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CONTEMPORARY ISSUES OF EDUCATIONAL ACTIVITIES: ESSENTIAL FEATURES AND EFFICIENCY OF A DIDACTIC GAME

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Abstract

Bearing in mind that one of the key challenges in the school system is the development of mental abilities, in this paper, we discuss the possibilities of the influence of didactic games on the development of concepts about geometric forms, the abilities of analytical and synthetic thinking and the abilities to draw a conclusion. The aim of this research was to examine the possibility of encouraging the development of the thinking skills of first grade pupils of the primary school, using a system of didactic games. Research design involved the implementation of a parallel-group experiment on the sample of 163 primary school pupils (6.5 to 7.5 years old). The following instruments were applied: The Kamenov's instrument for testing the level of development of concepts on geometric shapes, Raven's progressive colour matrices and Kohs Block Design Test. The results of the research showed that the system of didactic games significantly influenced the development of concepts about geometric shapes, the development of the ability to conclude, but not the ability of the analytical and synthetic thinking of pupils.

Key words: mental abilities, teaching, system of didactic games, pupil, the ability to draw a conclusion, analytical and synthetic thinking.

САВРЕМЕНИ ИЗАЗОВИ У ОБРАЗОВНИМ АКТИВНОСТИМА: ОСНОВНЕ КАРАКТЕРИСТИКЕ И ЕФИКАСНОСТ ДИДАКТИЧКИХ ИГАРА

Апстракт

Имајући у виду да је један од кључних изазова у школском систему развијање мисаоних способности, у раду се разматрају могућности утицаја дидактичких игара на развој појмова о геометријским облицима, способности аналитичко-синтетичког мишљења и способности закључивања код ученикâ млађег школског узраста. Циљ овог истраживања било је испитивање могућности подстицања развоја способности мишљења ученикâ првог разреда основне школе применом систем-дидактичких игара. Дизајн истраживања укључивао је спровођење експеримента са паралелним групама на узорку од 163 ученика основних школа (6,5–

7,5 година). Примењени су следећи инструменти: Каменовљев инструмент за испитивање нивоа развоја појмова о геометријским облицима, Равенове прогресивне матрице у боји и Косов тест састављања коцки. Резултати истраживања показали су да је систем дидактичких игара значајно утицао на развој појмова о геометријским облицима, развој способности закључивања, али не и на способност аналитичко-синтетичког мишљења ученикâ.

Кључне речи: мисаоне способности, настава, систем дидактичких игара, ученици, способност закључивања, аналитичко-синтетичко мишљење.

INTRODUCTION

Examining the possibilities of influencing the development of the thinking ability is the subject of numerous pedagogical and psychological researches. It has been found that these opportunities are great, especially if the way in which the development of these abilities influences is adjusted to children's needs and interests that change with the age and types of activities that attract children (Thomas, Warren & de Vries, 2011; Cutter-Mackenzie, Edwards, Moore & Boyd, 2014; Maričić, Špijunović & Lazić, 2015).

One of the favorite activities of children, especially at a younger school age, is certainly a game (Wood, 2010; Pribišev-Beleslin, 2013). The features of a game are particularly attractive to children: their spontaneity, motivation, an intellectual effort to stimulate self-discipline that characterizes children's behavior in the game (Johnson & Patte, 2013). A game is essential for the education of young children, and it should not be separated from learning. Many authors consider it necessary to implement the game into official curricula and train teachers to use the game as a powerful tool for learning (Pramling, Samuelsson & Pramling, 2013; Pramling & Pramling, 2013).

According to Piaget, the same factors determining intellectual development determine the development of the game. Thus, the game is a phenomenon that follows the development of intellectual functions and reflects the main characteristics of individual stages (Lillard, 2014).

> "By making the distinction between child imitation and child play, Piaget interprets the whole development of the child through two complementary processes: the process of accommodation and the assimilation process, which is in its pure form" (Ebbeck & Waniganayake, 2010, p.8).

