

# TRAINING OF MATHEMATICAL SKILLS AT PRESCHOOL AGE THROUGH ACTIVE – PARTICIPATIVE METHODS

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**Abstract:** Through the present paper I have tried to find out the influence of the use of active-participative methods, especially the didactic game in mathematics activities on the development of pre-school children. Didactic game is of particular importance among the learning methods used in kindergarten, because it is the predominant activity of pre-school children. Play is the activity they prefer in kindergarten, as it responds to their age peculiarities and it ensures the transition from the play-based activities in kindergarten to learning-based activities in schools.

**Key words:** didactic plays; kindergarten activities; active-methods

## **Argument**

The didactic game has formative-educational valences, developing the pre-schoolers` logical thinking, their divergence, flexibility and fluency in thinking. I believe that the use of these methods contributes to the development of pre-schoolers` creativity. In kindergarten activities, the child's creativity can develop by solving problems or by creating thinking problems based on given clues. The pre-schoolers` creativity is not formed only through mathematical activities or through the use of didactic games during these activities; each category of activity has its role and contribution to the development of pre-school creativity, as advocated by the Curriculum for early education.

## Research Methodology

The present research has the following objectives: developing the creativity of preschool children through the use of didactic games in mathematical activities correlated with the reference objectives of the Curriculum for Early Education. It is known that the aim of any research hypothesis is to identify a situation that could improve the quality of a process or product. Because of this, we have conducted an experimental research to determine the influence of the active-participative methods and especially of the mathematical didactic game in the development of the pre-schoolers' creative thinking.

These ideas were the basis of this research: by making the didactic approaches of mathematical activities using active-participatory methods and, in particular, didactic games for the purpose of accessing scientific content. We assume that if we use active-participative methods and especially didactic games during kindergarten math activities, the pre-schoolers' creativity and thinking will be stimulated. Thus, in the experimental group we mainly used didactic games as a method of stimulating creativity, but also other active-participative methods used for the development of critical thinking and creativity.

While the didactic games were conducted, pre-school children were constantly encouraged to find new solutions in mathematical activities, to find solutions to make didactic games more complicated. We applied several didactic games to the experimental group and their aim was to train:

- a) Counting: „How many pigeons are there?“, „Which butterfly has flown?“, „What is there just once...?“;
- b) Spatial relations and positions: „Where have the toys hidden?“, „Get me to my place!“;
- c) Comparison according to characteristics: „The Zoo“, „Big or small?“, „Where have hidden the characters from Mickey Mouse cartoons?“;
- d) Identification of geometrical figures: „Detectives“, „Look for my house!“.

We used traditional teaching-learning methods with the control group and therefore the child was more passive as compared to the experimental group. Throughout the experimental research, we used the following methods:

- *Didactic experiment* was used as main method of data collection and investigation of the pursuit aim. This experiment was meant to determine whether the hypothesis is confirmed or invalidated, namely that: if we use active-participative methods and especially the game in kindergarten mathematical activities, then the pre-schoolers' creativity is stimulated.
- *Observation method* facilitates knowledge of the subjects' personality and

involves methodological, exact and intentional record of various individual or group behaviour manifestations, in the manner they occur in the natural flux of manifestations.

- *Tests*, as standardized measurement tools aim an accurate determination of the development degree of mental and physical features. We have tried to make the tasks as accessible as possible and respected the shift from easy to complicated when designing the tests.

- *The method of analysing the children`s activity* was used to obtain data on the children`s intellectual abilities, their level of giftedness, the registered progress. It was conducted with both groups and we have applied various assessment strategies to prove or invalidate the hypothesis.

- *Statistical techniques for the measurement, comparison and registration of data in the table, charts, etc.*

The experiment began with the application of the initial tests, the data found being noted in the children's observation files. We wanted to identify the children`s level of knowledge and training at the beginning of the school year. The experimental stage consisted in applying different methods of learning mathematics during the two semesters of the school year 2017-2018. In the experimental group we used active-participative methods, especially the didactic game, as a method of stimulating creativity, but also methods for the development of critical thinking and creativity. The use of these methods has helped to establish an atmosphere of collaboration between children during the task solving activity. Teamwork has special importance in solving the work tasks.

