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Development of Intellectual Abilities of Primary School Students in Mathematics Lessons

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Abstract: The article discusses the features of the development of intellectual abilities of primary school students. Ways of developing mathematical abilities in mathematics lessons are revealed.

Key words: intellectual development, creative thinking, creativity, flexibility of thinking, originality of thinking, development of fluency, combinatorial problems.

The intellectual development of a person acquires particular relevance in the conditions of the current situation of the transition of society to the information stage of development. It is known that in the information society, in contrast to the industrial one, intellect and knowledge are mainly produced and consumed, respectively, and most of the members of society are engaged in the production of an information product. Therefore, in the emerging contours of the information society, education and intellect fall into the category of national wealth, and life in it requires a high intellectual level, information culture, and creative activity from members of the society. The most important place in the system of school education is given to primary classes, as a basic link in the development of an intellectual and creative personality. The primary school teacher should purposefully form general logical skills, because the content of education from the first grade includes, in addition to subject knowledge and skills, a logical component.

The relevance of the task of intellectual development of the individual, the most important component of which is the formation of logical skills, is due to a number of reasons. The quality of knowledge assimilation largely depends on the level of development of students' thinking: logically developed thinking makes it easier to assimilate knowledge and in a larger volume. Possession of the methods of organizing mental work, and these are most often the methods of mental operations, help the perception of the teacher's explanation, participation in a conversation, doing exercises, practical work, solving problems, independent work with a book in the classroom and when doing homework.

In recent years, the question of the need for special work of the primary school teacher on the development of the child's logical thinking has become particularly acute. Every primary school teacher wants his students to study with interest, with enthusiasm, in mathematics lessons they learn not only to count, but also to think, so that at the end of primary school, children develop logical, algorithmic, spatial thinking.

The formation of logical thinking is the most important part of the pedagogical process. Helping students to show their abilities, develop initiative, independence, and creativity is one of the main tasks of a modern school. The successful implementation of this task largely depends on the formation of students' cognitive interests.

The role of mathematics in the development of logical thinking is great. The study of mathematics requires active mental effort. It is very difficult to maintain voluntary attention throughout the lesson. Intense mental activity, a large number of the same type and, in general, routine calculations or algebraic transformations quickly tire schoolchildren. The teacher should make sure that each student works actively and enthusiastically in the lessons and use this as a starting point for the emergence and development of curiosity, deep cognitive interest. This is especially important in adolescence, when permanent interests and inclinations to a particular subject are still being formed, and sometimes only being determined. It is during this period that one should strive to reveal the attractive aspects of mathematics.

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The development of creative thinking and creative imagination of students is necessary to develop the following skills:
1) classify objects, situations, phenomena on various grounds;
2) establish causal relationships;
3) see the relationship and identify new connections between systems;
4) consider the system in development;
5) make forward-looking assumptions;
6) highlight the opposite features of the object;
7) identify and formulate contradictions;
8) to separate contradictory properties of objects in space and time;
9) represent spatial objects;
10) use different systems of orientation in an imaginary space;
11) represent the object on the basis of the selected features.

Creativity (from English creativity) - the level of creative talent, creativity, which is a relatively stable characteristic of the individual.
To develop students' creativity in thinking , the following learning tasks can be used.

I. Tasks for the development of flexibility of thinking

1. Establish relationships between the studied material and a specific task, for which it is necessary: 1) isolate the problem; 2) draw up a solution plan; 3) formulate hypotheses; 4) choose and justify the best solution.
2. Establish similarities and differences, causal relationships.
3. Explain the meaning of the phenomenon with confirmation of the patterns with your own examples.

I include tasks for the development of flexibility of thinking in oral counting, which contributes to the development in children not only of the flexibility of thinking, but also of understanding the relationship between quantities. The game is the field of creativity. It is in the game that flexibility and originality of thinking are manifested. Fairy tale characters come to class. Children help them to carry out any tasks, travel with them around the country of Mathematics. The inclusion in the lesson of geometric puzzles, crossword puzzles on various topics, graphic dictations, various didactic games ("I believe - I do not believe", " Daneki ", etc.) undoubtedly contribute to the development of students' creative abilities. The following tasks help the development of psychological mechanisms as the basis for the development of creative abilities (memory, attention, imagination, observation):
How many triangles are in the picture? (other geometric shapes?).
How are the pictures different?
· Color the areas where you will meet such figures (samples of various figures and a large drawing that these figures make up are given).
Underline the odd expression. Try to find more than one solution.
Color the fairy-tale hero who has the most number of actions of the second stage on the way of expression, etc.

II. Tasks for the development of originality of thinking

In problems of this type, I offer students the following reasoning scheme:
1. Determine the "correctness" of the conditions of the problem.
2. Come up with your own, unusual task.
3. Offer a completely different way to solve this problem.

