The Eurasia Proceedings of
Educational & Social Sciences (EPESS)
ISSN: 2587-1730

The Eurasia Proceedings of Educational & Social Sciences (EPESS), 2018

Volume 9, Pages 229 - 238

ICEMST 2018: International Conference on Education in Mathematics, Science and Technology

Educational Games and Activities in Preschool Mathematics

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Abstract: The core preschool curriculum currently binding in Poland sets forth the objective of pre-school education, the preventive and educational tasks of kindergartens, preschool departments in primary schools and other forms of preschool education, and the results of their implementation, i.e. the goals which children attain on completion of their preschool education. The objective of preschool education is to support the full development of children. This assistance comes in the form of care, upbringing and teaching & learning processes, which allow the child to discover its potential, get to know the logic of actions, and to gain experience on its road to truth, goodness and beauty. As a consequence, the child becomes mature enough to enter the first level of education. Preschool education defines educational contents as the elements of culture that are intentionally selected and included in the process of education. Cultural contents are the most crucial means of educational activity in preschools, as thanks to them the child absorbs the social achievements of many generations and may develop as a human being. Hence, in practice, preschool educational contents are classified, according to the domain of culture producing various type values, into:

- mental education including speech and thinking development (Polish language education), introduction to the qualitative and quantitative relations and mathematical concept development (Mathematical education), discovering nature (Scientific education),
- aesthetics education,
- social and moral education,
- health education.

Mathematical education is one of the most difficult areas of education. Maths is often not only non-supportive in terms of child's intellectual development, but in some children it can also impede or distort their personalities. As early as in preschool, children often experience failures, which may cause real drama. Consequently, many children are afraid of Maths and tend to avoid, by all means, any out-of-school situations associated with it. Research demonstrates that every fourth child at the end of the first grade/the beginning of the second grade experiences difficulties with Maths; whereas, every third child in the third grade cannot meet the requirements of the class. The main causes of the fear of and aversion to Maths are preschool failures. Thus, how to organise Mathematics so that they bring the desired results? It seems that to help the child reach the level of curricular requirements, often a simple introduction of other exercises, suited to the child's abilities and difficulties it experiences, would suffice. The article presents analyses regarding the influence of educational games and activities on the level of mathematical skills of 5-year-olds within the Siedlce city area (Poland). Research included 380 six-year-olds and 40 teachers. The first study was conducted in November and the second – in April, after a five-month mathematical education with the use of educational games and activities.

Keywords: Educational games, Educational activities, Mathematical education, Six-year-old, Kindergarten, Mathematical skills

Introduction

Mathematics is more than a formal construction or a supply of ready-to-go knowledge, which can be acquired. It is a way of approaching the world, a means to understand it better. "It ought to be taught, primarily, as a useful tool, a reasoning method" (Filip & Rams, 2000, p. 9).

Mathematics is more than just formulas and theories. It is knowledge determining the way in which the universe functions. When one enters digits into a calculator, s/he actually has an insight into universe's mysteries. Every

calculation made by a man renders its brains quicker and more flexible. Solving complicated exercises, pondering about a problem, develops imagination, provides a greater insight into oneself, one's skills, and the beauty of Mathematics (Skura, 2009, p. 42).

Mathematics, quite like the reading skill, is a tool for exploring the reality. mathematical skills and information are requisite in the learning of other school subjects. It is a subject featuring high educational values, for to master the notions and use them in practice logical thinking skill must be developed (Filip & Rams, 2000, p. 80).

Mathematical education is a crucial area of education at the preschool level. The conditions we create for our child to explore the world of Mathematics will determine whether his attitude to it will be creative or quite the opposite. As a school subject, Mathematics must be viewed from a dual perspective. On the one hand, we must consider the special nature of Mathematics as a science that is expressed, inter alia, by the operative nature of notions and by a separate language code, which allow mathematicization of certain situations. On the other hand, we need to account for all physical and mental abilities of a child, his/her level of perception and understanding of the world around" (Nowak, 2011, p. 28).

