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THE DEVELOPMENT OF METACOGNITIVE SKILLS OF PROBLEM SOLVING IN 7.5-8 YEAR-OLD CHILDREN

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Abstract

The metacognitive skills related to reflection of problem solving method were examined. The purpose of the study was to determine the conditions for the development of the reflection of problem solving method in 7.5-8 year-old children. The assumption was that the "Metacognition" original educational program establishes such conditions. The program includes 30 types of non-standard problems with non-curricular content: 8 narrative inference problems, 9 comparisons of schematic object representations, 13 problems that involve movement according to specific rules. Each problem type had three structural versions of tasks: find an answer, find the question, find a part of the initial conditions. The control group consisted of 53 children, the experimental group contained 56 children. These children participated in 30 group lessons (weekly, September through May). Initial and final diagnostics of the above-mentioned skills were held in the experimental and control groups. Comparison of results indicates that the children in the experimental group demonstrate significantly higher results than the children in the control group. The study showed that «Metacognition" lessons contribute to the development of the above-mentioned skills in children. In further studies it is planned to determine to what extent the "Metacognition" program promotes the development of the above-mentioned skills of 8.5-9 year-old children.

Keywords: 7.5-8 year-old children, development, metacognitive skills, reflection of problem solving method, "Metacognition" program.

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1. Introduction

This research is devoted to the study of the conditions for the development of metacognitive skills connected with reflection of the problem solving method in children at the age of 7.5-8 years. By study of metacognitive skills as conditions for mastering school programs the content of metacognitive skills furthering the schoolchildren self-control when they master conceptual texts content is developed (Koch, 2001) as well as their positive role in understanding of scientific texts in the primary school is revealed (Mikhalsky, Mevarech & Heibi, 2009).

By examination of conditions for the formation of metacognitive skills during study at school a serious consideration is paid to the pedagogical approaches which help children plan the application of different types of thinking to different tasks, the effectiveness of their way of thinking and change it in failures case (Swartz et al., 2007). Metacognitive environments by school subjects assimilation constitute an important condition for the development of metacognitive skills in younger schoolchildren (Larkin, 2010). The active dialogical learning environment together with the organization of collective discussions has a significant role in the formation of metacognitive skills for the analysis and assessment of the content and the form of discussions by children (Kramarsky & Mevarech, 2003). Teaching children to some methods of solving math problem creates conditions for the development of metacognitive skills (Desoete, 2007).

Analysis of metacognitive skills as indicators of successful training has revealed their prognostic efficiency by evaluation of training results (Schraw, Crippen & Hartley, 2006). Metacognitive monitoring allows obtaining more accurate and complete training results in children of primary school (Roebers, Krebs & Roderer, 2014), as reflexive characteristics actions determine successful school tasks performance (Elshout-Mohr et al., 2003).

The content analysis of the studies reviewed shows that researchers associate the development of metacognitive skills with schooling. Moreover, metacognitive skills connected with the management of thinking in general (planning, monitoring, evaluation) get more attention than individual metacognitive skills, in particular, connected with reflection of the problem solving method. The study of these skills, especially in children of primary school, is necessary, as the ability to distinguish and generalize the problem solving methods is an important condition for successful training in secondary school.

2. Problem Statement

We believe that not only educational material, but also non-curricular one can act as a factor of the development of metacognitive skills related to reflection of the methods of solving problems and their generalization. In the first case, children usually solve typical problems – their decision is based on the relevant knowledge, the lack of which causes failure. In the second case, children are asked to solve non-typical search tasks, their solution is not related to the preliminary acquisition of knowledge. This circumstance creates opportunities for successful actions for children making little progress and, accordingly, for more effective formation of metacognitive skills in such children, as the solution of such problems is not connected with academic failure. In this case, the self-esteem of these children will be higher than when solving school tasks. They will have the opportunity to act more confidently than when solving problems of a school subject.

