Features of Logical Thinking of Junior Schoolchildren

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ABSTRACT

Mathematics and its characteristic style of thinking are part of the culture and upbringing of a modern person. Today, teaching mathematics at school consists not only in the assimilation of actual knowledge by students, but also in the mastery of mathematical methods. Universal mathematical methods of cognition contribute to a holistic perception of the world, allow building models of individual processes and phenomena, and are also the basis for the formation of universal educational actions. Possession of such qualities of the mathematical style of thinking as criticality, evidence, abstractness, laconicism is required for a person in any field of activity.

Keywords: *mathematics, the formation of logical thinking, theoretical knowledge, interest, logical thinking*

I. Introduction

Let us dwell in more detail on the phenomenon of logical thinking. Analyzing the methodological literature, we find the following statements. AA Lyublinskaya believes that “logical thinking is found, first of all, in the course of the thought process itself.

About the difference ga me from a practical , logical thinking is only a verbal way. A person must reason, analyze and establish the necessary connections mentally, select and apply suitable rules, techniques, and actions known to him for a given specific task. He must compare and establish the desired connections, group different things and distinguish between similar things, and all this is done only through mental actions. "

O.K Tikhomirov in his work "Psychology of Thinking" defines logical thinking as "reasoning, theoretical thinking, characterized by the use of concepts, logical structures that exist and function on the basis of language, linguistic means." The author also calls it “analytical thinking, which is deployed in time, has clearly defined stages, is largely represented in the consciousness of the thinking person himself.

By R. S. Nemov , logical thinking is a "detailed, strictly sequential way of thinking in which a person repeatedly refers to the use of logical operations and deductions, and the course of this thinking can be traced from start to finish and check its accuracy by correlating with known requirements of logic ". Availability thinking logic makes it more accurate and reasonable. He wrote: “Scientific thinking is always logical thinking. The absence of strict logic makes such thinking unsubstantiated and does not guarantee against mistakes. In any case, an error in intuitive or common-sense thinking is much more difficult to detect than in logical and consistent thinking. "

II. Main Part

Logical thinking assumes that the child has the ability to perform basic logical operations: generalization, analysis, comparison, classification.

The most important mental operations in the learning process are analysis and synthesis. Analysis involves the selection of the elements of a given object, its features and properties. At the first stage, junior schoolchildren single out only individual parts and properties of the object, that is, they can only perform a partial analysis. Then, the ability to analyze all the properties of an object is formed, but without establishing relationships between them. And only after that, the younger student is able to analyze all the properties and characteristics of the object and establish the relationship between them.

Synthesis is the combination of various elements and sides of an object into a single whole. In the mental activity of students, analysis and synthesis complement each other, since analysis is carried out through synthesis, and synthesis through analysis.

Abstraction is the selection of a side or aspect of a phenomenon for the purpose of their separate study. One of the features of the abstraction of primary school students is that they sometimes take external, vivid, often perceived signs for essential signs. Another feature is that children are easier to abstract the properties of objects and phenomena than the connections and relationships that exist between them. Knowing these features, the teacher should draw the students' attention to hidden, but essential signs, their connections and relations sheniya. For example, creating a subject model of a problem, we abstract from the shape, color of the objects used, the main thing is their number.

Comparison, like a mental operation in younger schoolchildren, also has its own characteristics. This is expressed in the substitution of comparison by the positioning of objects - first they talk about one object, and then about another. At this age, children find it difficult to compare objects with which there is no way to directly act. Therefore, training in comparison should be carried out in stages, in close connection with the study of specific material. As objects, for a start, you can use objects or drawings depicting objects that are familiar to them, in which they can highlight certain features, relying on existing ideas. At the first stage, they teach to highlight the features or properties of one object, at the second - to identify the similarities and differences between the features of two objects, at the third - to establish similarities between the features of three, four or more objects.

Generalization is the selection of the main features of objects or phenomena and their properties. The peculiarities of the generalization of younger schoolchildren are in the selection of the most noticeable external signs of objects.

Generalization proceeds in close unity with concretization. The assimilation of concepts, laws, rules is based on the consideration of individual objects, facts, signs, schemes and the performance of specific actions with them. The assimilated concepts, laws, rules are applied to the solution of particular specific problems. So in the process of teaching mathematics, generalization is used when formulating mathematical rules, identifying patterns.

Concretization is a mental transition from the more general to the less general, from the general to the singular. The process of concretization is the opposite of the processes of abstraction and generalization.