When acquiring Mathematics, children should solve tasks thanks to which their natural curiosity will be satisfied and the ability to draw on their own experience and knowledge about the world will be developed. Activities organized by the teacher, during which children manipulate with objects, help them expand mathematical knowledge. Tasks that require some operations are necessary for normal intellectual development of preschool children's talents and wisdom. An indispensable element of said experience and the related learning process should be a relaxing, fun atmosphere, and a feeling of satisfaction. It is in child's interest that he is provided with mathematical exercises that will show him/her that Maths is not only accessible, but also highly interesting and funny (Pisarski, 1992, pp. 10-11).

It is said that to have good results in Maths, you need special skills. A lack of such abilities is the main reason of struggles and failures. Research conducted by psychologists refute this theory, for excessive difficulties and related failures associated with the learning of Mathematics are not a consequence of the lack of abilities, but rather of a delay in psychological processes' development required to learn Maths. A frequent cause of failure is an unsuitable choice of teaching methods for preschool children. We need to bear in mind that the principal form of child's activity at this age are games. It is thanks to them that the child discovers the world and social relations, shapes his mind and effective operational skills, satisfies his/her need to be active, establishes positive emotional states and eases emotional tension (Klim-Klimaszewska, 2005, p. 39).

Adequately selected didactic contents and the application of variable teaching methods when working with children and implementing mathematical education in preschool has positive effects – a child that begins education in a primary school can meet its requirements and cope with mathematical obstacles. One of the numerous methods facilitating the acquisition of mathematical skills includes didactic or educational games. During play time and didactic games children learn Maths with pleasure.

The Position of Educational Games in the Teaching of Preschool Children

Contemporary preschools should consciously and consequently organize activities which stimulate an active and creative attitude in every child. One opportunity to do so are didactic (or educational) games. They are a vital measure of development of correct attitudes to learning, cooperating with other children, and to the surrounding reality. They are important factors that optimize the process of upbringing and teaching in preschools. They minimize difficulties and failures children experience during preschool activities (Rynek, 2003, pp. 545-546).

Fun didactic activities and educational games have a deep-rooted tradition in teaching and upbringing. Plato, for instance, believed that upbringing and teaching must be founded on unconstrained methods, such as didactic games, and never on constraint. An occasional variation to classes in a form of "scientific games" could be observed also in Quintilian's. Jan Amos Komeński advised that reading was taught in a play-like manner, using a moving alphabet; he emphasised the role of didactic games in his approach to the upbringing of young children of Jan Henryk Pestalozzi (Kędzior-Niczyporuk, 1998, p. 16).

Educational games are one of the means of managing one's intellectual development. For children – they are an attraction; in the case of teachers – they support the didactic and educational process and diversify educational

situations. While delivering the pleasure of intellectual efforts, stimulating thinking, they enrich and reinforce skills and make them practicable (Kamecka, 2004, p. 39).

Didactic games expose children to active perception (discovery through senses), assimilation activities (acquisition/revision, especially with the use of memory), and exploration activities, i.e. discovering new elements of knowledge (discovery-like and creative activities). The teaching through educational games and activities comprises all underlying elements of comprehensive teaching, i.e. learning through cognition, experience and action (Łukasik & Cyran, 2002, p. 309).

The introduction of educational games into the teaching process develops perceptive-motor processes, the ability to observe, imagination, concentration, memory and mental processes, such as analysis, synthesis, classification, comparison, disregard, understanding and generalization.

Educational games provide an opportunity to acquire skills and habits necessary to master preschool knowledge, and in the future – to learn in school and then work (Okoń, 1987, pp. 261-262).

Educational games promote generation of "task-oriented motivation", thanks to which a child is willing to do certain tasks, as s/he derives pleasure from it. Fun-based teaching&learning methods are particularly useful when working with children with speech impairments. They help one ease preschool and out-of-preschool stress and organize group activities. They play a therapeutic role in relation to children with developmental deficits or retardation (Błanik, 1999, p. 103).