Performing such exercises, students are happy to find shortcomings in the proposed tasks, come up with their own options, including tasks with fantastic, non-existent characters. Relying on the “Problem Book” of the writer G. Oster , children come up with similar tasks, inventing the plot of the task and supplementing it with the necessary data.

III. Tasks for the development of fluency

Finding several possible solutions, choosing the best solution, establishing similarities and differences, determining cause-and-effect relationships help teach self-education and research skills in the classroom.

IV. Tasks for the development of creative thinking

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To develop creative thinking, the ability to think and act independently, to have your own independent opinion, I offer the following tasks:
1. Formulate your questions.
2. Determine what the contradiction is, formulate and concretize it.
3. Express your critical remarks.
4. Independently evaluate the answers of classmates.
5. Fix bugs.
Open assignments are as close as possible to everyday problem situations that students face in life. In these situations, it is very important to be able to put forward as many alternative solution strategies as possible, and then, after evaluating them, choose one or more of the best ones. To develop creativity, specially selected tasks are used. These are exercises such as “Chain”, “Encyclopedia”, “Mathematical Tales”, “Symbolism”, “Animals on the Plane”. Also, the development of creativity is facilitated by an analogy that helps a person in solving life situations and in mastering mathematics. This is such a mental operation, with the help of which the similarity between objects is found in some respect. The use of analogy in mathematics is one of the main methods in finding solutions to problems. I use the analogy extensively when solving word problems such as:
tasks for guessing;
tasks for movement;
tasks in parts;
geometric tasks for cutting;
tasks solved “from the end”.
To form the ability to draw an analogy, you can use tasks to find verbal analogies, analogies between different objects. Such exercises develop the imagination of students, which, of course, plays a significant role in mental activity. The selection of essential features of objects and phenomena and their use is also necessary when performing classification.
Solving such problems contributes to the development of the ability to “recognize” familiar objects, transfer knowledge to an unusual situation, see the structure of an object, and find alternative solutions.

V. Tasks for the development of logical thinking

Particular attention should be paid to tasks for the development of logical thinking, because. the ability to think logically is one of the indispensable conditions for the formation of a comprehensively developed personality. Such tasks require greater or complete independence and are designed for search activities, an extraordinary, unconventional approach and creative application of knowledge. As for non-standard tasks, tasks of search and creative content, it is necessary to include them in the lessons regularly and regardless of any topic. After all, their use contributes to the successful development of the thinking of younger students, their intellectual abilities, and not the assimilation of any specific knowledge and skills. These can be various puzzles that develop games, for example: " Tangram ", "Magic Square", "Magic Circle", tasks for ingenuity, logic: "Find a shorter path to the house", "Guess the fairy-tale hero by describing his properties" and etc. Children are happy to perform tasks related to various kinds of ciphers, labyrinths and puzzles. In connection with the study of the number series, it is useful to use historical information in the lessons, the study of various number systems, ancient numbers. Children can be invited to create "their" number systems, "invent" their numbers. Children should be offered tasks, the solution of which they find on their own without the participation of a teacher or with his little help, discover new knowledge and ways of obtaining it. I pay much attention to the tasks of finding patterns. They develop mathematical vigilance, the ability to think consistently, to generalize the depicted objects by signs or to find differences.
Examples of tasks for identifying patterns:
Divide the figures into groups.
Find "extra" drawing
Draw a pink line longer than green, green longer than blue, and brown equal to the pink line.
· Find a pattern and continue it.
By what principle were these figures combined, etc.

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For the development of creative abilities of students, such partial search tasks that contain several solutions are of great importance.

When solving a mathematical problem, I pose a problem to students , starting from the transformation of the conditions of the problem to obtaining the desired result. Such a transformation is precisely the process of creating something new, in this case a solution, and an active search for a solution is the process of creative thinking of students, which is fundamental in the work.

A prerequisite for solving problems is the independence of the student's thinking. To develop divergent (open, creative) thinking and identify individuals who are able to see and set tasks, striving to go beyond the set conditions, it is possible to use the following types of creative tasks:

o Tasks for ingenuity
o Joke tasks
o Number shapes
o Problems with geometric content
o Logic exercises with words
o Math games and tricks
combinatorial tasks .

Thus, we can conclude that the purposeful effective development of creative abilities in mathematics lessons in the system of L.V. Zankov takes place with a complex psychological and pedagogical impact on students through the creation of special conditions. Holistic approach of L.V. Zankov manifests itself in the psychological and pedagogical conditions for the development of creativity, which include special methods and techniques, a certain psychological climate. The systematic use of creative methods that ensure the promotion of students in the development of creative abilities by accumulating experience in creative activity while performing gradually more complex creative tasks is a necessary condition for the development of younger students. At the same time, it is necessary to focus not on the level of development already achieved by the student, but to run ahead a little, making demands on his thinking that somewhat exceed his capabilities, that is, not on the level of the actual, but on the zone of proximal development.

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