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Research Article

DEVELOPMENT OF THINKING OF SECOND-GRADERS IN MATHEMATICS LESSONS IN THE PROCESS OF MASTERING THE LOGICAL METHOD OF CLASSIFICATION

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ABSTRACT

The article is devoted to the study of the thinking of younger schoolchildren and one of the types of universal educational actions - logical actions, which are the basis of the ability to learn. The formation of a logical classification technique for second graders in mathematics lessons causes difficulties for the teacher. The problem of the study was the study of the specifics of the development of thinking of second graders in mathematics lessons in the process of mastering the classification technique. The purpose of the study is to identify the pedagogical conditions for the development of second-graders' thinking in mathematics lessons in the process of mastering the logical classification technique. The article describes the process of developing the thinking of second graders in mathematics lessons by means of multi-level tasks.

KEYWORDS

Thinking, logical operations, classification, multi-level tasks, second graders.

INTRODUCTION

In the new concept of education, the priority goals are developmental. Considering the developing possibilities of mathematics, they talk more about the development of students' thinking. And this is no coincidence: mathematics has ample opportunities for the mental development of students due to its system of exceptional clarity and accuracy of concepts, conclusions and formulations. However, mastering the very content of the mathematics course, according to

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E.A. Ponomareva, does not guarantee the automatic development of thinking, including logical thinking.

Achieving the highest stage of logical thinking is a long and complex process, since the full development of logical thinking requires not only high activity of mental activity, but also generalized knowledge about the common and essential features of objects and phenomena of reality, which are fixed in words. By about the age of 14, a child reaches the stage of formal logical operations, when his thinking acquires features characteristic of the mental activity of adults, but the development of logical thinking should begin with preschool childhood. From the age of 5-7, at the elementary level, a preschooler learns such logical thinking techniques as comparison, generalization, classification, systematization and semantic correlation. At this age, the formation of these techniques is carried out based on visual material with the participation of visual-imaginative thinking.

METHODS

The logical method of classification by its structure is a complex action for a second grader and includes a number of separate operations: determining the basis of classification, i.e. the attribute by which it will be carried out; dividing objects into classes according to a selected basis; assigning an object to its class; characteristics of each class; control of the results of the classification.

Multi-level tasks can become one of the means of forming a logical classification technique. The main purpose of these tasks is to adapt the learning process to the cognitive abilities, abilities and interests of each student. Educational assistance consists in creating the necessary conditions for the development of logical thinking in second graders.

The issues of level differentiation in teaching students the ability to classify have not been the subject of special study, however, they are relevant, since they allow taking into account individual differences in students' mental activity in teaching the logical method of classification, which meets the modern requirements of humanization and standardization of mathematical education.

In the general development of a child's thinking, mastery of logical operations occupies an essential place. Many psychologists have studied the role of classification (L. S. Vygotsky, B. Inelder, J. Piaget, etc.). In their works, they identify classification as the basis of any mental activity: what is a child's set of internalized logical circuits, such is thinking. The genesis of intelligence thus acts as a fixation of the stages of achieving the corresponding logical structures. The importance of studying the formation of elementary logical structures, such as classification, for example, follows from the fact that the process of cognition is, in fact, a continuous classification and

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systematization by a child of the results of previous intellectual experience.

The Federal State Educational Standard of Primary General Education stipulates that the meta-subject results of mastering the basic educational program of primary general education should reflect the mastery, among others, of such logical actions as comparison, analysis, synthesis, generalization and classification according to generic characteristics. The central indicator of the level of intellectual development of a child. Piaget considers the level of formation of the classification operation. Mastering the logical method of classification consists in the distribution of objects of any kind into interrelated classes according to the most essential features, contributing to the child's understanding of what underlies the similarities and differences of objects, the development of the ability to identify a common significant property, believes E. V. Sidorenko.

By definition, J. Piaget, the concept of "class" is psychologically nothing more than "an expression of the identity of the subject's reaction in relation to objects that he unites into one class"; logically, this is expressed by the qualitative equivalence of all elements of the class with its stable content and specific volume. The scope and content of the class, the main elements that J. Piaget characterizes the logical operation of classification, it can be designated as follows: the volume of a class as a set of objects and phenomena structured in this class, and the content as a set of essential properties of these objects and phenomena reflected in it.

It is known that the logical operation of combining objects into a class begins to form, normally, with the appearance of a familiar symbolic function in a child, after about a year and a half. But in the initial period, only the content component of the class is formed, determined by the generalization function. In our study, we will look at how the logical classification operation is formed in primary school children.