Preschool environment is significant to the acquisition of correct experiences and mathematical notions, whereas early experiences of children are key to the process of shaping adequate mathematical terms. And it is Mathematics, where educational games are used to a very large extent. They make Math classes more attractive. They release mathematical activity. What is more, they facilitate the understanding of novel terms and skill development, they develop cognitive needs, and stimulate mental activities of a child by teaching him/her to explore, discover, and express the data acquired (Iwańska, 2001, p. 227).

The role and importance of didactic games at the level of preschool education and teaching cannot be overestimated. Due to their qualities and unlimited applications, they can play a servant role in the process of teaching, supporting realization of a number of didactic and educational objectives and activities (Błanik, 1999, p. 138).

The use of educational games in preschool education has a positive effect on child's development. Didactic games structure multiple cognitive and social skills, such as problem solving, negotiating, or discussing. They teach children self-control, competition and cooperation techniques. They train agile minds and nimble wits. When children are involved in a didactic game, they encounter information, reconstruct it and create a new one; therefore, it is easily memorised, long-lasting and can serve as a future resource (Kruszewski, 2004, p. 238).

Educational games develop quick wits, ingenuity, and the ability to take in swiftly. They teach how to express one's thoughts in a succinct and intelligible manner. The objective of educational games is, above all, intellectual education. However, they also require children to be willing, to act according to a given plan, to master and abide by the rules of the game, to focus on the interest of the group rather than on their own first (Bleher, 1952, pp. 8-9).

Thanks to educational games, one gains paramount logical and mathematical experience, i.e. classifying elements in line with a predetermined criterion, searching for a criterion guiding the existing series, putting various parts together to make a whole, searching for repeatable patterns, comparing set sizes, calculating, determining varying potentials, evaluating results of arithmetic operations (addition and substraction) (Klim-Klimaszewska, 2010, p. 218).

For didactic games used in mathematical education to perform well, the following rules should be met:

1. Children ought to undertake and carry out educational games with pleasure, not due to an obligation. Therefore, teachers can only suggest didactic games/activities, rather than impose them.
2. Games/activities should be make-believe/invented only, but at the same time – dependent on the appearance of the real world. The make-believe convention favours the feeling of safety and children can, without any fear, practice skills to be used in real life situations later on in lives.

3. When organizing educational games, rules must be imposed very thoughtfully, so that they do not turn into a task to be done. Teachers should brief their pupils on the general idea of a given game, and then agree on the way they can play, allowing the children to, for instance, modify its course.
4. One ought to bear in mind that while every game is for fun, not every kind of fun is a game. Games incorporate rivalry and preschool children know very well that they will race one another for something, whereas mere playing does not involve the element of competition. Hence, the teacher should be cautious not to call fun activities/playing games and games – fun activities/playing.
5. Before any educational game or fun activity, one needs to check if it features the type of cognitive and performative experience that will contribute to the formation of mathematical competencies crucial form the point of view of a lesson plan (Gruszczyk-Kolczyńska & Zielińska, 2004, pp. 43-44).

Method

The subject of research was mathematical education. The study was conducted with a view to verifying whether educational (didactic) games used by teachers can affect the level of mathematical education presented by children attending preschools in the Siedlce city area.

The research problem was narrowed down to two questions:

1. What educational (didactic) games are used by the study teachers during mathematical education classes?
2. What is the level of mathematical education presented by the study group children?

To conduct the study, a diagnostic survey method was applied, which involved techniques, such as:

- a questionnaire,
- a pedagogical test.

The study was performed twice: in November 2016 and April 2017. Analyses included 380 six-year-olds and 40 teachers (females). The children were tested for mathematical skills. They had the following tasks to do:

