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DEVELOPMENT OF LOGICAL THINKING IN MATHEMATICS LESSONS AS THE BASIS FOR IMPROVING THE QUALITY OF THE EDUCATIONAL PROCESS

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ABSTRACT
The article examines the factors that form logical thinking in mathematics lessons in elementary school, psychological and pedagogical research, the formation of basic logical skills at the primary level.
KEYWORDS: *empirical, intellectual skills, types of thinking, analysis, synthesis, abstraction, generalization, experiment, individual.*

INTRODUCTION

At the moment, one of the main problems of primary school students is that in the classroom they do not know how to find a rational way out of various situations, thereby complicating the task of teaching, do not rationally use the time in the lesson.

Among the basic intellectual skills are logical skills, formed, first of all, when teaching mathematics. The objects of logical inferences and the rules for their construction adopted in mathematics contribute to the formation of the skills to substantiate and prove judgments, formulate clear definitions, develop logical intuition, briefly and clearly reveal the mechanism of logical constructions and teach their application.

Psychological and pedagogical studies of domestic and foreign scientists have proved that the basic logical skills at an elementary level can be formed in children from the age of 5-6.

Purpose of the research: identification and description of the most productive ways of developing logical thinking in children of primary school age.

The subject of the research is the development of logical thinking.

To achieve this goal, I plan to solve the following **tasks**:

- describe the theoretical foundations of the formation of logical thinking in children of primary school age;
- to characterize the existing general methodological approaches to solving logical problems in mathematics lessons in elementary school;
- to reveal the role of using logical problems in mathematics lessons in elementary school;
- to select suitable logical problems and classify them in accordance with possible solutions in mathematics lessons in elementary school.

The practical significance of the research - skillfully and rationally organized work of the teacher in solving problems contributes to the development of logical thinking in children.

When writing the work, the following theoretical **research methods** were used**:**

- theoretical- analysis of psychological, pedagogical and methodological literature, periodicals, Internet sources on the research topic;
- empirical- analysis of the products of students' activities, design, description of the results of testing.
- to form the logical thinking of primary school students;
- improve the quality of knowledge in mathematics through the development of logical thinking.

Experience relevance

One of the main tasks of a modern school is to train a person who is able to make decisions independently and act effectively and reasonably in life situations. Over the years of work at school, I realized that the successful implementation of this

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task largely depends on the formation of logical thinking in students.

Thinking is a special kind of mental and practical activity, involving a system of actions and operations of a transformative nature included in it. Cognitive activity of people is carried out using mental operations: comparison, analysis, synthesis, abstraction, generalization and concretization.

There are three types of thinking: visual-real, visual-figurative, verbal-logical. The earliest stage in the development of a child's thinking is visual-actual thinking. It is characterized by the fact that the task subject to thinking is given visually and solved by hands, i.e. with practical action. This form of "thinking with hands" does not disappear with the development of higher forms of logical thinking. With the development of speech and the accumulation of experience, the child comes to visual-figurative thinking. He thinks in images, and the word he owns helps him make generalizations. When a child comes to school, he basically thinks based on specific images. But a complete and deep study of the program material contributes to the development of verbal-logical thinking. Logical thinking is the highest stage of a child's mental development, it goes a long way.

When a child enters school, significant changes take place in his life, educational activities are formed. On the basis of educational activity, the basic psychological neoplasms of the younger schoolchild are developed. Thinking becomes the dominant function. The ability to think logically, to carry out inferences without visual support, to compare judgments according to certain rules is a necessary condition for the successful assimilation of educational material in mathematics lessons. About a child who has a well-developed logical thinking, they say that he thinks thoroughly, discusses disciplinedly. Such a student, as a rule, does not make mistakes in his reasoning and conclusions. The process of developing logical thinking is quite lengthy. Therefore, it should begin from the first years of a child's education at school.

Cognitive activity of people is carried out using mental operations: comparison, analysis, synthesis, abstraction, generalization and concretization.

Comparison is the juxtaposition of objects and phenomena in order to find similarities and differences between them.

Analysis is the mental division of an object or phenomenon into its constituent parts, the isolation of individual parts, signs and properties in it.

Synthesis is the mental combination of individual elements, parts, and attributes into a single whole.

Analysis and synthesis are inextricably linked, are in unity with each other in the process of cognition. Analysis and synthesis are the most important mental operations.

Abstraction is the mental highlighting of essential properties and attributes of objects or phenomena while simultaneously abstracting from the nonessential. Abstraction is at the heart of generalization.

Generalization is the mental unification of objects and phenomena into groups according to those general and essential characteristics that stand out in the process of abstraction. The process of concretization is opposite to the processes of abstraction and generalization.

Concretization is a mental transition from the general to the singular, which corresponds to this general. To concretize in educational activity means to give an example.

In elementary school, students must master such elements of logical actions as: comparison, classification, highlighting the characteristics of objects, defining a familiar concept through genus and species difference, making simple inferences based on these premises. Therefore, it is advisable to start learning logical actions with the formation of the corresponding elementary skills, gradually complicating the tasks.

