

## THE DEVELOPMENT OF LOGICAL THINKING OF PRIMARY SCHOOL STUDENTS IN MATHEMATICS

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### INTRODUCTION, LITERATURE REVIEW AND DISCUSSION

The modern world is oversaturated with information. Unbeknownst to himself, any person, and especially a child, receives a large amount of data every day, which is stored in his memory and affects behavior, psyche and character. Systematization of the information received is a difficult task and children deal with this in different ways and not always correctly. As a rule, information is analyzed and conclusions are drawn on a hunch, based on their own, internal, logic, which each person has his own.

The thinking of the child in the last classes of primary school is at a critical stage of development. During this period, a transition is made from figurative, childlike thinking to logical, conceptual, inherent in adult people. The formation of the logical thinking of elementary schoolchildren is an important component of the educational process. The development of logical thinking only through the study of academic subjects at school is ineffective, this approach does not provide a complete assimilation of the methods of logical thinking, and therefore special training courses on the development of logic are necessary.

To develop logical thinking is to learn:

- compare observed objects, find common properties and differences in them;
- highlight the essential properties of objects and abstract them from secondary, non-essential;
- find components in an object in order to know each component and combine these parts into a single whole, while learning the object as a whole;
- draw the correct conclusions from observations or facts, verify these conclusions; summarize the facts;
- convincingly prove the truth of their judgments and refute false conclusions;
- thoughts were stated in a definite, consistent, consistent and justified manner.

Students must master the elements of logical actions, therefore, one of the most important tasks is the development of an independent logic of thinking and, ultimately, an independent acquisition of knowledge.

Logical thinking - the child's ability and ability to independently perform simple logical actions (analysis, synthesis, comparison, generalization, etc.), as well as composite logical operations (construction of negation, statement and refutation as the construction of reasoning using various logical schemes - inductive or deductive) .

Currently, the problem of the development of logical thinking of younger students is sufficiently covered in the pedagogical and methodological literature. The development of this problem involved such scientists and practitioners as L.S. Vygotsky, D. B. Elkonin et al.

An analysis of the methodological literature, explanatory notes to the curriculum indicates that each teacher needs to develop the logical thinking of children. However, teachers do not always know how to do this in practice. Often this leads to the fact that the development of logical thinking is largely spontaneous, so most children do not master the initial methods of logical thinking.

It should be recognized that almost all modern mathematics textbooks for elementary grades contain special exercises, the purpose of which is the development of logical thinking. However, these tasks are often perceived by the teacher as additional and optional (due to the fact that they are given on the pages of textbooks sporadically and mainly at the end of the lesson material - in the margins or at the bottom of the page after the main material) and therefore are addressed in the best case advanced class students.

The analysis of the existing software and didactic support in mathematics for elementary school, the observation of the educational process allows us to conclude that there is no concrete program for the development of logical thinking techniques. As a result, work on the development of the logical techniques of the younger schoolchild goes on spontaneously, without knowledge of the system of necessary techniques, their content and sequence of formation.

The thinking of children of primary school age differs significantly from the thinking of a preschooler, characterized by spontaneity, low controllability. Thanks to the work of DB Elkonin, V.V.Davydov and their employees, it is proved that children of primary school age have great cognitive capabilities, which allows them to develop the foundations of theoretical forms of thinking. When a child comes to school, he has to some extent, only two types of thinking are developed: visual-effective and visual-figurative.

Visual-active thinking is the first type of thinking that occurs in a child in early childhood. At preschool age, a child develops visual-figurative thinking. Logical thinking is actively developing during the period of child's education in elementary school. The most important task of teaching mathematics is the development of students' thinking and imagination. Of course, the development of students' thinking and imagination takes place in the process of learning all subjects, in the process of their own activity and in the communication of children with adults and peers in everyday life. However, the role of teaching mathematics in the development of these mental processes is very large.

Mathematics contributes significantly to the development of logical thinking. And the main element of the educational function of mathematical education is the development of students' ability to fully argue. In mathematics lessons, children operate with different forms of thinking: concepts, judgments, conclusions.

During the development of logical thinking, students master the methods of logical actions, begin to act "in the mind" and conduct an analysis of their own and others' reasoning. Reasoning, the child applies the operations of analysis, synthesis, comparison, classification, generalization. In the process of schooling, the ability to plan their actions is actively formed. Younger schoolchildren are regularly placed in situations where they need to reason, compare different judgments, and carry out inferences. Therefore, in children of primary school age, verbal-logical thinking is actively developing. In this case, the main burden falls on the formation of methods of reasoning. Moreover, the thinking in children of the same age is

different. The presence of such a variety in the development of different types of thinking in different children greatly complicates and complicates the work of the teacher.