1. Look at the pictures closely and then follow the instructions underneath.
   - Colour what is in front of the fence.
   - Colour what is behind the boy.
   - Colour what is over the earthworm.
   - Colour what is under the table.
   - Colour what is next to the cat.
2. Circle all animals and objects looking left BLUE, and all those looking right RED.
3. Draw the sun on the top right and a cloud on the top left. Draw a red flower at bottom right and a vehicle you would like to use at bottom left.
4. Draw geometric figures by connecting the dots with a single line, following the direction of the arrows. Colour the circles red, the squares blue, the rectangles green and the triangles purple.
5. Match the fruits with relevant baskets.
6. Count the suns in the box In the next box, draw the same number of suns plus one.
7. Count the clouds in the box. In the next box, draw the same number of clouds plus one.
8. Count the hearts in the box. In the next box, draw the same number of hearts plus one.
9. Colour the fourth apple, the first pear, and the third strawberry (starting from the left).
10. Colour as many sunflower leaves as there are dots in the box next to the sunflower.
11. Basia has got three teddy-bears and six dolls. Inside the frame, draw as many lines as there are Basia's toys.
12. Filip had five lollipops. He has eaten three of them. Cross out as many lollipops as Filip has eaten. Inside the frame, draw as many lollipops he has got left.
13. A circle, a heart, a triangle, a circle, a heart, a triangle. What is next? Continue according to the pattern given.
14. Look at the pictures and the figures below them. In the second line under the pictures, draw relevant figures.
15. Circle the lowest tree, the biggest butterfly, the shortest crayon, the longest earthworm, the tallest house.
16. It is spring now. Circle the picture which shows the season which follows spring.

Every activity is allocated three levels at which a given skill is performed: A – mastered (the child correctly completed the whole activity), B – under development (the child correctly completed a part of the activity), C – not mastered (the child did not complete the activity or completed it incorrectly).

The teachers were presented with a survey. The survey allowed the researchers to gather information regarding the educational (didactic) games used during mathematical education classes.

Results and Discussion

The first stage of the study was to acquire information from the teachers regarding the methods employed by them during Mathematics. Teachers indicated several such methods each. The results are presented in Table 1.

Table 1. Methods used by the study teachers during mathematics

No.	Methodology	Number of teachers in %
1.	Own experience/discovery method	60
2.	Following child's own activity method	30
3.	Giving children tasks to do method	40
4.	Exercise method	70
5.	Observation and demonstration	50
6.	Teacher's personal example method	50
7.	Disclosing arts	20
8.	Conversations, stories and riddles	70
9.	Explanations and instructions	70
10.	Methods of social communication	20
11.	Living word method	40
12.	Glenn Doman method	20

Data presented in Table 1 indicate that the methods most frequently used by the study teachers during mathematical education were exercises, conversations, stories and riddles, and explanations and instructions – 70% of the study teachers. 60% of the teachers use the own experience method, whereas 50% – observation and demonstration and personal example. Less, i.e. 40% of the teachers, also employ the method of tasks set for a child and a living word method, whereas 30% – the method of directing child's own activity. The least teachers, i.e. 20%, use the Glenn Doman's method to teach Maths. We need to state that the methods proposed by the teachers are traditional methods adopted in preschool pedagogy and they cover all areas of educational work in preschool. They include both the upbringing process and the teaching process and account for the features and stages of child development. The only alternative methodology is the Glenn Doman's method, but it does not contain any elements of educational games or fun activities.

Next, the children were tested for mathematical skills. The results obtained are summarized in the Table 2.

Table 2. Children's mathematical skills test findings – Study I

No.	Analysed skill	% of children		
		A	B	C
1.	Describing location of objects, recognizing and using terms: on, under, next to, behind, in front of	4.3	91.4	4.3
2.	Telling right from left	-	87.0	13.0
3.	Directions/orientation on paper	-	87.0	13.0
4.	Recognizing shapes, naming geometrical figures: a circle, a square, a triangle, a rectangle.	82.6	17.4	-
5.	Grouping and classifying objects according to a given criterion	13.0	78.2	8.8
6.	Counting elements in a set, using terms: less, more, as many as	26.0	74.0	-

7.	Using numerals (cardinal and ordinal numbers)	4.4	87.5	8.1
8.	Counting of up to 10 objects	30.6	65.0	4.4
9.	Determining the result of adding/ subtracting up to 10	-	82.6	17.4
10.	Spotting regularities and capacity to continue them	8.7	82.6	8.7
11.	Naming sizes and lengths, using terms: big, bigger, the biggest, short, long, the same size, longer, shorter, the longest, the shortest	-	91.3	8.7
12.	Recognizing time sequences (day and night, seasons of the year, months)	8.7	82.6	8.7

Date presented in Table 1 show that in Study I, the majority (77.2%) were children who acquired a given mathematical skills in part. The second group (14.9%) were children who correctly completed the whole task. Whereas, children who did not complete the task or completed it incorrectly accounted for 7.9% of all study children.