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3. Research Questions

The main question of our research was to find out, whether solution of search problems having non-curricular content by children can promote metacognitive skills connected with reflection of the problem solving method. To solve this problem, the "Metacognition" program was developed, which allows to give 30 classes (once a week, September-May), during which the children are offered to solve 30 types of non-curricular search problems.

4. Purpose of the Study

The research was aimed at determination of influence of the "Metacognition" classes on the development of metacognitive skills among children at the age of 7.5-8 years. 109 children have participated in the research: 53 – control group, 56 – experimental group. It was expected that the "Metacognition" classes will provide intensive development of metacognitive skills, connected with reflection of the problem solving method: the results of the experimental group will have a statistically significant difference to the results in the control group.

5. Research Methods

The research included three stages. At the first stage, the children in control and experimental groups were solving problems under the "Exchanges" method for determination of degree of maturity connected with reflection of the problem solving method. At the second stage, 30 "Metacognition" classes (once a week) were given in the experimental group during the academic year (September-May). At the third stage, children of both groups were solving again the same diagnostic problem as at the first stage.

5.1. The "Metacognition" program

The "Metacognition" program is designed to conduct 30 lessons on the basis of 30 types of non-standard problems with non-curricular content: 9 comparisons of schematic object representations (comparative problems), 8 narrative inference problems (narrative-logical problems), 13 problems that involve movement according to specific rules (route problems). During each lesson the children solve problems of one type.

5.1.1. Comparative problems.

9 types of problems to compare quadrangles are as follows in Figure 1.

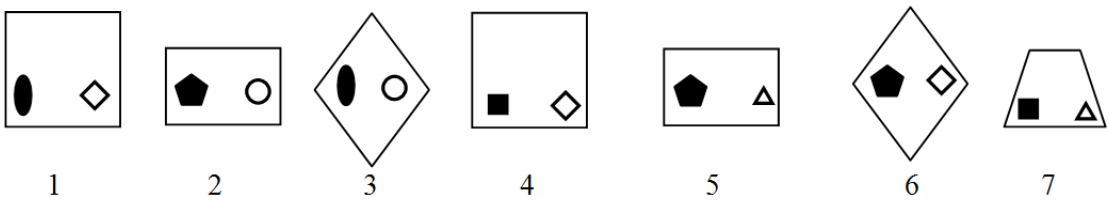

Figure 01. Quadrangles.

Type 1, e.g.: “Consider quadrangles 2, 3, 6. Which quadrangle is similar in kind to quadrangle 6?”

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Type 2, e.g.: “Quadrangles 1, 3, 5. Which quadrangle has an identical attribute with quadrangle 5?”

Type 3, e.g.: “Quadrangles 1, 4, 5. Which quadrangle, 4 or 5, has more identical attributes with quadrangle 1?”

Type 4, e.g.: “Quadrangles 2, 3, 6. Which quadrangle, 2 or 3, is similar in kind to quadrangle 6, but has a dark figure on it similar to that of quadrangle 1?”

Type 5, e.g.: “Quadrangles 1, 3, 6. Which quadrangle, 1 or 3, has one identical attribute in common with the quadrangle 1 and one identical attribute in common with quadrangle 6?”

Type 6, e.g.: “Quadrangles 1 – 7. Quadrangles 1 and 6 have one identical attribute. Which two quadrangles – 2,3 or 1,4– have moreidentical attributes than quadrangles 1,6?”

Type 7, e.g.: “Quadrangles 1 – 7. Which quadrangle, 3 or 5, is similar in kind to quadrangle 1, a dark figure like the quadrangle 6, a light figure like quadrangle 2?”

Type 8, e.g.: “Quadrangles 1 – 7. Which quadrangle, 4 or 3, has one identical attribute with the quadrangle 1, one with quadrangle 2 and one with quadrangle 6?”

Type 9, e.g.: “Quadrangles 1 – 7. Quadrangles 2, 5, 6 have one identical attribute. Which three quadrangles – 2, 3, 5; 1, 4, 6 or 5, 6, 7 have the same number of identical attributes like the quadrangles 2, 5, 6?”

