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POSSIBILITIES OF A DIFFERENTIATED APPROACH TO STUDENTS IN SOLVING MATHEMATICAL PROBLEMS FOR SEARCHING REGULARITIES

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Annotation
In order to somehow teach the student a rule, it is necessary to encourage a creative process, such as solving a problem or coming up with a new way to solve it. The article discusses several ways to solve the problem aimed at shaping the creative activity of primary school students by solving problems related to the search for mathematical patterns in the process of teaching mathematics.

Keywords and new concepts: elementary school, mathematics, educational process, mathematical laws, problem solving, creative activity, education.

Introduction

The problem of including creative activity in the educational process of primary school students arose in connection with the need to intensify learning. This issue is also related to the need to accumulate experience of creative work from an earlier age, since the opportunity to develop does not remain unchanged.

Psychologists note that up to 7-8 years in a growing person add up
and up to 70% of his personal qualities are manifested. During the period of initial training, first in play, and then in educational activity, the essential forces of a growing person are revealed, the core of the personality is formed. It is well known that everything assimilated by a child at this age remains for life[2].

Effectively motivate the student to be creative, such as solving a problem or inventing a new way to solve a problem in order to fully explain and teach the law in one way or another. When conducting this research, it is not difficult to see that the child is, in fact, repeating the actions performed by the scientist during the research process. Of course, this is not a full-fledged scientific work, but it is a unique, greatly simplified form[1].

This explains the attention of scientists to primary education, since here the question is solved in which direction the development of the individual will continue.

Let's consider a specific task of finding patterns from the point of view of the formation of certain skills.

WEB OF SCIENTIST: INTERNATIONAL SCIENTIFIC RESEARCH JOURNAL
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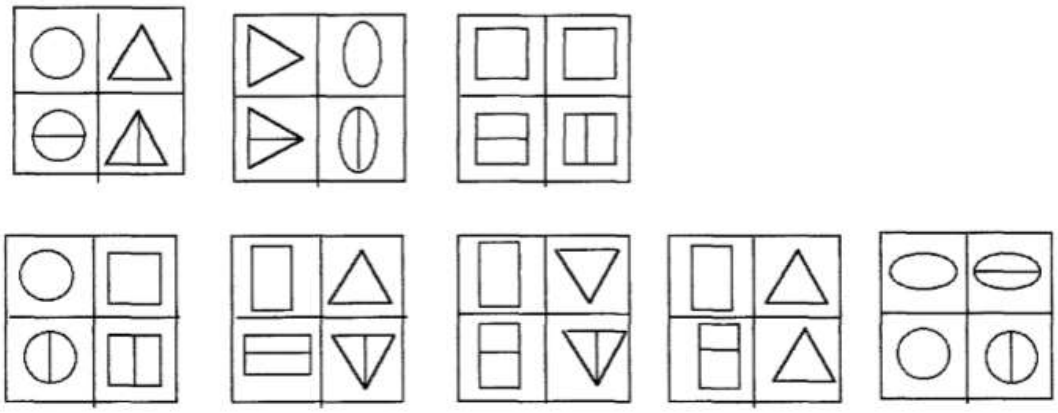
As noted in the previous chapter, the components of the creative activity of junior schoolchildren are such skills as analysis, synthesis, generalization, comparison, concretization, abstraction[3].

Let us find out whether our choice of tasks for finding patterns as a means of forming the creative activity of primary schoolchildren is legitimate.

For example, let's take the problem of finding a common feature.

Problem number 1.



A **B** **C** **D** **E**

To solve this problem, the student needs to do the following operations:

1. Analyze the condition of the problem by comparing the figures inside the squares.
2. Connect (synthesis) the features identified by analysis inherent in the figures within each individual square.
3. Abstracting from specific figures, to generalize the knowledge gained for all squares of the condition, namely: a) the figures are vertically congruent and equally oriented; b) there is a horizontal line (line segment) inside the lower left figure; c) there is a vertical line (line segment) inside the lower right figure.
4. Concretize the knowledge obtained by synthesis and generalization for each figure inside the squares of the second row.
5. The square, the figures inside which will correspond to all the selected features, should be considered the answer to the question of the problem.

The above points represent a scheme for solving problems to find a common feature[4]. We clearly see from it that when solving problems to find patterns (we will not give schemes for solving all types of problems), there are such methods of mental activity as analysis and synthesis, generalization and concretization, comparison and abstraction.

We can make an assumption, and later the conclusion that solving problems for finding patterns significantly affects the development of the above methods of mental

activity. Of course, within the framework of elementary school, it is impossible to bring analysis and synthesis, generalization and concretization, comparison and abstraction to the level of skill that is inherent in an adult. But, as our study shows, solving the proposed problems takes a big step in the right direction (which will be illustrated in the description of experimental learning).