While Piaget considers three types of games that correspond to different phases of mental development, Vygotski is focused on only one kind, a symbolic game. Also, unlike Piaget, Vygotsky (1978) believed that the symbolic game played a decisive role in the development and that it is the activity in which children first realize that the actions can be separated from reality (Lillard & Voollei, 2014; Skoljnika & Bloom, 2006; Taylor, 2013;

Lillard, 2014). In this way, the game contributes to the development of higher mental functions and promotes intentional behaviour. This becomes possible because of the relationship between the game and the rules that must be followed (Bodrova & Leong, 2015; Petrović- Sočo, 2014). For these reasons, contemporary researchers believe that the game is significant for children's intellectual development and they believe that the symbolic gesture that occurs in the game is a precursor to abstract thinking (Petrović-Sočo, 2014).

Research into the phenomenon of the game indicates its importance in terms of encouraging intrinsic motivation of a child, directing its attention and behaviour (Platz & Arellano, 2011; Wood, 2013; Cutter-Mackenzie et al., 2014). In doing so, the game processes lead to the creation of new mental structures, through solving problem situations and improving mental abilities.

The relation between a game and cognitive development has been the subject of many researches. For example, there are studies linking children's game with mathematical education (Yawkey, 1981), language learning (Pellergini, 2011), cognitive functions (Saltz, Dixon & Johnson, 1977) with the ability to represent (Pederson, Rook-Green & Elder, 1981), problem solving (Smith & Dutton, 1979), and the like. Numerous studies have explored the development of certain knowledge and skills through children's game. The longitudinal study of Bergen and Mauer (Bergen & Mauer, 2000) showed that children who played with materials for learning to read in pre-school age later in school spontaneously read and had a better ability to verbalize. Using similar strategies, Cook (2000) enriched the child's game with numerous symbols, and found that the rich environment also develops mathematical concepts. In addition, it has been shown that the success of these children is more significant in upper grades of primary school in the field of mathematical knowledge (Wolfang, Stannard & Jones, 2001). Other authors examined the influence of the game on the development of creativity, thinking and conservation ability (Bateson & Martin, 2013; Howard-Jones, Taylor & Sutto, 2002; Kellock, 2015). The above research suggests that a game is not just one aspect of life that brings joy, fun and meaning. It is the foundation for learning and developing children throughout their lives (Konklin, 2014; Mishra, Koehler & Henriksen, 2011; Henriksen, Keenan, Richardson & Mishra, 2015).

Researches by contemporary authors confirm that learning through a game at a younger age is an effective way of acquiring knowledge and transferring it to new situations (Kamenov, 2010). A special role is played by a didactic game, which is often associated with the development of thinking skills and the ability to improvise - which lead to "mental flexibility" (Koehler, Mishra, Bouck, DeSchryver, Kereluik, Shin & Wolf, 2011; Kray & Ferdinand, 2013).

The system of didactic games represents the games selected, processed and structured in a particular system while the order of their application depend on the intellectual and affective needs, the education during which the pupil acquired his cognitive style. These games have the function of enabling pupils to gain experience, on the basis of which internalization of logical systems of classification, serialization, transformation of order and probability should occur. Under internalization, in this case, we mean the ability of pupils to use internal criteria that provide thinking systems, as opposed to external manipulation of things.

> "The concepts that a child forms in a didactic game allow him to organize and systematize the sensory experience, help him to conclude a systematic, and sensual experience to think in pictures, which reflects on the autonomy and originality of the solutions to which they come" (Kamenov, 2010, p.42).

