28 ·3+2" is very lucky.

In the third and fourth classes the skills to define the order of operations in the expressions with three and four operations, to be able to read expressions given and to calculate the value of expression in the certain values of letters are taught.

As the students are able to read and write expression, they must also distinguish the expression with variable from equalities with variable. Let's take numerical expression 2 + 7. If we write the number 4 in place of the number 2 and keep the second item constant, then we will get the expression 4+7. If we type the number 15 in place of the first item, we will get the

expression 15+7. In general, if we keep the second (first) item constant in the expression given and type an arbitrary number from majority of natural numbers in place of the first (second) item, we will get a mathematical expression as 4+7. Here the number x shows a natural number to be written in place of the first item.

The letter written in the mathematical expression is called variable and the expression itself is called the expression of variable. Expressions have one, two etc. variables. For example: x+7 is expression of one variable, 2x+y is expression of two variables.

Students study the expressions of variables in elementary schools. They can read the expressions 35+a, (35+a)-7; (35+a)+7, calculate the numerical value of the expression in the values 0, 5, 7, 15.

In the third and fourth classes the expressions are chosen in such a way not just to calculate the value of the expression, but also to repeat and strengthen the knowledge and skills here.

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