As mentioned above, the formation of the creative activity of primary schoolchildren is ineffective and unreasonable without a differentiated approach to students. Therefore, the same tasks for finding patterns cannot be offered to all schoolchildren. In this regard, as a kind of characteristic of tasks for finding patterns with geometric content, we propose the use of the task design factor[5].

But before defining the meaning of the term "design factor" of the problem, we note the following.

Psychologists have shown, and practice confirms, that small children (and not only them) operate more freely with fewer objects, find it easier to navigate in structures of one kind or another, containing fewer elements. Therefore, it would be natural to draw the following conclusion: it is much easier for a child to work on problems with linear construction than on problems with tabular construction, since in problems of the first type, there are three or four elements, the second - nine or more[6]. Consequently, it is more expedient to offer younger students, first of all, problems with linear design, and then with tabular design.

Changing features in problems with geometric content can be as follows:

1.form;
2. color;
3. orientation;
4. location;
5.size;
6.quantity, etc.

These indicators (the number of changing features and the number of different changes) were used to determine the coefficient of constructing a problem for the reason that it is on them that the student relies when solving any of the problems to find patterns. This is confirmed by the above scheme for solving the problem of finding a common feature[7].

Let us show the definition of the design factor of the problem by an example (a problem with a "nested" filling of the table):

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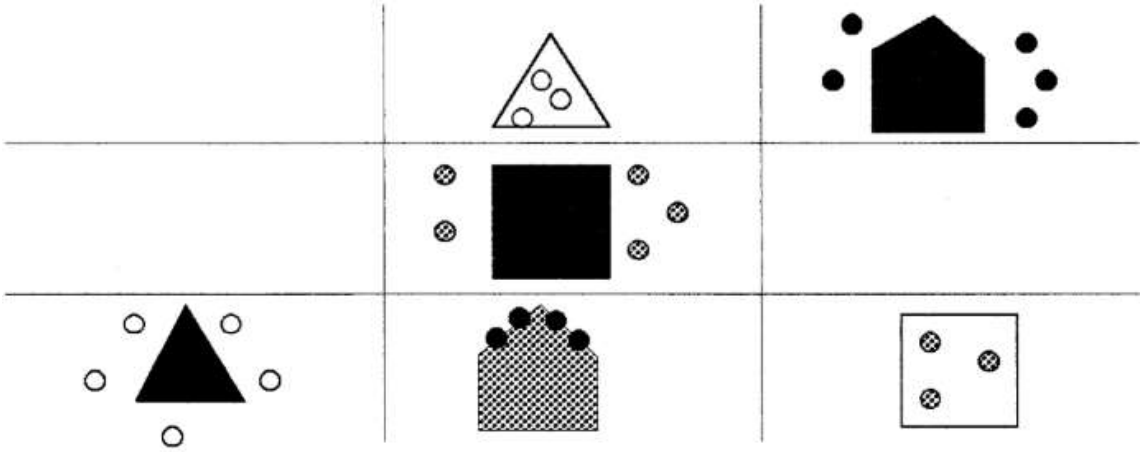
Problem number 2.



In this task, the following changing characteristics were used:
1) the shape of the figure (triangle, square, pentagon);
2) the color of the figure (white, black, gray);
3) the number of circles (three, four, five);
4) the location of the circles (inside, on the border, outside the figure);
5) the color of the circles (white, black, gray).

By weak, from the point of view of a predisposition to creative activity, students, we mean those children who are practically incapable of carrying out the creative process. All students of primary school age need a teacher's guardianship when it comes to creative activity (and not only about it)[8]. But students in this group require more attention than others. This happens either due to neglect on the part of the parents, and then the teacher, or because of any minor mental deviations. In order not to be the reason for this state of affairs, it is necessary to devote as much time and attention as possible to this group of students[2]. Therefore, we propose to limit the tasks assigned to them for finding patterns to those whose design coefficient is equal to four. At the same time, tasks for finding patterns with geometric content are aimed at developing general patterns, and tasks for finding patterns with arithmetic contents form and develop both general patterns and special (mathematical) ones.

By general laws, we mean the laws of analysis, synthesis and generalization, which are the main specific laws of thinking.

Let's give one example for each typing group (it will be correct for all problems of finding patterns based on any material).

Sequencing tasks.

Problem number 3. continue the series.

1. 2,5,8,11, ...

Seeing that each subsequent number increases by 3, you can continue the series as long as you like, repeating the table for adding three.