In this paper, we want to check the assumption that games can be used to develop thinking operations: analysis, synthesis, comparison, differentiation, identification, abstraction and generalization, as well as forms of induction, deduction, and conclusion by similarity. In support of the application of the game with pupils at the beginning of schooling, there is also the fact that the general characteristic of the child's mind at the age of seven indicates the possibility that the child establishes relationships and determines the relations between phenomena and objects. Starting from the age of 7, children can explain analytical and synthetic ways of procedures, to decompose some phenomenon, and to combine elementary, simple properties into a wider entirety. At this age, the children have made two essential development achievements. First of all, they are able to form object categories, to distinguish one characteristic common to all objects, and to consistently implement it as a classification category. Another achievement is the ability to form, at least the minimal, concept of the system. At that age, children are able to understand the logical relationships of subordinate and superiors, at least on two levels of generality, and to perform appropriate logical operations (Ivić, Pešić & Antić, 2001).

Starting from the characteristics of the thinking of children of the first grade, we consider a justified research aimed at determining whether and to what extent the pupils of the first grade can use the system of didactic games to influence the development of their mental abilities: the development of concepts of geometric forms, the ability of analytical and synthetic thinking and the ability to conclude.

METHODS

The aim of the research is to determine how and to what extent the system of didactic games influences the development of students' thinking skills: developing concepts about geometric shapes, the ability of analytical and synthetic thinking and the ability to conclude.

Objectives:

1. To determine if it is possible to use the system of didactic games in order to influence the development of pupils' thinking operations: recognition, naming, abstraction, formation and definition.

2. To examine whether and to what extent the system of didactic games influences the ability of the analytical and synthetic thinking of pupils.

3. To determine the influence of the didactic games system on the first grade pupils' ability to conclude.

Hypothesis:

1. It is assumed that the use of a system of didactic games can influence the development of thinking operations: recognition, naming, abstraction, formation and definition.

2. It is expected that the system of didactic games can influence the development of the analytical and synthetic thinking of pupils.

3. It is expected that the use of a didactic games system may affect the first-grade pupils' ability to conclude.

Respondents. During the research, pupils of the first grade of primary school, aged 6.5-7.5 years, were examined. 163 pupils were examined - 4 classes in primary school "17. October" and 2 classes in primary school "Rada Miljkovic" in Jagodina, Serbia. The sample was purposive. The sample display is given in Table 1.

Table 1 Experimental and Control groups according to the school they attend

Respondent groups	School that pupils attend		Total
	P.S. 17.oktobar	P.S. Rada Miljković	
Experimental	54	28	82
Control	53	28	81
Total	107	56	163

We have chosen the first grade pupils because the main changes in the child's mind appear when staring the primary school and when a child's opinion meets the structured school system and different way of thinking from the one he or she had used to. This, as Piaget says, decisive turning point in mental development, is reflected in the reporting of specific operations, complex mental operations such as the addition, subtraction, serialization, conservation, classification, etc., which allow the child to do "in the head" what could have been done only by direct manipulation of objects. Although these operations are reversible, they are still related to individual experience.

Measuring instruments. The following instruments were used in the research: *The instrument for testing the level of development of concepts on geometric shapes*[1] (ball, cube, cylinder, circle, ellipse, triangle, square and rectangle) at 5 levels: 1st level- Identification of geometric shapes; 2nd level-Naming; 3rd level-Abstraction; 4th level-Forming Level; 5th level-Defining; *Raven's progressive colour matrix test; Kohs Block Design Test.*

Test procedure. The survey was carried out during the school year 2016/17 in the period October 2016 - June 2017. During the experiment with parallel groups, initial measurements were made based on which groups of pupils were equalized with the calculation of the arithmetic mean (average measurements) and standard deviations (variation of E-SD = 3.61; K-SD = 3.30) for each group of subjects.

Experimental group introduced experimental program-system of didactic games for the development of thinking skills, which was specially made for the purpose of this research. The realization of the curriculum in the experimental group through the didactic games system lasted 6 months. Teachers applied a system of didactic games 3 to 4 times a week, in lessons of all subjects with the aim of processing, revising and reviewing of teaching materials. In the control group, the curriculum was implemented according to the regular activity plan. The pupil retest was completed six months after the experimental program was conducted, with the same instruments as in the initial test.

