DEVELOPMENT OF LOGICAL THINKING IN MATHEMATICS LESSONS IN PRIMARY SCHOOL UNDER THE CONDITIONS OF THE INTRODUCTION OF THE NATIONAL CURRICULUM

Burkhonov Sattor Asimovich
Candidate of Physics and Mathematics, Associate Professor at Tashkent State Pedagogical University named after Nizami

https://doi.org/10.5281/zenodo.10287309

Abstract. *The main goal of mathematics education should be the development of the ability to mathematically, and it turns out, logically and consciously investigate the phenomena of the real world. The realization of this goal can and should be facilitated by solving various kinds of non-standard logical problems in mathematics lessons. Therefore, the use of these tasks by a school teacher in mathematics lessons is not only desirable, but even a necessary element of teaching mathematics.*

Non-standard tasks require increased attention to the analysis of conditions and the construction of a chain of interconnected logical reasoning.

Keywords: *arithmetic, actions, additions, multiplications, divisibility, division, subtraction, equations.*

Logic is the science of the laws and forms of correct thinking. She studies forms of reasoning, abstracting from specific content, establishes what follows from what, and seeks an answer to the question: how do we reason? The founder of logic as a science is the ancient Greek philosopher and scientist Aristotle. He first developed the theory of logical inference. The term “logic” comes from the Greek word “lotus”, which means “to think”, “reason”.

No one will argue that every teacher should develop the logical thinking of students. This is stated in the methodological literature, in explanatory notes to educational programs. However, the teacher does not always know how to do this. This often leads to the fact that the development of logical thinking is largely spontaneous, so the majority of students, even high school students, do not master the initial techniques of logical thinking (analysis, comparison, synthesis, abstraction, etc.) [10]

The role of mathematics in the development of logical thinking is exceptionally great. The reason for such an exceptional role of mathematics is that it is the most theoretical science studied in school. It has a high level of abstraction and the most natural way of presenting knowledge is the way of ascending from the abstract to the concrete.

The most famous Russian teacher V. Sukhomlinsky devoted significant attention to the issue of developing logical thinking among younger schoolchildren in his works. The essence of his thoughts boils down to the study and analysis of the process of solving logical problems by children, while he empirically identified the peculiarities of children's thinking. He writes about work in this direction in his book “I Give My Heart to Children”: “There are thousands of problems in the world around us. People invented them; they live in folk art like riddle stories.”

Sukhomlinsky observed the progress of children’s thinking, and observations confirmed that “first of all, it is necessary to teach children to cover with their mind’s eye a number of objects,

phenomena, events, to comprehend the connections between them... Studying the thinking of slow-witted people, I became more and more convinced that the inability to comprehend, for example, a task - a consequence of the inability to abstract, to be distracted from the concrete. We need to teach children to think in abstract concepts." [12]

The national curriculum in Uzbekistan and the educational standard of the new generation sets new goals for primary education. Now in primary school a child must be taught not only to read, count and write, which is still being taught quite successfully. He must be taught two groups of new skills. We are talking, firstly, about universal learning activities that make up the ability to learn: the skills of solving creative problems and the skill of searching, analyzing and interpreting information. Secondly, we are talking about developing children's motivation for learning, self-development, and self-knowledge. The teacher, who previously taught the children simply mathematics as such, will now have to solve new non-standard problems using material familiar to him. It follows that already in elementary school, children must master the elements of logical actions (comparison, classification, generalization, analysis, etc.). Therefore, one of the most important tasks facing a primary school teacher is the development of independent logic of thinking, which would allow children to build conclusions, provide evidence, statements that are logically related to each other, draw conclusions, justifying their judgments, and, ultimately, independently acquire knowledge. Mathematics is precisely the subject where this can be realized to a large extent [5].

By developing our logical thinking, we contribute to the work of the intellect, and intellect is a guarantee of a person's personal freedom and the self-sufficiency of his individual destiny. The more a person uses his intellect in analyzing and assessing what is happening, the less susceptible he is to any attempts to manipulate him from the outside.

Today, the secondary school acts as the public institution that is most directly responsible for the quality of human history. It is not surprising that in societies oriented towards a progressive development scenario, government investment in education is quite significant. For it is already clear that those countries that are able to create the most advanced education system, guaranteeing extensive and intensive development of the intellectual abilities of the younger generation, are winning and will benefit economically and culturally.

Each generation of people makes its own demands on school. Previously, the primary task was to equip students with deep knowledge, skills and abilities. Today, the tasks of a comprehensive school are different. Studying at school does not so much equip you with knowledge, skills, and abilities. The formation of universal educational activities that provide schoolchildren with the ability to learn, the ability to select what they need from a mass of information, self-development and self-improvement comes to the fore. New Federal educational standards for general education of the second generation have appeared, which state that the main goal of the educational process is the formation of universal educational activities, such as: personal, regulatory, cognitive, communicative. In accordance with the standards of the second generation, cognitive universal actions include: general educational, logical, as well as formulation and solution of problems.