Today's experience of primary school education shows that such a logical technique as classification does not correspond to the current level of thinking development of second graders. It is necessary at the beginning of education to teach children the ability to classify in the organization of various forms of education, including during educational activities. We can say that today there are almost no methods that allow us to form a logical classification technique in mathematics lessons.

There are a large number of classification tasks in mathematics textbooks for various programs. But not all younger students know the algorithm for performing this mental operation. These algorithms are not in textbooks either, but any algorithm has an operational component, and the child must understand what this action is, what smaller

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operations it consists of, in what order it is performed. Based on this, the teacher is faced with the task of teaching children such a logical technique as classification, revealing its entire essence to students.

RESULTS AND DISCUSSION

To test the pedagogical conditions, we developed an algorithm for the formation of a logical classification method for second graders, which included several stages:

1. Understanding the sequence of classification, rules for combining and dividing objects into groups.

2. Creating conditions for the application of knowledge about the sequence of classification, rules for combining and dividing objects into groups.

3. Consolidation, i.e. creating conditions for the development of the ability to independently perform classifications, combine and divide objects into groups.

The implementation of the first stage, as a rule, does not require much time. Motivation plays an important role in this, since the teacher needs to help students understand the sequence of classification, the rules for combining and dividing subjects into groups. Tasks that are designed taking into account the individual characteristics of students, namely multi-level tasks, can best contribute to this. The child must understand that he performed certain actions for a reason or that his contribution to the collective cause is significant. The teacher must be sure that the second grader will cope with the task in any case, i.e. create a situation of success. High-quality performance of such tasks and the presence of an active position contribute to the fact that students are ready to directly apply the rules of combining and dividing subjects into groups, i.e. to move on to the next stage.

The second stage involves building tasks in such a way that they gradually become more complicated and the motivation created by the teacher decreases. A clear sign that students are training their skills to apply knowledge about the sequence of classification, rules for combining and dividing objects into groups is their diligence, willingness to complete a difficult task, even if they do not quite succeed. It is impossible to say exactly how long the second stage will last, it all depends on the characteristics of the students and the proposed material. This stage takes up most of the work on the formation of a logical classification technique.

The third stage is characterized by the ability of students to independently classify, combine and divide subjects into groups. A clear sign of the presence of a good level of formation of the logical method of classification is the high-quality performance of tasks and the ability to independently classify objects, combine and divide into groups, and give generalizing concepts.

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In the first lesson of mathematics, during the updating of knowledge, we offer classification tasks. Children need to name the marine life that will subsequently appear on the slide (they appear with examples on the body); after all the necessary inhabitants are presented on the slide, the children are given a task according to the student's level of development. We give all the guys task cards:

- for the first level: divide the examples into three groups, the basis for classification is given - the action in the examples;

- for the second level: divide the examples into groups, the basis for classification is given - the action in the examples;

- for the third level: divide the examples into groups.At the stage of initial consolidation, we also issue cards with the task to populate examples in houses.

For the first level, the task is formulated as follows: "Put examples in houses: examples with a big answer in a big house, with a small answer in a small one."

For the second level: "Get the examples from the houses, use the answers to the examples."

For the third level: "We've got examples in the houses."

After the students completed the tasks at each of the stages: updating and initial consolidation, they were checked.

Thus, the results show an increase in the level of formation of the logical classification technique in the experimental class. If at the beginning of the experiment the majority of children had a level below average - 58%, then at the end - the average level - 46% of students in the experimental class; the number of students with a level above average increased by 23% and by 11% - with a high; students with a low level were not recorded, the number of students with the level is below average. In the control group, the results were almost unchanged.

CONCLUSION

Mastering the classification helps the second grader to understand what is the basis of the similarities and differences of subjects, develops the ability to identify a common significant property. One of the tools that can act as a factor in the development of second-graders' thinking is multi-level tasks. The main purpose of these tasks is to develop logical thinking, adapting the learning process to the mental capabilities, abilities and interests of each student.

We have implemented pedagogical conditions for the organization of work on the development of second-graders' thinking in mathematics lessons in the process of mastering the logical method of classification.

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Diagnostics carried out on the basis of a control experiment showed that the results of the experimental class significantly increased after conducting mathematics lessons using multi-level tasks. This suggests the expediency of introducing pedagogical conditions for the development of second-graders' thinking in mathematics lessons into the educational process of primary schools.

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