The children acquired information through games, learning being approached from an interdisciplinary and cross-curricular perspective, as provided by the Curriculum for Early Education. During this stage, pre-school children were constantly encouraged to identify new solutions in solving the tasks imposed by the mathematical activities and to make the task more complicated. The control group pursued the same reference objectives, we applied the same evaluation tests but we used traditional teaching-learning methods. The child was placed in a more passive position, unlike the experimental group where active methods were applied, such as didactic play. The purpose of such methods is to develop the children's creativity, the spirit of cooperation in solving the work tasks and the achievement of better results by children.

*Mathematical didactic games on the experimental group at this stage:*

We applied several didactic games to the experimental group and their aim was to train:

e) Counting: „How many pigeons are there?“, „Which butterfly has flown?“, „What is there just once...?“;

f) Spatial relations and positions: „Where have the toys hidden?“, „Get me to my place!“;

g) Comparison according to characteristics: „The Zoo“, „Big or small?“, „Where have hidden the characters from Mickey Mouse cartoons?“;

h) Identification of geometrical figures: „Detectives“, „Look for my house!“.

In the final stage, we applied evaluation tests that covered the same objectives as those applied in the initial evaluation, but the final test tasks had a greater degree of difficulty and the items were more complex. Through the initial and final tests, we were able to make a good comparison of the results after a one-year training period and we were able to know the progress of the children.

### Data analysis. Results in the initial evaluation

The targeted objectives:

1.1. To count from 1 to 10 by recognising the groups with 1-10 objects and corresponding numbers;

1.2. To identify the position of an object in a row using ordinal numbers.

**Table 1. Results for the first two items**

Group	Total no of children n	No of children with VG scores	No of children with G scores	No of children with S scores
A	8	4	2	2
B	8	3	3	2

A – experimental group from the Kindergarten Şiad;

B – control group from the Kindergarten Stoineşti

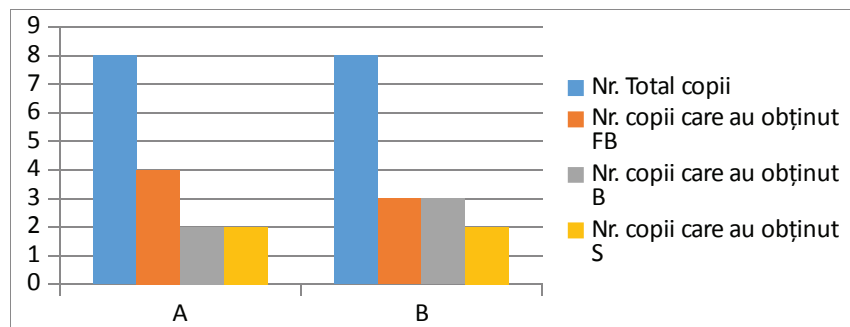


Figure 1. Results for the first two items

1.3. To understand and name relative spatial relations, to place objects in a

given space or to place him/herself in relationship to a given reference.

**Table 2. Results for the item 3**

Group	Total no of children	No of children with VG scores	No of children with G scores	No of children with S score
A	8	5	1	2
B	8	4	2	2

A – experimental group from the Kindergarten Şiad;

B – control group from the Kindergarten Stoineşti

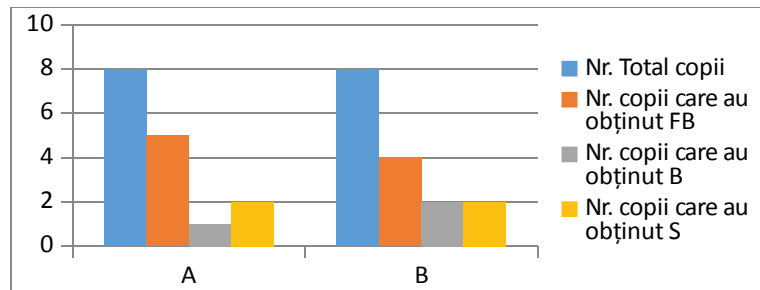


Figure 2. Results for the item 3

1.4. To recognize, name, build and use circle, squares, triangles, rectangles in games.

**Table 3. Results for the item 4**

Group	Total no of children	No of children with VG scores	No of children with G scores	No of children with S score
A	8	4	2	2
B	8	3	3	2

A – experimental group from the Kindergarten Şiad;

