DEVELOPING STUDENT MATHEMATICAL LITERACY

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ABSTRACT

The following article deals with information about the ways of building students' mathematical skills and competencies. The students' mathematical literacy status, mathematical competence and competence levels are also illustrated on the basis of examples.

Keywords: Mathematics, teaching, practice, work skills and competencies, competence, pedagogy, method, technology, activity.

INTRODUCTION, LITERATURE REVIEW AND DISCUSSION

Mathematical literacy refers to the ability of students to identify and solve problems in real life using mathematics, to express these problems in mathematical language, to solve these problems using mathematical facts and methods, to analyze used methods, to explain and interpret the results obtained taking into account the problems to formulate, express and record results and solutions.

The state of mathematical literacy of students is characterized not only by the availability of materials in the chosen content area, but also by the level of development of "mathematical competence".

Students' mathematical competence is assessed as a "set of knowledge, skills, experience and abilities in mathematics" that allows them to successfully solve a variety of problems that require the use of mathematics [1].

Research on mathematics teaching methods has shown three levels of mathematical competence: the level of recovery, the level of communication, and the level of reasoning [2].

The following types of activities are also identified in such studies to determine the level of mathematical competence:
a) Recovery (repetition), definitions and calculations;
b) The connections and integration needed to solve the problem;
c) Mathematical modeling, logical thinking, generalization and intuition.

These types of activities are listed in ascending order. However, this does not mean that the previous types need to be mastered in order to perform the next type of activity. For example, you don’t have to master calculations to start mathematical thinking.

We will look in detail at each level of competence listed above. In particular, **the first level of competence** is recovery (repetition), definition and calculation, in which competencies are tested in many standardized tests, mainly in the form of tasks such as answer selection tasks. This level of competence includes knowledge of various facts, reconstruction of properties, recognition of peer mathematical objects, implementation of standard algorithms and

procedures, use of standard methods and algorithmic skills.

Example 1: Two-wheeled and three-wheeled bicycles of equal quantity are sold in a children's toy store. What can be the total number of wheels on all bikes?

A) 16; B) 24; C) 25; D) 28; E) 33.

Solution. Since the number of two- and three-wheeled bicycles is equal, their number of wheels must be multiplied by 5. Correct answer: C) 25.

Example 2. Three friends went on a trip and decided to buy a tent. The first paid 60% of the price of the tent, the second 40% of the rest of the price, and the third - the last $ 30. How much does a tent cost?

A) $ 120; B) $ 150; C) $ 90; D) $ 125; E) $ 100

Solution. Suppose the price of a tent is in a dollar currency.

Then the first of them: $0.6x$, the second: - $0.4x \times 0.4 = 0.16x$, the third paid $x - (0.6x + 0.16x) = 0.24x$ dollars. According to the task, a third friend paid $ 30. So, $0.24x = 30$ or $x = 125$. The tent costs $ 125. The correct answer is D) $ 125

The second level of competence is the connections and integration that is required to solve a problem, while the second level of competence involves identifying connections between different fields, sections, and topics in mathematics to solve simple problems. These tasks cannot be included in standard tasks, but the situation seen in them requires a deeper mathematical knowledge. At this level of competence, students will need to have the skills to present the information given according to the terms of the assignment and to pose the problem according to the task. In order to make connections between materials from different sections of mathematics, students are required to be able to distinguish concepts, conditions, proofs, affirmations, and examples and relate them. This level of competence also includes the ability to interpret the content of writings written in a language formalized with different characters, translating them into a common language. In terms of tasks that depend on this level of competence, students suggest a specific situation that requires decision-making depending on the specific characteristics of the situation.

For example, **Example 1**: To develop the scale of entrepreneurship, the two partners have allocated 50,000 currencies. Due to changes in prices in the market, the former increased its share by 30 percent and the latter by 70 percent. The total capital of the result was 81,000 currency units. How much did each partner contribute?

Solution. This situation can be modeled as a system of linear equations with two variables.

