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THE ROLE OF TASKS IN THE DEVELOPMENT OF REFLEXIVE ABILITIES IN STUDENTS IN THE PROCESS OF LEARNING MATHEMATICS

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Abstract

The problem of developing the reflexive abilities of each schoolchild is one of the complex, multifaceted and always relevant problems. Reflection is a universal property of the psyche that ensures the success and effectiveness of an individual's activities.

The article presents various types of reflexive tasks that contribute to the development of reflexive abilities.

Keywords: *reflection, ability, reflexive task, optimality of the method, result of activity, research task, provoking task, self-control*

Introduction

An important goal of teaching in a secondary school is to improve the quality of students' mathematical education. Improving the quality of students' mathematical knowledge largely depends on deepening the student's understanding of mathematical material. One of the means of deepening the understanding of mathematical material is the formation and development of the student's reflective activity. And the development of a student's reflective activity depends on his experience in solving reflective problems.

The role of reflection in learning has been studied by many scientists. But they all agree that the effectiveness of the teacher's influence on students increases due to the activation of reflexive processes. One of such means of activating reflexive processes is the systematic solution of reflexive problems (Далингер В.А., 2014).

Solving reflective problems is seen as a tool that allows the student to understand the process of solving a problem. Solving reflective problems helps students develop the ability to "independently analyze the process of solving a problem" and "critically evaluate their learning activities."

Solving reflective problems serves to develop the following educational skills in students:

– the ability to analyze the condition of the problem in order to identify the main connections in a given educational situation;

– ability to model identified connections;

– ability to generalize methods for solving similar problems.

Leading methodologists identify the following types of reflexive tasks:

– tasks related to finding errors in the proposed solution example;

– tasks related to finding errors in proposed judgments;

– provoking tasks;

– research tasks.

Below are some examples of reflective tasks.

First, let's look at the research questions:

Problem 1. In an aquarium in the shape of a rectangular parallelepiped, 40 cm high and with a base area of 1200 ⟦cm⟧^3, there are 8 red, 4 yellow and 12 white fish.

Question 1. Find the dimensions of the aquarium if the width of its base is 10 cm less than its length.

Solution. Let us denote the width of the base by u. Then we have:

$$u(u+10)=1200,$$

$$u^2+10u-1200=0,$$

$$u=30cm,\quad u+10=40\ cm.$$

This means that the length of the aquarium is 40 cm and the width is 30 cm.

Answer: 30 cm and 40 cm.

Question 2. Find how many ⟦dm⟧^3 volumes of the aquarium are there for each fish?

Solution. According to the conditions of the problem, the height is 40 cm, the width is 30 cm, and the length is 40 cm. Then the volume of the aquarium will be

V = 30 · 40 · 40 = 48000 ⟦cm⟧^3=⟦ 48dm⟧^3.

According to the problem, there are 8 + 4 + + 12 = 24 fish in the aquarium.

This means V/24 = 48/24 = 2 ⟦dm⟧^3.

Answer: 2 ⟦dm⟧^3.

Question 3. Rashid pulled out 2 white fish from the aquarium. Find the probability that a randomly drawn fish is white or red.

Solution. After 2 white fish are pulled out, 10 white, 4 yellow and 8 red fish will remain in the aquarium. First, let's find out what percentage of the fish in the aquarium are yellow?

$$P=\frac{4}{22}=\frac{2}{11}.$$

Then the probability that a randomly drawn fish is not yellow is equal to

$$P=1-\frac{2}{11}=\frac{9}{11}.$$

Task 2. In a school with 500 students, there are 2 clubs – football and chess. Each student can attend one or both clubs. 35% of students do not attend any of the clubs.

Question 1. $\frac{2}{13}$ of the students attending clubs attend both clubs. Find their number.

Solution. First, let's find the number of students attending at least one of the clubs:

$$500 \cdot 0.65 = 325.$$

Of the 325 students, $\frac{2}{13}$ attend both clubs. Means,

$$325\times\frac{2}{13}=50$$

Students attend both circles.

Question 2. Find the number of students attending only one of the clubs if the number of students attending the chess club is half as many as attending the football club.

Solution. Since the number of students attending both clubs is 50, we have:

325 = u +2 · u – 50, 3 · u = 275, u = 125.

Here u is the number of students attending the chess club.

Example. Find the error in the following evidence:

a) "$\frac{1}{25}>\frac{1}{5}$".

Proof:

$$\frac{1}{5}=\frac{1}{5},$$

$$\ln\frac{1}{5}=\ln\frac{1}{5},$$

$$2\cdot\ln\frac{1}{5}>\ln\frac{1}{5},$$

$$\frac{1}{25}>\frac{1}{5}.$$

The error in this proof is that $\ln\frac{1}{5}<0.$

b) "8 = 3"

Proof: Let us solve the system of two linear equations:

$$\begin{cases} x+2y=8? \\ y=6-\frac{x}{2} \end{cases}$$

Substituting y from the second equation into the first, we get:

$$x+2\left(6-\frac{x}{2}\right)=8$$

$$x+3-x=8.$$

$$3=8.$$

The error in this proof is that the value of $x+2y$ in the first equation is taken to be 8, and in the second it is 12.

c) "Half of any number is equal to half of its opposite."

Proof: Take an arbitrary number a and set $b=-\frac{a}{2}$. Then we have that $2\cdot b+a=0.$ Multiplying both sides of the last equality by a we get: $2\cdot ab+a^2=0.$ Adding b^2 to both sides, we get: $b^2+2ab+a^2=b^2$. Taking the square root of both sides of the last equality we get: $b+a=b.$

Since, by condition $b=-\frac{a}{2}$, then from the last equality we have:

$$-\frac{a}{2}+a=-\frac{a}{2} \text{ or } \frac{a}{2}=-\frac{a}{2}.$$

The first mistake in this "proof" is that the case $a = 0$ is not taken into account.

The second mistake is that both sides of the equality cannot be multiplied by a variable that can take the value zero.

The third error is when taking the square root of both sides of an equation.

The above examples show that reflective tasks help students develop assessment skills:

– assessment of the results of activities;

– assessment of the optimality of the method of action;

– assessment of the generality of the method of action.

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