The teaching of concretization in the educational process is understood in the sense that the teacher must teach students to confirm the generalthe definition of mathematics with specific

examples. For example, from the rearrangement of the terms, the sum does not change: 2 + 3 is equal to 3 + 2, since both of these sums are equal ; the same concerns the process of developing the thinking of primary school students, here psychologists distinguish two main stages. At the first stage (grades 1–2), their thinking practically does not differ from the thinking of preschoolers: the analysis of the educational material proceeds mainly in a visual-effective and visual-figurative plan. Pupils argue about objects and phenomena on their external individual signs, superficially, one-sidedly. Their inferences are based on visual premises given in perception, and conclusions are drawn not relying on logical arguments, but by directly correlating judgments with perceived information. Concepts and generalizations at this age are strongly related to the external characteristics of objects and are based on those properties that lie on the surface.

By the third grade, thinking passes into a qualitatively new, second stage, which requires the teacher to demonstrate in detail the connections that exist between the individual elements of the material being studied. During this period, children learn generic relationships between individual features of concepts, an analytical-synthetic type of activity is formed in them, and the action of modeling is mastered. This determines the beginning of the formation of verbal-logical thinking.

Thus, the development of the child's mental activity has its own characteristics and is determined by the regular change of stages, in which each previous stage prepares the next. With the emergence of new forms of thinking, the old forms do not disappear, they persist and develop. More complex cognitive tasks become available to younger students. They develop the ability to reason, substantiate their judgments, compare, generalize, and concretize. A transition is made from visual-figurative to verbal-logical thinking.

The formation of logical thinking in junior schoolchildren is an important component of the pedagogical process. Helping students to fully demonstrate their abilities, develop initiative, independence, creativity is one of the main tasks of a modern school. Already in elementary school, students must master the basic elements of logical operations (comparison, generalization, classification, analysis, etc.), which will allow them to further provide evidence, build inferences, statements that are logically related to each other, draw conclusions, justifying their judgments, and , ultimately, independently acquire knowledge. Mathematics is exactly the subject where this can be realized to a greater extent. Many researchers note that purposeful work on the development of logical thinking in primary schoolchildren should be systematic (E.V. Veselovskaya, E.E. Ostanina, A.A. Stolyar, L.M. Fridman, etc.). In this study of psychologists (Galperin, VV Davydov, LV Zankov , AA Lublin , DB El'konin et al.) Suggest that the effectiveness of logical thinking development junior schoolchildren depends on the way of organizing special developmental work. In the works of these authors, it is proved that as a result of properly organized education, junior schoolchildren quickly acquire the skills of logical thinking. At the same time, there is currently no unified approach to solving this issue, how to organize such training.

Let us dwell in more detail on the ideas of developing education by L.V. Zankov and D.B. Elkonin - V.V. Davydov, since these systems are aimed directly at developing the thinking of children of primary school age .R Consider the LV system Zankova . The task of psychological development is understood as the development of the mind, will, feelings of children and is considered as a reliable basis for the assimilation of knowledge, skills and abilities. She is promoted to the first

place. In the course of researching the problem of training and development, L.V. Zankov formulated the didactic principles of the system:

the leading role of theoretical knowledge in the content of training;

students' awareness of all links in the learning process;

the need to work on the development of all students, including the weakest;

training at a high level of difficulty with observance of the measure of difficulty;

studying the program material at a fast pace;

The main feature in the technique of L.V. Zankov is a property of variability, which implies a change in the style of the teacher's work depending on the specific conditions (capabilities) of the class: this may relate to the logic of the presentation of the material, and manifest itself in relation to students. Tasks and questions of the teacher are formed in such a way that they contribute to the formulation of different points of view, different assessments, attitudes towards the studied material, and do not require an unambiguous answer and action.

L.V. Zankov believes that the lesson should be structured differently to the traditional presentation, when most of the time was filled with teacher's speech. Of course, this requires great skill from the teacher: while maintaining his leading role, it is necessary to ensure the freedom of self-realization of the student, to create such conditions so that from the first steps in the lesson the child is not afraid to express his thoughts, his observations. To do this, it is important to learn how to ask children questions that require variant rather than unambiguous answers.

Thus, speaking about the development of logical thinking in children according to L.V. Zankov , we will highlight the following: in the course of studying the material, there should be a clash of knowledge and their contradictions, and the existing conflict is usually resolved by the students themselves;

the use of variability in teaching, where the child is not afraid to say the wrong answer, because there are several points of view on the problem from different sides.

Developmental education aimed at the mental development of the child creates conditions for personal development and growth.

In general, developmental learning, as a system, provides education with the means to achieve those goals that were previously only mentioned in the works of various authors, but not all teachers could implement them in the classroom.