*Experimental program****.*** The system of didactic games contained the following groups of games: Games containing inductive activities, Operations of geometric shapes, Games containing generalization and classification, Games containing comprehension and formation of terms and Games and activities involving reasoning. The general procedure contained in certain games includes the following: the adoption of the rules of the game that focus on the perceptions of forms, their classification by essential marks and the formation of appropriate terms, carrying out a series of actions which in materialized and extruded forms contain in themselves the support for thought operations which lead to a prominent goal, along with appropriate methods of analysis and synthesis induction and deduction (comparisons are made, similarities and differences are distinguished, relevant is separated from irrelevant, the form as a general marking is distinguished and classification of the model according to it, the practice of these operations until they become fully accurate and quickly realized, which is a sign that the didactic requirement has been met, all this accompanied by a group

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[1] The instrument for testing the level of development of concepts on geometric shapes (series of objective objects of type) was taken from E. Kamenov (1974), who used this instrument in researching the influence of the game on the development of intelligence. More in Kamenov, E. (1989): Intelektualno vaspitanje kroz igru. Beograd: Zavod za udžbenike i nastavna sredstva.

autocorrelation of the pupils, in relation to which the verbalization of the appropriate procedures, or criteria by which they were derived, is carried out (Sutherland & Friedman, 2013).

RESULTS

The first task of our research was aimed at examining the level of development of concepts about geometric shapes in pupils. Initial research and the significance calculated by the Mann-Whitney test r= 0. 828> 0.05 indicates that there is no statistically significant difference between the results of the pupils of experimental and control groups, that is, the groups of pupils are equal in relation to the knowledge of geometric shapes. In the final test, the results obtained are shown in Table 2.

Table 2 Results of pupils in initial and final research

Geom.	Recognition		Naming		Abstraction		Formation		Defining	
Shapes	I (%)	F(%)	I (%)	F(%)	I (%)	F(%)	I (%)	F(%)	I (%)	F(%)
Ball	98,8	99,4	84,7	98,2	92,6	99,4	98,2	100	78,5	92,0
Cube	98,2	99,4	78,5	93,9	38,0	70,6	54,6	69,3	54,6	73,0
Cylinder	98,2	98,8	64,4	81,0	96,3	98,8	86,5	90,8	47,2	62,6
Circle	100,0	100,0	93,3	96,9	59,5	76,1	68,7	74,2	47,2	62,6
Ellipse	97,5	97,5	31,9	50,3	90,2	93,3	68,1	76,1	49,1	59,5
Triangle	98,8	99,4	81,6	88,3	90,8	92,6	67,5	73,6	56,4	65,0
Square	100	100	60,1	69,9	87,1	90,8	68,1	77,9	52,1	64,4
Rectangle	100	98,0	75,5	81,0	76,1	84,7	68,1	71,8	51,5	56,4

Based on the obtained Kolmogorov-Smirnov Normality Test (Table 3), which we have applied, we note that the significance is less than 0.05, which means that the data do not have a normal distribution and that the statistical significance of the difference between the results of pupils E and C groups at the initial test should be determined using non-parametric Mann-Whitney test. The significance calculated by the Mann-Whitney test r = 0. 000 <0.05 (Table 4) indicates that there is a statistically significant difference between the results of the pupils of the experimental and control groups achieved in the examination of the level of development of the concepts of geometric forms.

Table 3 Normality test according to groups (final testing)

	Kolmogorov-Smirnov		
Group	Statistic	df	Sig.
Experimental	0,161	82	0,000
Control	0,127	81	0,002

Table 4 Mann-Whitney: Final testing

	Number of accurate answers to the knowledge test of geometric shapes
Mann-Whitney U	1885,50
Asymp. Sig. (2-tailed)	0,000

As the results show in the final stage, the similarity between the groups has disappeared. While E group has achieved high results in every respect, in the C group they move around the central ones. The difference between the groups became very significant, which was interpreted primarily by the influence of different methods of educational work.