Next, mathematical activities with the application of educational games were performed for 5 months. The following were used for the implementation of math educational contents:

1. Constructing board games. Board games constructed by children themselves play a vital role in preschool work. They engage children's creative potential and allow expansion of their intellectual abilities. In turn, when rules and the need to follow them are discussed with a child, the children's interpersonal skills are developed and their emotional resistance is shaped. Games children can construct on their own are highly appealing. Children are passionate with creating various variants of a given game and zealously negotiate its future rules. They adjust the rules to the boards, or the boards to the rules, invent numerous tricks and bonuses – everything for the game to be interesting. When a game is no longer attractive, it is modified or replaced with a new one. Game building may be associated with various educational elements. By game type selection, one may make various situations more mathematic-like, learn how to code, decode, use symbols, or create own symbols. Another crucial item is to gain logical and mathematical experience: classifying elements in accordance with a predetermined criterion, determining a criterion for existing series, putting various parts together to make a whole, searching for repeatable patterns, calculating, comparing set sizes, determining varying potential when identifying the winner, and finally – training intensively to calculate the result of addition and subtraction. Classes concerning game building may be conducted one-to-one or with a group of children. When working with a group, the teacher helps children get in pairs in which they will be working. S/he makes sure that every pair consists of children of congruent cognitive and performative abilities. Every game involves a similar-scheme story (a board, pawns, which mark different players, and a race towards the finish line). Games may contain varying adventures – their themes are driven by imagination and inventiveness of children. However, they have similar patterns: animals, people, vehicles etc. race one another following a pre-planned route. All games feature traps and bonuses, which make them more attractive and exciting. The game board is a record of an invented storyline. It must be made on large sheets of paper to be legible. While drawing it, children learn to code information. Numerous symbols, drawings, or words must be easily understood by both parties. The racing players are marked with regular pawns, small pictures or surprise eggs' figures. Another important element is a dice. More advanced game variants involve a mathematics-related plot. They consist of a lesser number of stories, whereas adventures have numerical values. The range of mathematical operations broadens. The method of construing all games is analogous and necessitates the following:

- that a racing route is drawn, i.e. an adequately long path, that special steps are measured within it, and that the start and the finish line are marked;
- that those who are to race are identified, that traps and bonuses are invented and legibly marked along the race route.

In addition, when building a game, children must understand that:

- every player has his/her own representative in the form of a pawn, which may jump over the path's squares,
- children take turns to roll the dice, count the dots, and move their pawns forward by the number of squares they got on the dice,
- you must count the dots fast and must not be wrong – it is also worth checking if all the other players can count correctly,
- at the end of the race, you must roll the dice to get the number of dots exactly the same as the number of squares the pawn has to reach the finish line – if there are more dots, you must wait,

- he, who first reaches the finish line, wins,
- instructions and rules are set during the joint board drawing (every game has a new board drawn).

One needs the following tools to build games:

- paper sheets, Bristol boards, smooth wallpaper scraps, fabrics,
- dices,
- markers, crayons, scissors, colour paper, adhesive tape,
- "surprise eggs" figures,
- little cars,
- animal figures,
- pawns, stones, buttons,
- blocks to measure the path's squares,
- strings,
- lollipop and ice-cream sticks,
- rubber bands,
- clothes pegs,
- dominoes (paper domino is allowed) created by children as needed,
- fine homogeneous objects, such as bean seeds, chestnuts,
- postcards,
- measuring tapes,
- jackstraws,
- playing cards (Klim-Klimaszewska, 2010, pp. 217-219).