The experience of famous teachers, psychologists and methodologists (Halperin, Talyzina, A.V. Beloshistaya) shows that it is possible to begin the formation of simple logical thinking methods already in a 3-4-year-old child, taking into account age-related characteristics, and then by 6-7 years of age they can be formed at a fairly high level. The period of preschool and primary school age is the most sensitive and psychologically favorable in order to stimulate and develop simple logical actions. In the future, the presence of this base will help organize special work on the formation of composite logical operations: teaching reasoning and methods of proof.

Practice shows that while simple logical actions to some extent are formed spontaneously in each person, composite logical operations, which are more complex and complex, are not formed by most people themselves, their development requires special purposeful methodological work. This conclusion only in recent years begins to attract the attention of methodologists, and then, mainly, specialists in teaching mathematics in high school. At the same time, many methodologists note that the low level of logical culture of high school students is a natural consequence of the lack of systematic work on the formation of logical thinking in primary grades. However, a thoroughly developed methodological base, on which a primary school teacher could rely here, practically does not exist today.

The development of logical thinking is also facilitated in the classroom by discussing ways to solve problems, by considering different solutions, when the teacher asks the children to substantiate, tell, and prove the correctness of their judgments. In the methodology, mathematicians also talk about analytical and synthetic methods for solving problems, bearing in mind the course of reasoning in the process of solving: from the requirements to the conditions or, conversely, from the conditions to the requirements of the problem.

Comparison - a comparison of objects of knowledge in order to find similarities (highlighting common properties) and differences (highlighting the special properties of each of the compared objects) between them.

The famous Piaget phenomena are associated with this action (operation). At the beginning of the last century, Piaget found that young children (4-6 years old) lack the "principle of conservation (invariance) of quantity or quantity" and they think that the quantity or quantity of a substance changes if one of its dimensions or form has clearly changed. This feature of children was established by Piaget with the help of special "Piaget problems".

In recent years, such an experiment has been conducted at interviews with children entering school. They take two identical pieces of paper and ask: "Which piece of paper has more?" Children confidently say: "Equally." Then, in front of the child's eyes, I cut one of the leaves with scissors along the axis and fold a long rectangle from two halves. "And now, where is the more paper, in the old (whole) leaflet or in the new?" And many children said: "There is more paper in the new piece of paper."

As you can see, children 6-7 years old entering school still suffer from the Piaget phenomenon. Therefore, in the first grade it is necessary to carry out work to overcome this phenomenon in children. To do this, firstly, explain to the children that each item has many different properties and qualities. It is necessary that they learn to see and establish the properties of various objects

familiar to them. Then we need to teach them to distinguish common properties in different objects. This is a painstaking, rather lengthy work, which should be carried out in parallel with the study of other educational material. Secondly, it should be especially explained to the children that it is possible to compare different objects with each other only by some common property.

To do this, you need to do such an experiment: put on the table about 10 different objects, among which are the largest in volume, but light; the heaviest, but small in volume; and the longest, but the thinnest (for example, a rope). We call the student to the table and ask: "Which of these items is the largest? And what is the smallest? " If the child indicates some of the largest and smallest (this usually happens), then we explain the error: this question cannot be answered, because it is not indicated by what property it is necessary to compare: by length, volume, mass. This experiment after some time must be repeated several times so that the children firmly grasp the basic principle of comparing objects.

Abstraction is the mental selection of any essential properties and attributes while simultaneously abstracting from all other properties and attributes of these objects. As a result of abstraction, a distinguished property or sign itself becomes an object of thinking (an abstract object).

All mathematical concepts are precisely abstract objects. So, for example, the concept of a geometric figure is formed by highlighting in the observed objects their shape, length or relative position in space and distraction from all other properties (the material from which they are made, colors, masses, etc.). But at the same time, there is not only abstraction (the allocation of some property and discarding all other properties), but also the idealization of these properties by a mental transition to limit forms that really, of course, do not exist (ideal straight line, point, plane, etc. ). It is necessary, at least in grades 3-4, to draw students' attention to the abstract and ideal nature of the studied mathematical concepts, to explain why and why this is done, to teach them to see real prototypes of abstract mathematical concepts around them.

Practice shows that for mastering the general provisions, rules, conclusions, students require a considerable number of specific exercises. Only as a result of focused long-term work in this direction is there an opportunity for the effective development of the logical thinking of primary school students. In order to interest students in mathematical logic, it is necessary to include interesting and fascinating tasks in the educational process. It is also recommended to use tasks to continue the discussion.

For the effective development of the logical thinking of younger schoolchildren, it is necessary to use a special task system that can be included in the educational process when studying various educational subjects in addition to textbooks. Moreover, the task system itself should take into account the specifics of perception and thinking of primary school children.

Thus, it can be noted that it is in elementary school that it is necessary to carry out focused work on the formation and development of logical thinking in children.

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