When solving problems to determine the sequence, constant supervision of the teacher is required, since when solving problems on their own, the students, but necessarily overlook something. This happens especially often when it comes to tasks in which the numbers change according to more than one sign:

7, 9, 8, 10, 9, ..., ... (1st grade).

We establish that we need to add 2 to the first number, and subtract 1 from the second and thus continue the series. By offering students similar problems for independent solution, the teacher runs the risk of getting a series either increasing by 2 or decreasing by 1. Therefore, checking is mandatory.

Transformation detection tasks.

Problem number 4. 5 + 3 = 3 + 5, 4 + 6 = ...

To solve the problems of this group, you should see and understand what transformation takes place in order to transfer it to the next pair of numbers (or one number).

For the second grade, the following tasks are proposed for knowledge of the multiplication table.

- Tasks for finding a common feature.

Problem No. 5. 3 • 8 = ... 4 • 6 = ... 8 • 3 = ...

5 • 4 = ... 9 • 8 = ... 6 * 4 = ... 8 • 8 = ... 7 • 9 ...

Highlighting a common feature - the result of all works is 24, students should solve all the examples of the second row before answering the question of the problem. The task is appropriate when fixing the entire multiplication table.

Sequencing tasks.

Problem number 6. 2 * 3 = ..., 4 • 3 = ..., 6 * 3 = ..., ...

Multiplication table by 3, the first factor in each subsequent product is increased by 2.

For the third class, the following tasks can be proposed.

- Sequencing tasks.

Problem number 7. 110 • 2 = ..., 220 • 2 = ..., 330 • 2 = ..., ...

We calculate the product of two numbers, the second factor of which is constant, and the first is increased by 110. The multi-digit number ending in zero is repeated by a single-digit number.

The above tasks for finding patterns show the versatility of their use. In the same way, they can be compiled on the material of other objects. It is possible to use some types of problems to find patterns in older grades, not limited to the level of primary school.

WEB OF SCIENTIST: INTERNATIONAL SCIENTIFIC RESEARCH JOURNAL
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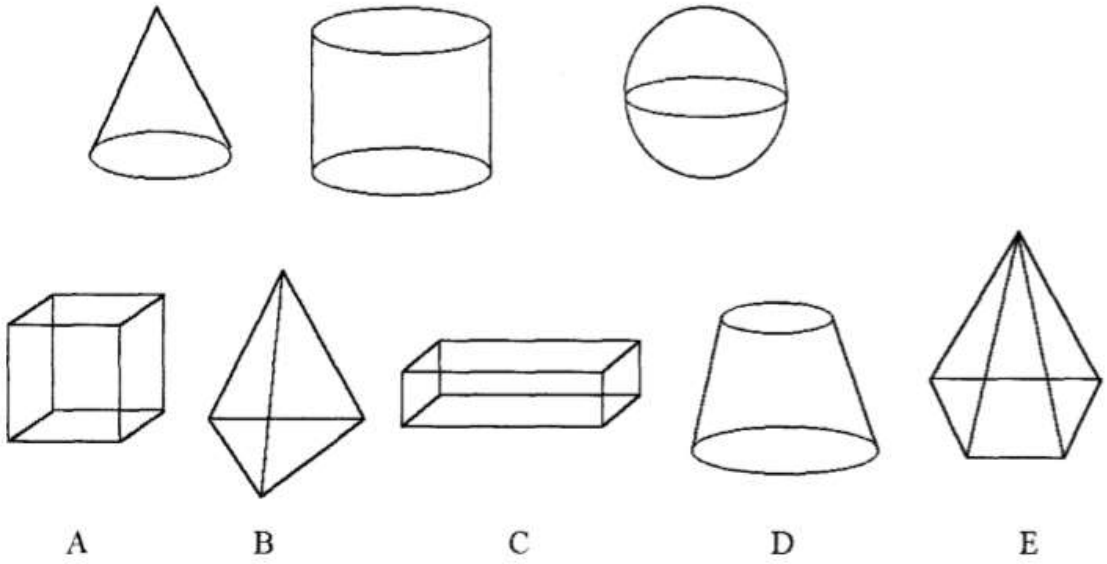
For example, when getting acquainted with bodies of revolution, the following problem of finding a common feature will be appropriate:

Problem number 8.



Thus, the tasks for finding patterns can be used as a means of shaping the creative activity of younger schoolchildren, since in the process of solving them, skills such as analysis and synthesis, comparison and abstraction, concretization and generalization are developed.

Tasks for finding patterns with geometric content differ in the coefficients of constructing the task, which are a specific characteristic of tasks of this type and are determined by the number of changing features and the number of different changes. The division of tasks in accordance with their design coefficients determines the possibility of a differentiated approach to students, who are divided into groups in terms of a predisposition to creative activity.

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