Table 5 Examination of the level of development of concepts on geometric shapes (Final testing - average number of correct responses by groups - experimental and control)

Respondent’s group		Statistic
Experimental	Mean	34,96
	Std. Deviation	4,65
	Minimum	19,00
	Maximum	40,00
Control	Mean	31,57
	Std. Deviation	5,00
	Minimum	21,00
	Maximum	40,00

The second task of our research was to look at the answer to the question of whether and to what extent the system of didactic games could influence the ability of the first grade pupils to conclude. We this purpose, we tested the pupils with the test - Raven's Progressive Colour Matrices. The coloured matrices, Series A, Ab, B (J.C. Raven, 1965), are arranged so that mental development takes them to the stage when the ability to reason with analogy has been sufficiently built and that such a way of thinking is adopted as a consistent method for concluding. Three series of twelve problems that make colour matrices are arranged to determine the main cognitive processes for which children under 11 are normally capable. In each series of assignments, the pupils were supposed to engage in the conclusion by analogy, primarily on the basis of comparison. For these reasons, a T-test was performed, which values df = 161 and p = 0.240 indicate that in the initial test pupils are equal in terms of achievements on the Progressive colour matrix test.

In contrast to the achievements on the initial test, where the experimental and control groups were consistent with the achievements, in the final test the significance calculated by Kolmogorov-Smirnov test and the Mann-Whitney test r = 0, 026 <0.05 (Table 6) point out that there is a statistically significant difference between the results of the pupils of the experimental and control groups achieved on the Progressive Colour Matrix Test.

Table 6 Mann-Whitney: Ranks (Progressive Colour Matrices-final testing)

Group	N	Mean Rank	Sum of Ranks
Experimental	82	90,15	7392,00
Control	81	73,75	5974,00
Total	163		

	The number of accurate responses to the Progressive colour matrix test
Mann-Whitney U	2653,500
Asymp. Sig. (2-tailed)	0,026

In order to examine whether the experimental system of didactic games can influence the development of the analytical-synthetic thinking of pupils of the first grade, we used the *Kohs Block Design Test* (1923).

In the initial testing, we obtained the results (df = 161, p = 0.324) which show that the control and experimental groups are equal in the achievements of this test. Further analysis of the results of the final testing, Kolmogorov-Smirnov test and T-test (t = 0.626, df = 161, p = 0.532) show that the pupils of the experimental and control groups were equalled, that is, there was no statistically significant difference in achievements, although the didactic games system was used in the experimental group (displayed in Tables 7 and 8).

Table 7 The normality test according to groups (Kohs Block Design Test-Final Testing)

	Kolmogorov-Smirnov		
Group	Statistic	Df	Sig.
Experimental	0,066	82	0,200
Control	0,081	81	0,200

Table 8 t-test (Kohs Block Design Test-Final Testing)

t-test for Equality of Means		
T	Df	Sig. (2-tailed)
0,626	161	0,532

DISCUSSION

In order to investigate the development of pupils' thinking operations: recognition, naming, abstraction, forming and defining geometric shapes using a system of didactic games, we started the research by identifying the objects as the initial phase in developing concepts of geometric shapes, relying on Galjperin's method in which thoughts are built through several characteristic stages, among which the material execution of the action is the first step in the construction of thought operations. During the naming of geometric shapes, as in the second phase, the pupils achieved the best results in the initial test with respect to the circle and the weakest in case of the ellipse.

The operation of abstraction implies that pupils, in the process of acquiring knowledge and forming concepts, thoroughly reject and remove irreplaceable, less significant properties, while retaining the essential properties of an object or phenomenon. In the initial testing, the pupils mostly recognized among the offered items, those that were in the form of a cylinder. The weakest result, the least accurate answers, was achieved when the object of the cube was abstracted. In the final test, pupils were most successful in abstracting the shape of the ball. The weakest results, as well as in initial research, have been achieved in the form of a cube, but the pupils have made the most progress when it comes to this form in relation to the initial test.