In each lesson, the children solve 5 variants of one problem type, e.g. type 1.

Variant 1, e.g.: “Consider quadrangles 2, 3, 6. Which quadrangle is kind like quadrangle 6?”

Variant 2, e.g.: “Consider quadrangles 2, 3, 6. What question is suitable for the answer "Quadrangle 2": (a) Which quadrangle has a dark figure like quadrangle 2? (b) Which quadrangle has a light figure like quadrangle 3? (c) Which quadrangle is kind like quadrangle 6?

Variant 3, e.g.: “Consider quadrangles 3, 6. Which quadrangle has a light figure, like quadrangle 6? Which third quadrangle is needed to answer this question: (a) quadrangle 2, (b) quadrangle 5, (c) quadrangle 4.

Variant 4, e.g.: Di, Lo and Jim solved the problem: “Look at quadrangles 1 – 6. Which quadrangle has a light figure, like quadrangle 2?” Answers: (a) quadrangle 1, (b) quadrangle 3, (c) quadrangle 4. Lo chose answer (a). Di – answer (b). Jim – answer (c). Who made the correct choice?

Variant 5, e.g.: Hi, Mo and So solved the problem: “Look at quadrangles 1 - 6. Which quadrangle has a dark figure, like quadrangle 5?” Answers: (a) quadrangle 2, (b) quadrangle 4, (c) quadrangle 6. Lo chose answer (a). Di – answer (b). Jim – answer (c). Who made the wrong choice?

5.1.2. Narrative-logical problems. 8 types of narrative-logical problems are as follows:

Type 1, e.g.: “Don, Li and Bob swam across the river. Don swam faster than Li. Li swam faster than Bob. Who swam faster than everyone else?”

Type 2, e.g.: “The words HE, HI, DI are of different colors. Blue and pink words have the same first letter, pink and red – the same second letter. Which word is blue?”

Type 3, e.g.: “Ann and Lo are of different ages. After many years, Ann will be a little older than Lo is now. Who is the younger one of the girls?”

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Type 4, e.g.: “Pat, Amy and Sue sent letters: two to Ufa, one to Bor. Pat and Amy, as well as Amy and Sue sent letters to different cities. Where did Pat send her letter?”

Type 5, e.g.: “Three words were written with blue, red and gray paint: SO BE GO. The blue word is to the left of the red, and the gray is to the right of red. What color is the word BE?”

Type 6, e.g.: “Di and Ka had cubes with letters. First, Di composed the word POT. Then he moved the letters and it became TOP. Ka first composed the word ERA, and then moved the letters, in a way identical to Di's.What word did Ka get?”

Type 7, e.g.: “Amelia, Jessica and Lily lived in different houses. House № 1 – high and stone, house №2 – high and wooden, house № 3 – low and stone. Houses of Jessica and Lily – high, house of Lily and Amelia – stone. What house was Lily – №1, №2 or №3?”

Type 8, e.g.: “Harry, Jack and Oliver played musical instruments. Someone was playing on the trumpet, someone - on the flute, someone - on the violin. Oliver did not play the violin, Jack did not play the flute and violin. What did Harry play on?”

During each lesson the children solve 5 variants of one problems type, e.g. type 1.

Variant 1, e.g.: “Don, Li and Bob swam across the river. Don swam faster than Li. Li swam faster than Bob. Who swam faster than everyone?”

Variant 2, e.g.: “Don, Li and Bob were practicing high jumps. Don jumped higher than Lee. Don jumped higher than Bob”. What question can be answered considering the conditions of this problem: (a) Who jumped higher than Don? (b) What style did Bob jump in? (c) Who jumped lower than Lee?

Variant 3, e.g.: “Don, Li and Bob swam across the river. Don swam faster than Li. […]. Who swam faster than everyone?” What do you need to add to the conditions in order to answer the question of this problem: (a) [Bob swam faster than Don]. (b) [Bob swam as fast as Don]. (c) [Li swam faster than Bob].