Considering the system of D.B. Elkonin - V.V. Davydov, we can conclude: for the development of the logical thinking of children, the teacher should give such tasks where the students independently draw conclusions, formulate rules, build inferences. And the most important thing is that in this system there is an individual approach, so the results cannot and should not be the same for different students.

The child's personality develops, changes qualitatively in the process of schooling. The intellectual sphere begins to rebuild primarily in the field of thinking. This is due to the fact that during a child's education at school, he first encounters a new type of knowledge for him - a concept (D.B. Elkonin includes many scientific concepts in the content of education).

If a preschooler relies on so-called everyday concepts, that is, concepts that he has learned in communication with adults, then the student most often uses scientific concepts. Therefore, the main direction of the development of thinking at school age lies in the transition from concrete-figurative thinking to abstract-logical thinking . Behind the same term that children learn, there may be two

fundamentally different types of knowledge: either a formal abstract idea of a certain class of objects that have a set of common features, or a scientific concept that reflects a system of essential properties of a subject in their interconnection and interdependence.

In addition to the use of developmental learning in the educational process, there is a method of problem learning, which also contributes to the development of logical thinking.

Problem-based learning is understood as such learning in which the removal (resolution) of problem situations consistently created for educational purposes occurs. L.S. Vygodsky argued: "If you want to firmly bring up something in a child, take care of the obstacles."

Let's figure out what the problem situation is. A problem situation is a situation in which a certain conscious difficulty is created, which generates a discrepancy, inconsistency between the available knowledge and those that are necessary to solve the arisen or proposed task. The task that creates a problem situation is called a problem task or simply a problem.

B it is also a challenging task for the students, and what are the symptoms of the problem?

Signs of the problem are:

Generating a problem in the learning process;

A certain willingness and interest of the decisive person to find a solution;

Possibility of an ambiguous solution, leading to the presence of different search directions.

Problem-based learning first of all forms and develops the ability for creative activity, reveals the need for self-expression. Problem-based learning is more intensive than non-problem learning and so by the same token, it has a more active influence on the development of logical thinking.

Another condition necessary for the development of logical thinking is cognitive interest. Professor G.I. Shchukina considers it a powerful learning engine that raises students to active, creative solutions to their goals. “A student without interest is like a robot, a memorization mechanism devoid of creative movement,” she writes in her work.

Psychological and pedagogical research helps to identify another condition that contributes to the development of logical thinking in younger students - the individualization of learning.

The characteristics of students that should first of all be taken into account when individualizing learning include:

Learning , that is, general mental ability as well as special characteristics.

Training , consisting of both programmatic and non-programmatic knowledge, skills, and abilities.

Cognitive interests.

We believe that individualization of learning is a necessary condition for the development of students' thinking.

Everyday life of any person, including a child, presents more and more new combinations, unforeseen cases of behavior. If an adult has experience, knowledge, skills, then the child does not have such baggage, so he has to deal with difficult and confusing circumstances himself. Therefore, it would be pedagogically more correct, first of all, to teach the child to think logically and find the correct answer himself, and not just give the child ready-made knowledge.

Thus, it should be concluded that for the full development of students' thinking, it is necessary to create such conditions when who will wake up interest in learning. It will be interesting for children to learn something new, understand various problems, independently find solutions and formulate

conclusions, and this can be facilitated by such learning systems, which are based on the concepts of independence, variability, contributing to the self-realization of students, the development of their personality.

III. Conclusion

So, we found out that thinking is an indirect and generalized process of cognition of the surrounding world. Thinking reflects the general and essential properties of objects and phenomena, as well as essential relationships and regular connections between objects and phenomena.

Thinking is divided into three types and is presented: visual-active thinking, visual-figurative thinking and verbal-logical thinking.

The development of the mental activity of a child of primary school age has its own characteristics and is determined by the regular change of stages in which each previous stage prepares the next. With the emergence of new forms of thinking, the old forms do not disappear, they persist and develop.

School education is structured in such a way that verbal-logical thinking is predominantly developed. If at first much attention is paid to working with visual samples, then starting from the third grade the volume of this kind of activity is sharply reduced. The figurative principle is losing its need for educational activities. Children master the techniques of mental activity, acquire the ability to act in the mind and analyze the process of their own reasoning.

Numerous studies have shown that it is in elementary school that the foundations of evidence-based thinking are laid. Here the main goal of work on the development of logical, abstract thinking is so that children master the techniques of logical thinking, learn to draw conclusions from those judgments that are offered to them as initial, so that they can restrict themselves to the content of these judgments without involving other knowledge.

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