Logical universal actions include:

— analysis of objects in order to identify features (essential, non-essential);

- synthesis - composing a whole from parts, including independent completion with the completion of missing components;

— selection of bases and criteria for comparison, seriation, classification of objects;
— summing up the concept, deriving consequences;
— establishing cause-and-effect relationships;
— building a logical chain of reasoning;
- proof;
— putting forward hypotheses and their substantiation.

From the above it follows that already in elementary school children must master the elements of logical actions (comparisons, classifications, generalizations, etc.). Therefore, one of the most important tasks facing a primary school teacher is the development of all qualities and types of thinking that would allow children to build inferences, draw conclusions, justify their judgments, and, ultimately, independently acquire knowledge and solve emerging problems.
The practical significance of the work is that the materials can be used in the practice of primary school teachers interested in the intellectual development of their students, and, first of all, young professionals [6].

The thinking of a child of primary school age is at a critical stage of development. During this period, a transition occurs from visual-figurative thinking, which is basic for a given age, to verbal-logical, conceptual thinking.

Starting from 1st grade, I introduce special tasks and tasks aimed at developing the cognitive capabilities and abilities of children. I use additional developmental tasks, logical tasks that require the application of knowledge in new conditions.

The formation of logical thinking is the most important component of the pedagogical process. Helping students fully demonstrate their abilities to develop initiative, independence, and creativity is one of the main tasks of a modern school. The ability to think logically, to make inferences without relying on visual evidence, to compare judgments according to certain rules is a necessary condition for the successful assimilation of educational material. The main goal of working on the development of logical thinking is for children to learn to draw conclusions from those judgments that are offered to them as initial ones.

The successful implementation of this task largely depends on the formation of cognitive interests in students. Mathematics provides real prerequisites for the development of logical thinking. My task is to make fuller use of these opportunities when teaching children mathematics. However, there is no specific program of logical thinking techniques that should be formed when studying this subject. As a result, work on the development of logical thinking proceeds without knowledge of the system of necessary techniques, without knowledge of their content and sequence of formation [8].

Learning is a two-way process: children work, the teacher works; he leads students, directs their mental activity, organizes and directs.

The problem of developing a child’s cognitive interest is solved by means of entertainment in teaching mathematics. However, more use should be made of the so-called “internal” fun of mathematics itself, which is closely related to the educational material being studied, and the innate curiosity of young children. “Internal” entertainment is the emergence of unusual, non-standard situations with concepts already familiar to children, the emergence of new “whys” where, it would seem, everything is clear and understandable (but only at first glance). What should you teach your child when learning mathematics? Think, explain the results obtained, compare, make guesses, check whether they are correct; observe, generalize and draw conclusions.

The line towards the development of students' cognitive interests can be seen quite clearly in mathematics textbooks and mathematics notebooks. They contain exercises aimed at developing attention, observation, memory, and developing logical thinking. However, I came to the conclusion that additional tasks of a developmental nature, tasks of a logical nature, tasks that require the application of knowledge in new conditions are needed [9].

I include such tasks in classes in a certain system. I begin to learn to notice patterns, similarities and differences with simple exercises, gradually complicating them. For this purpose, I select a series of exercises with a gradual increase in the level of difficulty.

Development of logical thinking in 1st grade.

Where did I start? I began to develop in children the ability to identify properties in objects. In the first grade, I offer tasks aimed at developing observation skills, which are closely related to such techniques of logical thinking as analysis, comparison, and generalization syntheses. For example. In the first grade, students usually identify only two or three properties in a subject, while in each subject there is an infinite number of different properties. I propose to name the properties of the cube. Small, red, wooden - these are the properties that the children were able to name. I show another group of objects: an apple, cotton wool, glass, a weight. After comparing these objects with the cube, the children were able to name several more properties of the cube: hard, opaque, inedible, light. We come to the conclusion that we use the method of comparison to highlight the properties of an object.

When the children learned to identify properties when comparing objects, I began to formulate the concept of common and distinctive features of objects.

I propose to compare three objects: a ruler, pencil triangles - and highlight common and distinctive properties. Children name the general characteristics of objects: all are made of wood and are used for drawing; distinctive properties - shape of objects and size. After the children have learned to compare specific objects, I offer cards. Without taking into account the images of objects and geometric shapes, children must say where there are more of them and where there are fewer. Then I invite students to choose the objects in which they want to highlight the properties. Children name objects and all their properties [1-3].