2. Tangram. The tangram is a classic logical puzzle, renown and appreciated over the ages. The idea of the tangram originated in China, most probably between the 8th and 4th century BC. It is one of the most popular geometric riddles. It is an absorbing intellectual entertainment providing a lot of satisfaction, when the required figure is ready. The tangram is composed of 7 elements (a square, a parallelogram and 5 different triangles). All the necessary shapes (tans) may be made of a piece of paper cut in a proper way. Playing with tangrams develops spatial imagination, teaches creative and inventive thinking, and stimulates one to seek novel solutions. By playing with the tangram, children practice concentration, perceptiveness and persistence in pursuing objectives. No fixed rules apply to the Tangram, but for one: all tans must be used in order to form a figure and none of the tans can overlap another. Every puzzle may be inverted. Manipulating with the tans, looking for matching figures, comparing, fitting the side lengths – these are activities which allow children to gain experience facilitating recognition of geometric figures and their characteristics. (Pisarski, 1992, pp. 115-117).

3. Origami. Origami is an old Japanese art of paper folding to form sculptures: people, animals, flowers, objects etc. A flat square sheet of paper is folded along straight lines in all directions, forming symmetrical, overlapping surfaces. It cannot be cut, glued or additionally adorned. Paper folding becomes an opportunity to explore the secrets of Maths in an empirical, engaging and fun way. It involves geometry, edges, symmetry axes, sections, or algebra. Folding a circle with the use of its diameter makes the understanding of fractions much easier. Multi-element models made of circles and squares help one grasp issues, such as spatial relations, comparison, subtraction, etc. By creating geometrical figures with folded paper sheets, children can practice spatial orientation, distinguish size-related features, compare and search for common characteristics, evaluate the size and shapes. In addition, they count the tops or edges in polyhedrons they have created; they also estimate the number of homogeneous tops when folding a single origami form. Apart from plenty of satisfaction derived from autonomous model-making, following pictorial schema, a number of crucial skills and features is formed, as if "by chance". Some of them are related to mathematical education. The most desirable characteristics, from the point of view of mathematical predispositions, are the following:

- combining reasoning with manual activities – implementing the principle of learning Maths with fingers;
- developing spatial imagination by targeted manipulation with modelled paper sheets,
- developing precision – working prerequisite,
- implementing a patient and consequential need to follow adopted rules of conduct, necessary to achieve the final effect,
- developing intuition related to geometric figures, transformations, and their simplest characteristics,
- preparing for creative problem solving and demonstrating elementary conventions employed, e.g. principles/rules: the final result is arrived at by solving intermediate problems; a task once started should be completed, etc.

On top of the above mentioned characteristics, other vital aspects include those relating to child's emotional development. His/her willingness to work, happiness with results, artistic experience associated with problem solving – they are all key, although, not always fully appreciated, elements of Maths learning (Pisarski, 1992, pp. 118-120).

4. Computer-based mathematical games. Computer educational programmes for preschool-age children comprise a highly attractive form of classes and develop various skills. The man objective of computer mathematical programmes is to teach children logical reasoning skills and the solving of selected problems in the area of mathematics. Mathematical computer programmes are sets of mini games and activities during which children enhance their skills, such as classifying, ordering objects according to certain features, counting up to 20. Above all, they significantly facilitate the process of figure and number recognition, counting skills, understanding of mathematical terms, adding and subtracting, exploring basic and derivative colours, shapes, directions, time sequences. With the application of varying games, fun logical activities, crosswords, riddles, rebuses, puzzles, animations, picture puzzles, poems, sons, games involving movement, educational colouring pages, rhyming expressions, competitions, original tasks and activities, and thanks to the adjustment of the level of activity to child's age or individual potential, the majority of said programmes develops perceptiveness, concentration, memory, logical thinking, the ability to associate sounds, and language competencies. They develop children's imagination and perception, rhythmic, movement and sensual abilities, eye-to-hand coordination, and a broadly-understood creativity. Oral commands are also of importance, for the child can learn to understand and perform exercises correspondingly. The diversity of games and plays, interesting graphic design, cartoon animations, music which preschoolers are so keen on, sound effects, and fun reader comments encourage children to act and deliver educational contents in an absorbing, children-friendly, and easy-to-memorize manner. Multimedia educational programmes for children are great fun to the youngest users, while – simultaneously – delivering preschool knowledge and supporting the course of preschool education. (Klim-Klimaszewska, 2010, pp. 255-256).