In order to confirm the pupils' ability to successfully abstract geometric shapes, one of the best ways is to check their ability to form these shapes. In order to form geometric shapes, pupils must have an internalized image, their significant properties and characteristics (Abbas, 2006). In order to examine the pupils' ability to form geometric shapes, the research asked from pupils to form a ball, a cube, a cylinder and other forms with the help of plasticine clay. The pupils initially named a geometric shape, and then they "made" it out of plasticine clay. In defining geometric shapes, pupils were most successful with the ball in the initial and final testing, while the performance in defining other geometric shapes ranged about half in the initial test, and this percentage was significantly increased in the final test.

In this section, we are especially interested in the way in which pupils explain geometric shapes, since the definition reflects the level of their development of thinking. To this end, we will show the criteria of the definition procedure, which was used in the Binet-Simon Scale (Ivić, Milinković, Rosandić & Smiljanić, 1981). Our respondents often gave definitions of use, when defining geometric shapes, in 23,7% of cases. Among the definitions of geometric shapes, most were descriptive. In 60.6% of cases, pupils defined geometric shapes through a description of looks, compared with objects of the same or similar form: "like a roof on the house", "like a steam," "like a candle", "like the moon" ...

In the group of logical answers, we put the answers in which pupils included at least two properties of shapes or geometric bodies, for example: "The triangle has three corners and when there are two triangles you can make a square." As we notice in this answer there is anticipation and abstraction, because the pupil can imagine the operation of joining two triangles and the result-square. This also confirms that the child has the ability to operate with hypothetical attitudes, and not just what is close to his eyes (Bruner, 1986).

Our results are in accordance with the results of other researchers. The definition procedure applied in the Binet-Simon Scale (1908 and 1911) shows that the definition tasks are in the sixth (usage definition) and the ninth year (higher-order definition). In the NBS (New Belgrade Revision of the Binet-Simon Scale, 1976) subtest definitions are in the fifth and ninth years. Milinković (according to Ivić, 1981) finds that at the former age children give the most definitions of use and on the latter descriptive definitions and logical definitions. Applying the definition procedure, LJ. Miočinović (according to Ivić, 1981) at the age of the second grade of primary school (8-9 years) finds: usage definitions (15.2%), descriptive definitions (3.5%), incomplete logical definitions (7.7%) and logical definitions (4.4%). Vygotski (1986) points out to research whose findings indicate that defining terms with the goal and function decrease with age, and defining with logic increases.

As the results show, the pupils of the experimental group, after applying the method of game, achieved very high results in all series of assignments and in all forms, which suggests that the game helped to free the pupils from the "action", the "image", the "subject" perceptions and go to one in which the quality of the form became "categorical", and the acquired concepts are structured in a coherent system. In the game, the process of misperception was assisted, which, with the active transformation of perception, by a complex thought process, came to qualitatively new creations-concepts (Kamarulzaman, 2015). Construction play is strongly related to mathematical performance in primary school children, and this relationship is mediated by visuospatial memory (Nath & Szücs, 2014). Our findings are also supported by the analysis of the changes that are taking place in the field of the development of concepts of geometric shapes, given by Đokić and Zeljić (2017). They point out that "noticeably changed teaching in the teaching of geometry and insisting on open teaching approaches has an important role in the process of developing mathematical thinking among students as well as the pedagogical guidance of teachers, which should enable the optimal development of the thinking operations" (Đokić & Zeljić, 2017, p.635). The obtained results show that our first hypothesis which is the following: It is assumed that the use of a didactic games system can influence the development of thinking operations: recognition, naming, abstraction, formation and definition, is confirmed.