Variant 4, e.g.: Di, Lo and Jim solved the problem: “Don, Li and Bob swam across the river. Don swam faster than Li. Li swam faster than Bob. Who swam slower than everyone?” Answers: (a) Don, (b) Li, (c) Bob. Lo chose answer (a). Di – answer (b). Jim – answer (c). Who made the right choice?

Variant 5, e.g.: Di, Lo and Jim solved the problem: “Don, Li and Bob were practicing high jumps. Don jumped higher than Lee. Don jumped higher than Bob. Who jumped higher than everyone? Answers: (a) Don, (b) Li, (c) Bob. Lo chose answer (a). Di – answer (b). Jim – answer (c). Who made the wrong choice?

5.1.3. Route problems. 13 problems that involve movement according to specific rules as follows:

A B C D E

F G H I J

K L M N O

P Q R S T

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U V W X Y

Type 1, e.g.: “Don, Li and Bob swam across the river. Don swam faster than Li. Li swam faster than Bob. Who swam faster than everyone else?”

Type 1, e.g.: ““What two steps did the duck take to get from K to R?”

Rule: 1) “Duck”, an imaginary character, moves through the letters in the “cells” of the “square”; 2) the characteristics of its movements are: (a) it steps directly, i.e., into a neighboring cell vertically (e.g.: from M to H or to R) or horizontally (e.g.: from M to N or L); (b) it steps obliquely, i.e., diagonally,(e.g.: from M to G or I or S or Q); 3) duck can not make two identical steps (two direct steps or two oblique steps) in succession. Solution: K…L…R.

Type 2, e.g.: “What two jumps did the hare take to get from K to E?”

Rule: 1) “Hare”, an imaginary character, moves through the letters in the “cells” of the “square”; 2) the characteristics of its movements are: (a) it jumps directly, i.e., through the letter vertically (e.g.: from M to C or W) or horizontally (e.g.: from M to K or O); (b) it jumps obliquely, i.e., diagonally, e.g.: from M to E or A or U or Y; 3) hare can not make two identical jumps (two direct jumps or two oblique jumps) in succession. Solution: K…M…E.

Type 3, e.g.: “What two jumps did the fox take to get from K to S?”

Rule: 1) “Fox”, an imaginary character, moves through the letters in the cells of the square; 2) the characteristics of its movements are as follows: it jumps through the letter (e.g.: from M to F or B or D or J or T or X or V or P). Solution: K…V…S.

Type 4, e.g.: “What two moves do the duck (directly) and the hare (obliquely) need to make in order to get from G to T?” Solution: G…H…T.

Type 5, e.g.: “What two moves do the duck (obliquely) and the hare (directly) need to make in order to get from H to S?” Solution: H…G…V.

Type 6, e.g.: “What two moves do the duck (directly) and the fox need to make in order to get from B to J?” Solution: B…C…J.

Type 7, e.g.: “What two moves do the duck (obliquely) and the fox need to make in order to get from D to Q?” Solution: D…H…Q.

Type 8, e.g.: “What two moves do the hare (directly) and the fox need to make in order to get from R to E?” Solution: R…H…E.

Type 9, e.g.: “What two moves do the hare (obliquely) and the fox need to make in order to get from G to V?” Solution: G…S…V.

Type 10, e.g.: “What four moves do the duck (directly and obliquely) and the hare (directly and obliquely) need to make in order to get from K to J?” Solution: K…L…X…T…J.

Type 11, e.g.: “What four moves do the duck (directly and obliquely) and the fox need to make in order to get from F to D?” Solution: F…L…S…O…D.

Type 12, e.g.: “What four moves do the hare (directly and obliquely) and the fox need to make in order to get from A to C?” Solution: A…K…R…J…C.

Type 13, e.g.: “What three moves do the duck, the hare and the fox need to make in order to get from F to V?” Solution: F…G…S…V.

