



**METHODS FOR FORMING CRITICAL THINKING IN MATHEMATICS  
LESSONS IN PRIMARY EDUCATION**

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A B S T R A C T	K E Y W O R D S
<p>This article shows the practical application of the technology of forming critical thinking in the process of teaching mathematics to elementary school students.</p>	<p>Critical thinking, thinking methods, problem research, palette, surface, polygon, perimeter.</p>

**Introduction**

Today, the ability of primary school students to solve practical problems, to be able to integrate knowledge into various areas of practical activity, applying knowledge in non-standard situations and transferring it to new forms of activity is one of the main tasks. in front of every teacher. To do this, it is necessary to teach students: rational methods for solving a specific problem, adequate assessment of the state of events, substantiation of conclusions, putting forward new ideas, responsibility for their own opinion, development of intellectual potential.

The famous philosopher T. Edison wrote that one of the most important tasks of civilization is: "Teaching a person to think."

Practical experience shows that if a person does not master the methods of thinking: analysis, synthesis, generalization, thinking, a person cannot think, analyze facts and put forward hypotheses, make correct assessments, draw reasonable conclusions, draw critical conclusions. learn to let go.

Critical thinking is based on the use of cognitive technologies or strategies that increase the likelihood of achieving a desired end result. Critical thinking:

- ability to check facts, evidence, reliability of information sources;
- the ability to ask reasonable questions in certain situations;
- the ability to correctly define the problem and develop additional various reinforcements for the arguments put forward;
- the ability to analyze ideas, proposals and make independent, thoughtful decisions;
- the ability to take a critical position and think outside the box;
- ability to be sociable.

The main goal of developing critical thinking is the formation, development and expansion of scientific competencies for the effective solution of social, scientific and practical problems. Depending on the age of the subject of education, the level of his knowledge, practical orientation and previous experience in the modern education system, various tasks of developing critical thinking are solved.

Explaining the stated thoughts and concepts, we understand the system of critical actions under the critical thinking of younger schoolchildren:

- manifestation of children's curiosity;
- expressing your opinion on a specific issue in the current situation;
- the ability to observe, compare, identify and defend one's opinion using well-founded logical arguments;
- the ability to predict a situation, problem and the ability to apply research methods in practice.

Obviously, critical thinking begins with asking questions, so in preparing for lessons that involve critical thinking, the teacher should identify problems and help students formulate these problems if they are able to understand them.

Let us note that one of the main conditions for critical thinking is the subject's knowledge of the rules of logic, classification, comparison and generalization. It is important for schoolchildren to learn a certain algorithm of critical thinking, which consists of a conscious need: observe, describe, compare, identify, correlate, draw conclusions, predict, apply.

The formation of critical thinking in younger schoolchildren occurs in several stages:

- memory, characterized by the revival of known facts, ideas and concepts in an academic subject;
- recovery, that is, the student must be able to follow the algorithm;
- justification for completing the task, i.e. generalization of the event being considered by the subject according to a general principle or concept;
- reorganization, that is, the student transforms the initial conditions of a certain problem into a new problem situation, which allows one to find an original solution;
- interdependence of knowledge, based on the combination of newly acquired knowledge with previously acquired knowledge or personal life experience;
- reflection, which consists in studying the thought itself and the reasons for its appearance.

We provide examples of the use of methods for developing critical thinking.

For example, in the process of studying the topic "Finding the edge of a figure using a picket fence," the teacher sets the following goals:

- 1) developing practical skills in finding the edge of a geometric figure using a palette;
- 2) developing the ability to critically evaluate and understand information;
- 3) formation of basic research skills;
- 4) develop the ability to work in a group.

Paper "footprints" of some students' shoes on the board or computer screen to achieve a goal.

These are your shoe prints. Each path occupies a certain area. Arrange them in descending order of size.

Students offer different sequence options.

How to come to an agreement? Can certain methods be used to detect a figure's face? (-No, we can't.)

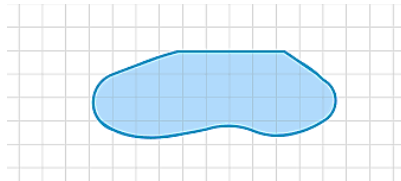
Why? (- We can only detect the edge of rectangles and squares, and these shapes are curved.)

Tell me about the problem. (- How to determine a curved face?)

Here, the stage of formation of critical thinking is the actualization of students' knowledge, it consists in arousing interest, interest in the topic, problem, identifying the face of unique shoe prints (curved shapes).