After a series of classes with the use of above quoted educational games, a mathematical skills test was retaken. The results obtained are demonstrated in Table 3.

Table 3. Children's mathematical skills test findings – Study II

No.	Analysed skill	% of children		
		A	**B**	**C**
1.	Describing location of objects, recognizing and using terms: on, under, next to, behind, in front of	65.2	34.8	-
2.	Telling right from left	34.8	65.2	-
3.	Directions/orientation on paper	34.8	65.2	-
4.	Recognizing shapes, naming geometrical figures: a circle, a square, a triangle, a rectangle.	100	-	-
5.	Grouping and classifying objects according to a given criterion	70	30	-
6.	Counting elements in a set, using terms: less, more, as many as	87	13	-
7.	Using numerals (cardinal and ordinal numbers)	43.5	56.5	-
8.	Counting of up to 10 objects	70	30	-
9.	Determining the result of adding/ subtracting up to 10	39	61	-
10.	Spotting regularities and capacity to continue them	52.2	47.8	-
11.	Naming sizes and lengths, using terms: big, bigger, the biggest, short, long, the same size, longer, shorter, the longest, the shortest	73.9	26.1	-
12.	Recognizing time sequences (day and night, seasons of the year, months)	52.1	47.9	-

Data presented in Table 3 show that in Study II, there were no children who would not complete the task or complete it incorrectly. The vast majority of the children (60.2%) performed every task correctly, whereas 39.8% of the children performed tasks partially correctly.

When comparing the results of both analyses, we can see that in Study II, the number of children who correctly completed all tasks increased by 45.3%. At the same time, the number of children who completed a task only in part decreased by 37.4%. The number of children who did not complete a task or completed it incorrectly equalled zero in Study II.

Conclusion

The main component affecting developmental opportunities of a child is his/her creative activity. The themes or subjects presented during classes becomes a stimulus for child's inner expression and allows him/her acquisition of new experiences and skills. Hence, child development may be promoted by a variety of situations encouraging one to take up various actions aiming at reality exploration with the application of different methods, arousing child's interest and involvement, and showing open-ended problems. Therefore, methods to be used when working with children are those associated with spontaneous and unrestrained activities, ones that will release their creativity, which include amongst other things – educational (didactic) games.

The effect of the application of didactic games is an increase in the level of children's mathematical education. The findings presented in the tables do not express the joy children experienced when participating in educational games. The children were contented and pleased, the games arouse their interest, encouraged them to overcome difficulties and acquire new terms. Competition or rivalry found in didactic games stimulated children to perform tasks correctly, to focus on winning and devote all their energy to perform well.

Educational or didactic games fulfil their functions only when they are adequately planned and conducted. Most importantly, they need to be pleasant for the children. Through the employment of educational games, we may definitely affect the development of mathematical skills in children.

If every teacher introduced the method of educational games into his teaching practice, children would be invigorated and excited to explore new mathematical notions. We may not forget that the most crucial is conscious and active children's participation. It may not be achieved in the absence of educational games. They play an underlying role in mathematical education, for it is vital that children take delight in the ability to solve problems using concrete examples, which makes classes more attractive. A well-organized, interestingly conducted game or didactic activity is of a great advantage to young minds. The teacher should be familiar with many didactic games, so as to choose those best meeting the needs and interests of his/her pupils. This is due to the fact that repetition develops fatigue and weariness, rather than activation.

However, there is a number of obstacles which may impede the correct implementation of educational games. Their use requires plenty of planning and considerations on the part of teachers, a lot of work and preparations, escaping the routine and a more comfortable (common) class scheme, and a continuous search for new ideas and solutions.

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