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During each lesson the children solve 5 variants of one problem type, e.g. type 1.

Variant 1, e.g.: “What two steps did the duck take to get from K to R?”

Variant 2, e.g.: “Which cell did the duck get to in two steps from Q: Y or N?”

Variant 3, e.g.: “From which cell did the duck get to Sin two steps: from U or J?”

Variant 4, e.g.: Leo, Dan and Jim solved the problem: “What three steps did the duck take: (a) L – H – I – E, (b) L – M – I – E or (c) L – H – D – E, to get from L to E?” Leo chose answer (a). Dan – answer (b). Jim – answer (c). Who made the correct choice?

Variant 5, e.g.: Leo, Dan and Jim solved the problem: “What three steps did the duck take: (a) M – L – P – U, (b) M – R – V – U or (c) M – O – V – U, to get from M to U?” Leo chose answer (a). Dan – answer (b). Jim – answer (s). Who made the wrong choice?

It should be noted the purpose of variants 2 - 5 in each type of problems. Variants 2 and 3 are necessary for the development of reflective skills, in order, accordingly, to search for the question and search for a part of the conditions. Variants 4 and 5 are needed for the development of reflective skills, in order, accordingly, to evaluate the correct method for solving and incorrect method of solution.

5.2. Contents of the "Metacognition" program

Lesson 1: route problems (type 1). Lesson 2: comparative problems (type 1). Lesson 3: narrative-logical problems (type 1). Lesson 4: route problems (type 2). Lesson 5: comparative problems (type 2). Lesson 6: route problems (type 3). Lesson 7: narrative-logical problems (type 2). Lesson 8: route problems (type 4). Lesson 9: comparative problems (type 3).Lesson 10: narrative-logical problems (type 3). Lesson 11: route problems (type 5). Lesson 12: comparative problems (type 4). Lesson 13: narrative-logical problems (type 4). Lesson 14: route problems (type 6). Lesson 15: comparative problems (type 5). Lesson 16: route problems (type 7). Lesson 17: narrative-logical problems (type 5). Lesson 18: route problems (type 8). Lesson 19: comparative problems (type 6). Lesson 20: narrative-logical problems (type 6). Lesson 21: route problems (type 9). Lesson 22: comparative problems (type 7). Lesson 23: route problems (type 10). Lesson 24: narrative-logical problems (type 7). Lesson 25: route problems (type 11). Lesson 26: comparative problems (type 8). Lesson 27: route problems (type 12). Lesson 28: narrative-logical problems (type 8). Lesson 29: route problems (type 13). Lesson 30: comparative problems (type 9).

5.3. Enrichment lessons

Lessons of the "Metacognition" program consist of three parts. During the first part (about 15 minutes) the teacher together with the students analyzes the ways of solving a typical problem. It is necessary for the children to understand what needs to be discovered in problems of this type and how this can be achieved. Children are given the means of analyzing problems and ways of managing the search for a solution and of controlling their actions, – for metacognitive skill development.

During the second part (about 30 minutes) children solve 12 to 15 problems independently, applying the knowledge obtained in the first part.

During the third part (about 15 minutes), the teacher, along with the students, checks the solved problems and examines incorrect solutions, once again demonstrating the methods of analyzing problems and ways of controlling mental activity.

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5.4. Diagnostics of metacognitive skills

Before and after 30 sessions of the program "Metacognition" group diagnostics of children of control and experimental groups was conducted. Children were asked to solve training and main problems of the "Exchange" technique.

Training problems
(two actions)

1. R D C -------- C R D
2. M G D P V -------- V P D G M

Main problems
(three actions)

1. Y C O A E T ---------- C Y A O T E
2. L M B H D G ---------- H D G L M B
3. Z W X V T S ----------W Z V X S T

Statements
1. Three problems are similar.
2. Three problems are different.
3. Problems 1 and 2 are similar, and problem 3 is different from them.
4. Problems 1 and 3 are similar, and problem 2 is different from them.
5. Problems 2 and 3 are similar, and problem 1 is different from them.