The assimilation of knowledge is a big and hard work. It requires students to maximize, prolonged and strenuous efforts, constant mobilization of will and attention. Every day of children's lives is dear, starting from birth, and even more so, time should not be lost in the first school years, which are the most important period in the development and formation of a person. At this time, the development of logical thinking acts as the most important factor ensuring the effectiveness of its further education at school, success in professional training and life.

Well-developed logical thinking warns against mistakes in practice. This quality develops mainly in the process of studying mathematics and is, in my opinion, the main task of mathematics lessons. In mathematics, the student can most fully see the demonstration of almost all the basic laws of elementary logic. The quality of students' knowledge depends on the development of thinking.

Discovery, research , experiment are the basis of the educational process. The idea is to provide students with the opportunity to experience for themselves what any researcher who has to answer the questions posed is experiencing, even before students receive specific knowledge.

Considering the development of my students, I drew attention to the fact that learning puts thinking at the center of the child's consciousness.

The development of logical thinking in junior schoolchildren is one of the most important areas of student learning. The importance of this process is

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indicated by curricula and methodological literature. The urgency of the problem of the development of thinking is explained by the fact that the success of any activity depends in many respects on the characteristics of the development of thinking. It is at the primary school age, as special studies show, that logical thinking should develop quite intensively. Thinking plays a huge role in cognition. It expands the boundaries of knowledge, makes it possible to go beyond the limits of direct experience of sensations and perception. Thinking makes it possible to know and judge what a person does not directly observe, does not perceive.

Unfortunately, in the middle grades, mathematics teachers are faced with the problem of unformed students' ability to analyze, concretize, generalize, plan, and draw conclusions. The question arises, how can we improve the mental activity of primary school students in mathematics lessons, make their minds more flexible, teach them to think what means to use.

Based on this problem, I believe that the development of logical thinking in mathematics lessons in elementary grades is relevant and is determined by the social order of society for a creative person capable of mastering, transforming and creating new ways of organizing their activities.

In elementary school, students must master such elements of logical actions as: comparison, classification, highlighting the attributes of objects, defining a familiar concept through genus and species difference, making simple inferences based on these premises.

A first-grader has visual-figurative thinking, his analytical skills are elementary, the content of generalizations and concepts includes only external and often insignificant signs, therefore it is advisable to start learning logical actions with the formation of the corresponding elementary skills, gradually complicating the tasks. With the help of exercises, the knowledge of children is not only consolidated, but also clarified, the skills of independent work are formed, and the skills of mental activity are strengthened. Children constantly have to deal with analysis, comparison, make up phrases and sentences, abstract and generalize. This ensures the simultaneous development of a number of the most important intellectual qualities of the child: attention, memory, various types of thinking, speech, observation.

Thus, in the process of forming the logical thinking of children of 7-10 years old, perhaps the most important thing is to teach children to make, even if small, their own discoveries. A student should already in the elementary grades solve problems that required him not to simply act by analogy (copying the teacher's actions), but would conceal an opportunity for a “mental breakthrough”. It is not so much the finished result that is useful, but the process of solving itself with its hypotheses, mistakes, comparisons of various ideas, assessments and discoveries, which, ultimately, can lead to personal victories in the development of the mind.

In my lessons, I always find a moment when I can offer students joke tasks, smart tasks, tasks in verse. It helps to make the learning process more interesting, and contributes to the development of logic.

For the development of mathematical abilities and the development of thinking, logical problems are very useful and interesting. Logical tasks - tasks that require the ability to conduct evidence-based reasoning, analyze. It allows you to organize interesting situations in the classroom that contribute to better assimilation of program material and the development of logical thinking.

Experience shows that the majority of students have common sense ahead of mathematics training. This determines the high interest of schoolchildren in solving such problems. They differ from ordinary ones in that they do not require calculations, but are solved using reasoning. We can say that a logical task is special information that not only needs to be worked out in accordance with a given condition, but also wants to be done.

To implement the plan, I developed a system of using a variety of methods, techniques, tasks aimed at developing the logical thinking of students, testing students for the formation of their logical thinking. After I was convinced that the students are able to think logically while completing math tasks, I began to carry out control and correction activities for completing math tasks.

Experimenting my scientific work in practice, I noticed that almost all students eventually became more active in the classroom, and logical thinking was also highly developed. We have learned to solve logical problems in a short time.

CONCLUSION

Since mathematics provides real prerequisites for the development of thinking, I decided to make fuller use of these opportunities in the classroom when teaching children. As my experience shows, the lessons of mathematics have a unique developmental effect and provide real prerequisites for the development of logical thinking. I believe that the systematic nature of my work, the forms and methods of development of logical thinking that I have chosen, contribute to the development of the independence of the logic of thinking, which will allow children to build inferences, carry out proofs, statements, draw conclusions, justify their judgments, acquire knowledge, and also more actively use this knowledge in math lessons and in everyday life. The practical significance of the work is that the materials

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are used in practice by primary school teachers. Logical thinking is the basis of school education, the key to a successful understanding of technical and humanitarian disciplines. The development of logical thinking as a pedagogical process must be carried out in accordance with the laws of the development of the child's body, in unity and harmony with the intellectual development of the child. The development of logical thinking of students in all lessons is one of the most essential requirements for ensuring the quality of teaching.

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