Comprehension of new information and its critical reading occurs in the process of working with the 4th grade Mathematics textbook, when students read the text “How to measure the surface of a figure using a palette.” “You know that a surface is the interior of a geometric figure. The unit of surface is the area of a unit square. For example, 1 square centimeter is the surface of a square with a side of 1 cm (so 1 dm<sup>2</sup>, 1 m<sup>2</sup>, 1 km<sup>2</sup>). Finding the face of a figure means counting how many unit squares it contains.

The palette is used to find a face with a curved shape. The pallet is a transparent plate divided into square centimeters.



In the figure, the palette is superimposed on the picture. To find the edge of a figure, you need to count how many complete squares there are in this figure (19). Then count how many incomplete squares there are in this picture (22). Divide the partial squares by 2.  $22:2=11$ . Add up the results:  $19+11=30$ . Answer: the edge of this figure is 30 squares.

Thinking or reasoning based on personal opinion and the formation of an attitude towards newly received information involves improving the plan for calculating a face with a curved shape.

□ What are the steps to calculate the face of a shape using the palette? Information provided by several readers. (- First you need to apply a palette to this image; count the number of complete squares in the image; count the number of incomplete squares in the image; divide the resulting number by 2; add the resulting numbers. This is the value of the face of the figure.

Generalization and assessment of the information provided by the problem, ways of solving it and one’s own capabilities should be obtained in the process of practical work, when students begin to calculate the surface of the “trace”.

To solve this problem, each group receives a “trace” - a worksheet on which it is necessary to identify its person, in which the count of the person and the final result should be recorded (in this case, each group member has a specific role, task; group members complement each other).

The exchange of information and its organization consist in the fact that each group presents the results of their calculations to the class, and the teacher puts the results on the board.

Based on the information received, students return to the problem at hand and construct a sequence of shoe prints: this is the thinking stage.

Teacher: “Where can I find a surface using the palette used in life?” when posing a question, there is nothing more than a real connection between newly acquired knowledge and the new knowledge that will be required in practice.

Students answer that the palette knife method of measuring surfaces is used to measure curved shapes; when purchasing parts made from animal skins. This method can also be used for cutting clothing, shoe parts and other processes (Information provided by group members).

Next task: measure the lengths of the sides of the polygons. Find the perimeters of polygons using the rational method.



Completing a task is associated with the discovery of new knowledge. (all sides are the same length). Completing a task requires using a problem-solving method. The notation for the solution looks like this:  $3 \cdot 6 = 18(\text{cm})$ ;  $3 \cdot 5 = 15(\text{cm})$ .

The acquired new knowledge is developed and consolidated in the process of solving the next problem.

Measure the lengths of the sides of the rectangle. Find the perimeter using any method. Choose a reasonable method.



Primary reinforcement is performed with annotations and requires knowledge of the properties of the rectangle. A quadrilateral is a polygon in which all angles and opposite sides are the same length. Primary reinforcement requires knowledge of the characteristics of the square. A square is a rectangle with all sides equal.

After completing the task, students go to their notes, choose the appropriate method and decide:

a)  $(2+4) \cdot 2 = 12(\text{cm})$ ; b)  $2+2+2+2=8(\text{cm})$ ;

$2 \cdot 2 + 4 \cdot 2 = 12(\text{cm})$ ;  $2 \cdot 4 = 8(\text{cm})$ ;

The importance of the lesson lies in the active position of students, in independently choosing a reasonable way to solve a problem.

The proposed tasks solve an educational-cognitive, communicative-developmental, socially-oriented problem that prepares students for critical understanding of the information received and the use of the acquired new knowledge in real practice. The formation of critical thinking here is associated with new approaches to solving problems: opposite sides are equal, therefore a reasonable method for finding the sum of two sides multiplied by 2; all sides are equal, so a reasonable way to do this is to multiply the length of one side by the number of sides.

An analysis of the work experience of primary school teachers shows that critical thinking plays an important role in new non-standard forms of teaching.

The most important task of modern education is the formation of universal educational activities that provide schoolchildren with the ability to learn, self-development and self-improvement. Therefore, primary school teachers should pay special attention to the need for comprehensive and timely development of critical thinking, creativity, self-education and personal self-awareness.

Thus, when faced with new information, students must consider new ideas from different perspectives in order to be critical. This means that critical thinking must become the strategic foundation of the current education system.

The teacher is the most important link in this process and contributes to the formation of critical thinking of the subject of the educational process in primary school.

## References

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