Suppose x is the contribution of the first partner, y is the contribution of the second partner.

After the price increase, the share of the first partner will be $1.3x$ and the contribution of the second partner will be $1.7y$.

The result is the following system of linear equations:

$$\begin{cases} x + y = 50000 \\ 1,3x + 1,7y = 81000 \end{cases}$$

Solving it, we have found that the first entrepreneur contributed 13,000 and the second 68,000 currency.

Example 2. Three friends played the game. The game leader distributed cards numbered from 1 to 8 to two players. He dealt 3 cards to the first player and 5 cards to the second. As a result, the sum of the card numbers in them was the same in both.

The third participant made the following comments:

1) Three odd-numbered cards in the second player;

2) Card number 2 is in the second player;
3) Card number1is not in the first player.
Is he right?

Solution. Since the sum of the card numbers in the players is the same, they make up half of the sum of all the numbers from 1 to 8. So the sum of the card numbers in them (1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 = 36 half) equals to 18.
So the first player who had three cards can have 5, 6 and 7 or 3, 7, 8 number cards. Because the sum of the numbers on the cards were less than 18. Then the second player can have cards with numbers 1, 2, 3, 4 and 8 or 1, 2, 3, 5 and 7 or 1, 2, 4, 5 and 6. So the first idea is right, the second is right, and the third is right.
Answer: 1) No, 2) Yes, 3) Yes.

The third level of competence is mathematical modeling, logical thinking, generalization, and intuition, which requires students to mathematically model a situation presented in the third level of competence. The use of mathematics, finding a solution with the help of mathematical considerations, the necessary mathematical proofs, generalizations and activities involves the learner to critical thinking, analysis, and observation.

Students should not only be able to solve the proposed problems, but also formulate them in accordance with the situation in the problem, as well as have a deep understanding of the content and essence of mathematics as a science. This level of competence is the highest peak of mathematical literacy, stands at its center, and poses great challenges in the assessment and testing process. It is not advisable to use tests in which the answers are selected to evaluate the results obtained on it. Assignments with an open answer are appropriate for this level. Developing and evaluating such assignments is a daunting task.

For example, Bank A exchanges $ 1 for 3,000 dinars (conventional currency) and receives 7,000 dinars for the service, no matter how much money it exchanges. Bank B exchanges $ 1 for 3,020 dinars and receives $ 1 for the service and will take it over as shown. The traveler found that exchanging a certain amount of money in these banks was no different for him. How much money did you want to exchange?

Solution. Let the traveler want to get x dollars from the bank. In return, he gives dinar (3000x + 7000) dinars to bank A and 3,020 (x + 1) dinars to bank B.
Conditionally, we have the following equation:
3000x + 7000 = 3020 (x + 1),
Solve it and find that x = 199.
So the traveler wants to exchange a total of 3020 × 200 = 60400 dinars.
Answer: The traveler wants to exchange 60,400 dinars, for which he will receive $ 199.

Based on the above analysis, the following requirements can be placed on their knowledge and skills to develop students' mathematical literacy [3]:
-searching and using mathematical definitions, formulas and other facts from textbooks and reference books;
-applying knowledge, skills and graphic skills in algebra in different life situations;
-collecting data, analysis, processing, synthesis;
-using of mathematical formulas, independently formulate formulas representing the relationship between quantities on the basis of generalization of certain special cases;
-applying mastered algebraic substitutions and functional graphic representations and representations in the expression and analysis of related objects in the surrounding or other

disciplines;
-to substantiate one's point of view, to participate in its discussion and to draw logically correct conclusions;
-working with mathematical text (analysis and extract the necessary information), be able to clearly and accurately express their ideas using mathematical terms, symbols, and express themselves orally and in written form;
-solving practical problems of a practical nature, if necessary, to use the necessary references and computing tools to solve them;
-analyzing tables, diagrams, real digital data in graphical form, as well as statistical data;
-using modern information technologies as a means of solving mathematical problems of a practical nature.

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