In the beginning of the lesson the children were due to formal rules to solve problems: for one action is taken by mutual exchange of places of any two letters, for example K R C– R K C or M N P – P N M or V D T F – F D T V. Then shown the decision of problem in two steps, for example: G C X Z – Z X C G. In this problem, the first step is to change the letters G and Z in the second – the letters C and X.

Children indicated that the move you need to make mentally with letters located on the left. The arrangement of letters on the left is called initial, and on the right – required. It was reported that the meaning of the problems in two moves or in three actions is that the letters of the initial location after two or three mental movements were placed in the same way as in the desired location. It was also explained that, making the first mental movement, you need to write the result, i.e. the location of all the letters after a permutation. You also need to do mental after the second move and third.

Then children were asked to solve training problems. After a collective test of their solution, it was proposed to solve the main problems.

After solving the main problems, it was indicated that you need to choose one statement out of five and briefly justify it. The children were told: “Many children solved these problems. Some children said that all problems are similar, others – all problems are different. Another group of children said that problems 1 and 2 are similar, and problem 3 is different from them. The children of the other group said

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that problems 1 and 3 were similar , and problem 2 was different. The children of the third group said that problems 1 and 2 are similar, and problem 3 is different from them. All children have different statements about these problems. Each of you should choose only one statement that feels most correct, and write why this statement is chosen".

The solution of these three problems and the choice of statement in the lesson was not evaluated.

When processing the results of the solution of three problems, it was taken into account what statement the student chose and how he justified it.

Some children chose statement 1, justifying, for example, as follows: "... because everywhere you need to change the letters...".

Some – statement 2, justifying, for example, as follows: "...because in all problems the letters are different...".

Some – statement 3, for example, justifying it as follows: "...because the letters in the third problem are the last in the alphabet, and in other problems – not so...".

Some – statement 4, for example, justifying it as follows: "...because in the first and third problems adjacent letters are changed, and the second – not so...".

Some – statement 5, arguing, for example, so: "...because the first problem has vowels, but not others...".

If the student chose statement 1, 2, 3 or 5, based on the similarity and difference of the external features of the problem conditions, it was assumed that he had a formal knowledge of these problems, which indicates the absence of reflection in their solution. If the student chose statement 4, based on the similarity and difference of problems in the structure, it was accepted that he had a meaningful knowledge of the problems, indicates the presence of reflection in their solution.

6. Findings

Table 01. Test results of control (C) and experimental (E) groups before and after the 30 "Metacognition" lessons

Statements	**Before the lessons**		**After the lessons**	
	C group	**E group**	**C group**	**E group**
1	18 (34.0%)	19 (37.5%)	13 (24.5%)	6 (10.7%)
2	14 (26.4%)	16 (28.6%)	10 (18.8%)	7 (12.5%)
3	9 (17.0%)	10 (14.3%)	11 (20.8%)	12 (21.4%)
4	6 (11.3%)	5 (8.9%)	11 (20.8%)*	22 (39.3%)*
5	6 (11.3%)	6 (10.7%)	8 (15.1%)	9 (16.1%)

* – < 0.05

The data given in the Table 1 characterize differences in choice of statements 1, 2, 3, 4, 5 between the children of control and experimental groups before and after "Metacognition" classes.

First, we should note quantitative changes (by comparison of results, obtained before and after the "Metacognition" classes) in choice of the statement 4, characterizing determination of the unity of content of the main problems 1 and 3. It indicates implementation of metacognitive skills, connected with reflection of the problem solving method.

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In both groups the number of children, who have chosen this statement, has increased. For example, before the classes there were 11.3% of such children in the control group, after the classes – 8.9%, in the experimental group, respectively: 20.8% и 39.3%; the difference between these figures is statistically significant (by $p < 0.05$). In the experimental group this subgroup of children has increased more than threefold, in the control group – less than twofold respectively: by 30.4% (from 8.9% to 39.3%) and by 9.5% (from 11.3% to 20.8%). This fact shows substantial influence of the "Metacognition" classes on the development of metacognitive skills, connected with reflection of the problem solving method.