B – control group from the Kindergarten Stoineşti

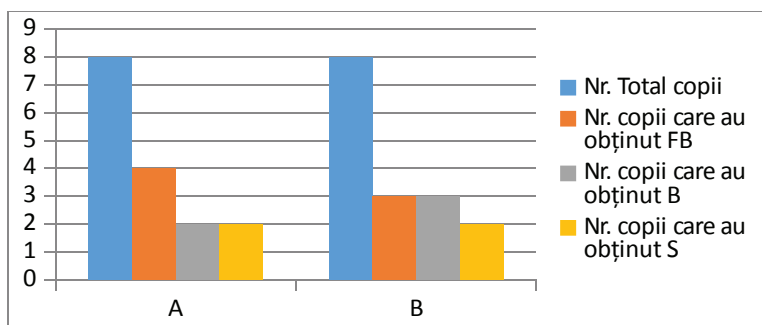


Figure 3. Results for the item 4

**Results in the final evaluation:**

**Table 4. Objective: 1.1., 1.2.**

Group	Total no of children	No of children with VG scores	No of children with G scores	No of children with S score
A	8	7	1	0
B	8	4	2	2

A – experimental group; B – control group

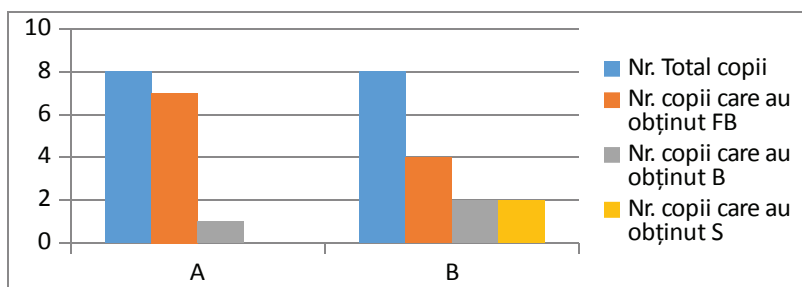


Figure 4. Objective: 1.1., 1.2.

**Table 5. Objective: 1.4.**

Group	Total no of children	No of children with VG scores	No of children with G scores	No of children with S score
A	8	6	2	0
B	8	4	3	1

A – experimental group; B – control group

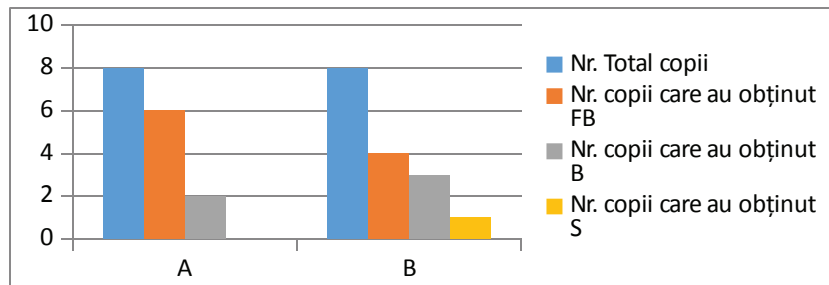


Figure 5. Objective: 1.4

The results of the experiment highlighted in the above charts validate our hypothesis, namely that the use of active-participative methods in kindergarten activities and especially in mathematical activities, activates the children's thinking, their creativity as well as the ability to understand the content is positively influenced. It has also been found that the ability to focus increases when active-participative strategies are used, the interest of children in learning increases when they are directly involved in the activity and in their own training.

The results of the experiment illustrate the importance of didactic games for children. When they are placed in different situations, they enjoy the opportunity to be trained in a warm, open, cooperative climate in which they can play the role of a playing child. The didactic game stimulates the didactic activity through playful motivation, subordinated to the teaching-learning-evaluation activities with a strong formative character.

As a result of the experiment, we can observe the improvement of the children's results. They participate actively with interest and curiosity in the mathematical activities in which the didactic game is used, and they are also more motivated for the next learning activities. Pre-schoolers from the experimental group have developed cooperative skills and team spirit in accomplishing work tasks.

## Conclusions

Active-participative didactic strategies, including didactic games used in mathematical activities in the kindergarten, help to increase the interaction between the minds of children, their personalities, improve counselling, cooperation, all of which lead to a dynamic, pleasant learning and with obvious results. These strategies help children learn with pleasure because they are directly involved in the learning process, trigger interest in the activity, encourage the shy to be more confident in their own efforts.

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