For variety, I also use the following tasks: I name the properties of an object, and the children must name the object itself; I highlight the main properties of an object, without which it cannot exist, the children name the object. I take on the following tasks:

How are these expressions different and similar?

2+3 7+2 7-3 8-3
6+2 5+2 5-3 9-4

Find the result using the solved example:

3+4=7 3+5= 3+6= 3+7= 3+8= 3+9=

Compare the numbers written in the first and second lines. The sum of the numbers in the first line is 27.

In the process of studying the numbering of numbers, I very often suggest comparing two numbers: 26 and 56. and how many different answers you will hear. To complete such tasks, the student must not only have a stock of certain terms and concepts, but also be able to establish relationships between them, be observant, and analyze the data obtained. And this contributes not only to the conscious assimilation of material, but also to mental development.

To develop logical literacy among junior schoolchildren in grades 1 and 2, training was conducted on the following topics:

“The meaning of the words: “and”, “or”, “all”, “some”, “each”

“Method of comparison, highlighting the properties of objects.”

“Method of comparison, essential and non-essential properties.”

“Statements” (true, false).

"Technique of classification."

"Method of analysis and synthesis."

"Technique of generalization."

2. Task for the development of thinking in 3rd grade.

In grades III and IV, I offer various tasks for independently identifying patterns, dependencies and formulating generalizations. For this purpose, I use the following tasks:

Compare examples, find commonality and formulate a new rule:

20+21 21+22 22+23 23+24 24+25 25+26

Conclusion: the sum of two consecutive numbers is an odd number.

40-39 41-40 42-41 43-42

Conclusion: if you subtract the previous one from the next number, you get 1.

125+10-10 86+5-5 256+28-28

Conclusion: if you add the same number to any number and then subtract the same number from it, you get the original one.

54:2x2 75:5x5 91:7x7

Conclusion: if any number is divided by the same number, you get the original number. In the process of teaching reasoning, I encourage students to look for new examples that confirm the correctness of the conclusion made, and teach them to compare the conclusion with the facts on the basis of which it was made, and to look for facts that can refute the conclusion, for example:

Compare the expression, find the commonality in the resulting inequalities, formulate a conclusion:

8+9 * 8x9 21+22 * 21x22 10+11 * 10x11

Conclusion: the sum of two consecutive numbers is always less than the product of the same numbers - incorrect because 0+1>0x1, 1+2>1x2.

The mathematics program provides solutions to problems that are better understood by students when comparing and contrasting. These are direct and composite tasks, tasks to increase and decrease a number by several units and several times; direct and inverse, etc. When comparing direct and inverse problems, I ask the following questions: What is common and different in the conditions of direct and inverse problems? What quantities are needed? What are common and different in solving direct and inverse problems? What action solved each problem? Why? One student's reflections contribute to the development of skills in other students.

By mastering in the learning process such mental operations as analysis and synthesis, abstraction, concretization, and generalization, students become more deeply aware of the material being studied and learn to substantiate their judgments. They develop the skills and abilities to independently solve assigned problems and consciously use the acquired knowledge.

To ensure continuity between education in primary school and secondary school, I carry out some work on developing the ability to build correct deductive conclusions. To conduct

deductive reasoning, a lot of preparatory work is required, aimed at consciously assimilating the general conclusion, properties and patterns.

Examples:

Divide the numbers into groups so that each group contains numbers that are similar to each other: 53, 33, 84, 75, 22, 13, 11, 44

What rule is used to write each series of numbers?

Continue it: 10, 30, 50, 70… 14, 34, 54, 74…

I always spend 5-10 minutes in every math lesson to work on tasks that develop logical and abstract thinking. The use of classification techniques in mathematics lessons contributes to the formation of positive motives in educational activities, since such work contains elements of a game and elements of search activity, which increases the activity of students and ensures independent completion of work.

The system of work I outlined for developing students' logical thinking is aimed at shaping the mental activity of children. Children learn to identify mathematical patterns and relationships, perform feasible generalizations, and draw conclusions. As a result of systematic work on the development of logical thinking, the educational activities of my students intensified, and the quality of their knowledge increased noticeably.

Tasks for the development of thinking in 4th grade.

During targeted work on the development of cognitive processes in fourth-graders, special attention is paid to the development of the basic characteristics of thinking. Thus, great importance is attached to developing the ability to conduct a full comparison, indicating the similarities and differences of geometric figures, numbers, examples, problems, quantities, equations, etc.