Second, it is important to note quantitative changes in choice of other statements, characterizing formal similarity of the problems 1, 2 and 3 (statement 1), problems 2 and 3 (statement 3), problems 1 and 2 (statement 5) and formal difference between the problems 1, 2 and 3 (statement 2). The choice of these statements indicates non-implementation of metacognitive skills, connected with reflection of the problem solving method

The number of children, who have chosen statements 1 and 2, has decreased in both groups. Before the classes these subgroups have constituted, respectively, 37.5% and 28.6% in the experimental group, 34.0% and 26.4% in the control group. After the classes these subgroups have constituted, respectively, 10.7% and 12.5% in the experimental group, 24.5% and 18.8% in the control group. In the experimental group decrease constitutes 26.8% and 16.1%, in the control group, respectively: 10.5% and 7.6%. As a result, in the experimental group the number of children, who have considered main problems 1, 2 and 3 similar or different, has decreased more than in the control group.

The number of children, who have chosen statements 3 and 5, has increased in both groups. Before the classes these subgroups of children have constituted, respectively, 14.3% and 10.7% in the experimental group, 17.0% and 11.3% in the control group. After the classes these subgroups have constituted, respectively, 21.4% and 16.1% in the experimental group, 20.8% and 15.1% in the control group. In the experimental group increase constitutes, respectively, 7.1% and 4.4%, in the control group – 3.8% and 3.8%. As a result, in the experimental group the total number of children, who have considered main problems 1 and 2, 2 and 3 similar or different, has increased slightly more than in the control group, i.e. by 11.5% and 7.6% respectively.

The facts reflecting changes in the subgroups of children, who have chosen statements characterizing determination of formal similarity and differences in the main problems, indicate significant (this is particularly true for the subgroups of children who have chosen statements 1 and 3) influence of the "Metacognition" classes on the change in the children's knowledge of the problems solved: from less specific ("Main problems 1, 2 and 3 are similar» and «Main problems 1, 2 and 3 different") to more specific knowledge ("Main problems 1 and 2 are similar, task 3 differs from them") and ("Main problems 2 and 3 are similar, task 1 differs from them"). Our researches (Zak, 2004) show that such change characterizes an important stage in the development of children's metacognitive skills, connected with reflection of the problem solving method.

7. Conclusion

The research conducted has confirmed that initial hypothesis that the classes under the program "Metacognition" provide an intensive development of metacognitive skills connected with reflection of the

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problem solving method, while the results of the experimental group have a statistically significant difference from the results of the control group.

This result is related to five characteristics of the search problems included in the program: non-academic content, search nature, variety of specific material (8 types of plot and logical problems, 9 types of comparative and 13 types of route material), the difference in the structure of each type of task (search for answers, query, search for a part of the condition), different position of the child in relation to the problem ("a solver", "an inspector").

The important features of the program implementation are peculiarities of developing classes: their total number, frequency and regularity of the classes, duration and structure of each class. In total, 30 classes were conducted during nine months (from September to May) once a week. Each class lasted 60 minutes and included three parts: preliminary discussion (about 15 minutes); independent solution of problems (about 30 minutes); final discussion (about 15 minutes).

By characterization of the peculiarities of examinee selection it should be noted that control and experimental groups included ordinary pupils of regular classes of an ordinary school школы. It creates grounds for confirmation of the experimental results in other classes and schools.

The research allowed obtaining new information on conditions of the development of metacognitive skills in children at the age of 7.5 – 8 year (second class of the Russian primary school). This information extends and specifies the concept of possibilities of intellectual development of children of this age, established in developmental psychology.

The «Metacognition» program, approved in the research, is one of possible ways of intellectual enrichment of the teaching environment, implemented by means of inclusion of a course of non-curricular classes into the educational program for primary school.

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