When it comes to examining the pupils' ability to conclude and the application of the Progressive Matrix colour Test, one should point out the most common mistakes pupils made during the test. These are final assignments in the A series, from A10-A12, (in 75% of cases, they made a mistake), in the Ab series, on task Ab12 (57% of errors) and the series of tasks of group B (on task B12 95% of errors). These difficulties can be explained on the basis of the constraints on specific operations at the level of the first grade pupils. Some of these constraints are, for example, that a child of this age cannot determine all possible solutions to the problem it is facing, as the requested task required (Miočinović, 2002). Despite the errors, the results show that the experimental group achieved better results in the final testing. This advancement of the experimental group can be explained by the content and goals of the games, especially groups of games involving induction activities and activities involving reasoning. This confirmed the second hypothesis of this research by which we assumed that the system of didactic games could influence the development of analytical and synthetic thinking of pupils. When it comes to the possibility of influencing the system of didactic games on the development of analytical-synthetic thinking, which we measured with the help of the Kohs Block Design Test, our research showed that there was no improvement in pupils' success. The data show that the lack of difference in the initial test repeated in the final one, that is, there was no difference in the achievement of this test among the pupils of the experimental and control groups. We can interpret the results obtained in many ways. One of them relates to the characteristics of first-grade pupils. The illogic of children's thinking, at least to a certain age (7-8 years old), is reflected in the following facts:

> "The lack of logical connection in children's presentation, the lack of need for children to expose and explain their opinions, the inability to talk with younger children, proving something to them, since for them often logically the most valuable proof is not of any value, often the fall in contradiction (insensitivity to these contradictions and the absence of effort to overcome them), often easily jumping into conclusions on the basis of individual cases, inability of children to put their views tolerantly, the inability to receive and logically operate the ideas that are only hypothetical, and they do not have to be real and true, etc."(Ivic, 1964, p. 27).

This type of pupil behaviour during the test was also noted by other researchers. In a study carried out by P. Kovačević (1986) on the sample of 400 children from the 1st to 4th grade of a primary school in Belgrade, he came to some conclusions about the behaviour of the respondents during the testing. Two levels are manifested in the Kohs Test: on the one hand we had respondents who look at the model, chose colours, looked at where the colour should be placed. For the second group of respondents, it can be said that they used a model of trial and error. They rotated the cubes without order, and they gave the impression that they do not look for a certain colour, but when they came across something that seems good to them, they used it. They were more oriented to the impression of the whole model, did not analyse it, turned the cubes without a plan... Such children needed specific help (Kovačević, 1986; Rozencwajg & Fenouillet, 2012). The results pointed out to the conclusion that the hypothesis we had set: assuming that the system of didactic games influences the ability of the logical (analytical and synthetic) thinking of first-grade pupils was not confirmed.

In the end, it is important to note the shortcomings of this research. Regarding the procedure, which is carried out with the use of a game method in order to stimulate the development of thinking skills among pupils, it should be pointed out that it cannot be completely convincing that all of its stages and details were equally necessary, nor that everything was done in the best way and to the extent necessary. It is also likely that some of these effects will gradually weaken, and be completely lost, if they are not accepted in the further educational process and appropriately developed and further improved. Further research is required for a more specific overview of this issue.

CONCLUSIONS

The system of didactic games was very effective in improving the development of concepts of geometric shapes: recognition, naming, abstraction, formation and definition, as well as when it comes to examining the pupils' deduction, because there is a significant statistical difference between pupils of the control and experimental groups. The use of the didactic games system in the work with pupils of the experimental group did not lead to the improvement of pupils' success in the ability of analytical and synthetic thinking. We can assume that the selected games did not adequately stimulate the development of these abilities, or, on the other hand, that the pupils were not willing to develop analytical and synthetic thinking to a higher level through the exercise.