Conclusion. The problem of developing logical thinking is very relevant at this stage with the transition to a new National Curriculum. The second-generation standard in the mathematical preparation of junior schoolchildren does not imply a revolution. He supports the traditions of primary mathematics teaching, but places different emphasis and defines other priorities. The determining factor in goal setting, selection and structuring of content, and the conditions for its implementation is the importance of the initial course in mathematics for continuing education in general and mathematics in particular, as well as the possibility of using knowledge and skills in solving any practical and cognitive problems. The standard states that during the course of development, the student should be able to master "the basics of logical and algorithmic thinking, writing and executing algorithms" [5]. It is obvious that simply working with ready-made algorithms for arithmetic operations and occasionally solving logical problems, which is usually offered in mathematics textbooks, is not enough to create a real basis for the development of logical thinking.

Unfortunately, as a rule, the teacher does not create situations for the successful formation of logical thinking. Therefore, it is very important that modern forms and methods of teaching mathematics contribute to the formation of the ability to follow instructions, rules, algorithms; taught to reason, correctly use mathematical terminology, construct a statement, check its truth, and formulate a conclusion.

I believe that the forms and methods I have chosen for developing the logical thinking of primary school students in mathematics lessons are capable of developing independence in the logic of thinking, which would allow children to build conclusions, provide evidence, statements that are logically related to each other, draw conclusions, justifying their judgments, and, in

ultimately, independently acquire knowledge, as well as more actively use this knowledge in everyday life.

Therefore, the use by a primary school teacher of these forms and methods of developing logical thinking in mathematics lessons is not only desirable, but even a necessary element of teaching mathematics.

REFERENCES

1. Zlatopolsky, D.M. Entertaining computer science: textbook / D.M. Zlatopolsky. - 4th ed. – Moscow: Knowledge Laboratory Laboratory, 2017. - 424 p.: ill.
2. Djumayev M.I. The development of mathematical abilities in younger students. Science And Innovation International Scientific Journal Volume 2 Issue 1 January 2023 Uif-2022: 8.2 | Issn: 2181-3337 | Scientists.Uz/ 424-434
3. Djumayev M.I Formation of mathematical competence in future primary school teachers in the. Educational process science and innovation international scientific journal volume 2 issue 3 march 2023 uif-2022: 8.2 | issn: 2181-3337 | scientists.uz 165-173
4. Djumayev M.I The transformation of те english language's variants in contemporary great Britain. Educational process science and innovation international scientific journal volume 2 Issue 4 April 2023 Uif-2022: 8.2 | Issn: 2181-3337 | Scientists.Uz 19-27 *https://doi.org/10.5281/zenodo.7818607*
5. Djumaev M.I. (2023) Some Considerations of Teaching Mathematics Inuzbek Primary School. Journal of Mathematical & Computer Applications. SRC/JMCA-123. *J Mathe & Comp Appli, 2023 Volume 2(2): 1-5* ISSN: 2754-6705
6. Джумаев М.И. Перспективы совершенствования преподавания математики в школе, колледже и вузе Республики Узбекистан. Ямало.Нанецк Россия «рофессиональное образование арктических регионов» № 1, МАРТ, 2023. № 6(147) 3-6 ст https://arctic-journal.ru/index.php/prof
7. Djumaev M.I. Some Considerations of Teaching Mathematics Inuzbek Primary School.Journal of Mathematical & Computer Applications. Received: March 28, 2023; Accepted: April 03, 2023, Published: April 22, 2023 ISSN: 2754-6705 1-5
8. Djumaev M.I. Формирование элементарных математических представлений у детей в дошкольном возрасте с использованием и без наглядных материалов. Глобальный научный потенциал» , ИД ТМБпринт, СПб.№ 6 (147) 2023 г. http://globaljournals.ru/
9. Djumaev M.I. Methodological principles of the student's independent work form under the supervising of the teacher in process of modern education Musaeva Nargiza Khashimjanovna Master's student of Tashkent state pedagogical universityr's student of Tashkent state pedagogical university https://doi.org/10.5281/zenodo.7772930
10. Lavrinenko T. A. How to teach children to solve problems: Methodological recommendations for primary school teachers. – Saratov: Lyceum, 2000
11. Orlova E.V., Gladin N.V., Vorovshchikov S.G. How to effectively develop the logical thinking of junior schoolchildren. M.: "5 for knowledge", 2008
12. Pavlova T.L. Diagnostics of the thinking of junior schoolchildren. Sphere shopping center. 2009
13. Podlasy I.P. Pedagogy. Learning process. M.: "Vlados", 2003
14. Sample programs of primary general education. M.: "Enlightenment"., 2009

15. Sidenko, E. Universal educational actions: from term to essence // Experiment and innovation at school, 2010 No. 3
16. Tikhomirova L.F. Exercises for every day: logic for primary schoolchildren. Yaroslavl: "Academy of Development", 2001
17. Shamarina E.V., Tarasova O.V. I count and think. M.: “Gnome and D”, 2005