The game method enabled the pupils to sort out their experience adequately, motivated them to do it and pointed to the direction. Through the motor and perceptual activity, essentially related to the mental, they were encouraged to discover, think, reason logically, draw conclusions, generalize, acquire and use information and exchange them among themselves. Thanks to the implementation of the didactic games system, the pupils managed to effortlessly adopt terms that are among the most abstract in the first grade curriculum. Based on this knowledge, it is important to choose in the classroom the activities that engage not only the individual senses, but also multiple senses at the same time. The games we proposed and realized with E group pupils enabled them to synchronize sensory impressions that give a complete picture of objects, processes, phenomena and enables them to integrate into a complex image of the world. Good integration of sensory impressions is a precondition for proper experiential knowledge and an open way for the transformation of performances and observational and practical thinking into conceptual.

In addition, a number of questions and tasks were opened, which should be dealt with by next researches. In this regard, it would be necessary to: further explore the possibilities of using the game method for the adoption of program contents and achieving the tasks of educational work; standardize the tests that could, with greater precision, measure the development of mental abilities; analyse the rich teaching experience created by the use of traditional methods and to extract from it procedures that could still be applied to achieve good results in pedagogical work.

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САВРЕМЕНИ ИЗАЗОВИ У ОБРАЗОВНИМ АКТИВНОСТИМА: ОСНОВНЕ КАРАКТЕРИСТИКЕ И ЕФИКАСНОСТ ДИДАКТИЧКИХ ИГАРА

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Резиме

Испитивање могућности да се утиче на развој мисаоних способности тема је бројних педагошких и психолошких истраживања. Утврђено је да су ове могућности велике, нарочито ако се начин на који се утиче на развој поменутих способности прилагоди дечјим потребама и интересовањима, који се мењају са узрастом и врстама активности које привлаче децу. Поставља се питање којим поступцима се може подстицати развој мисаоних способности на млађем школском узрасту. У овом раду желели смо да истражимо могућности примене система дидактичких игара у настави првог разреда основне школе. С обзиром на чињеницу да је игра основна активност детета на раним узрастима и потребу за успостављањем континуитета између предшколског и основношколског образовања и васпитања (пре свега по питању метода рада), сматрамо да је значајно одредити улогу игре у раном школском узрасту и могућности утицања на развој мисаоних способности код ученикâ. Дидактичке игре могу омогућити ученицима да се у складу са својим развојним могућностима, у процесу образовања, чињенице преводе на перцептивни облик представљања, као и да се чешће организују сазнајне активности у којима ће преовладавати опажање у конкретним ситуацијама и непосредној делатности. Истраживачки дизајн подразумевао је експеримент са паралелним групама, при чему су ученици контролне групе садржаје за први разред усвајали на традиционалан начин, а у раду са ученицима експерименталне групе примењен је систем дидактичких игара. Дидактички систем, о коме је реч, заснован је на савременим схватањима дечје игре као активности која покреће њихов развој у целини, како интелектуални тако и социо-емоционални, о чему су прикупљени релевантни подаци. Истраживањем је обухваћено 163 ученика првог разреда основне школе, који су тестирани у два наврата – на почетку увођења експерименталног програма/система дидактичких игара и после њега. Узорак је био пригодан, а експериментална и контролна група уједначене су у почетној фази експеримента. Испитивање развоја мисаоних способности вршено је помоћу низова задатака објективног типа (инструмент за испитивање нивоа развијености појмова о геометријским облицима) и тестова који су мерили способност закључивања (Равенове прогресивне матрице) и аналитичко-синтетичко мишљење (Косов тест састављања коцки). Поступак система дидактичких игара био је врло ефикасан у унапређивању одређених мисаоних способности: развијање појмова о геометријским облицима (способност препознавања, именовања, апстраховања, формирања и дефинисања) и способности закључивања, али није утицао на развој способности аналитичко-синтетичког мишљења ученикâ. Сходно горенаведеним закључцима, када је реч о развоју аналитичко-синтетичког мишљења ученикâ, не смемо се ослањати само на систем дидактичких игара, већ је нужно комбиновати дидактичке игре са активностима које у већој мери ангажују ученике да мисаоно рашчлањују предмете, процесе и појаве, а затим их синтетишу. Поред тога, у настави је неопходно чешће примењивање индуктивне и дедуктивне методе.