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INFLUENCE OF COORDINATION TRAINING ON THE DEVELOPMENT OF MEMORY OF CHILDREN WITH DIFFERENT TYPOLOGY

Georgy G. Polevoy[1]

ABSTRACT

Differentiated development of coordination abilities of children, taking into account their typology, has a positive impact on the level of development of their memory. The purpose of the study is the effect of coordination training on the development of memory in children with different strength nervous system. The study involved 60 schoolchild of 7-8 years, who were divided into 3 groups 20 children each group. Determine the type of nervous system using the “tapping-test”. Indicator of short-term memory was determined according to the test “method of Jacobs”. Indicators of coordination abilities were determined by the test “shuttle run 3x10”. Mathematical and statistical analysis was performed using T-student. After 7 months of the experiment, there were changes in all groups. In KG, students were engaged in the usual programs for school, the indicators deteriorated in the test coordination of movement from 10.3 s. to 10.4 s. ($p>0.05$), but slightly improved in the test “method of Jacobs” from 6.82 ± 0.3 p. to 6.94 ± 0.2 p. ($p>0.05$). In EG-1, in which children performed exercises to develop coordination abilities, the performance in both tests improved, but not significantly. In the test “Shuttle run3x10” the values improved from 10.3 ± 0.6 s. to 10.1 ± 0.5 s. ($p>0.05$), and in the test “method of Jacobs” the values improved by 0.19 points ($p>0.05$). In EG-2, children who performed physical exercises for the development of coordination abilities, taking into account the strength of the nervous system, significantly improved their performance in the “Shuttle run 3x10” test from 10.3 ± 0.6 s. to 9.7 ± 0.5 s. ($p<0.05$) and improved the short-term memory from 6.93 ± 0.5 p. to 8.43 ± 0.2 p. ($p<0.05$). Short-term memory of children will develop faster if the physical education classes to carry out coordination training, using a differentiated approach, which is based on the typology.

Key words: Coordination training. Differentiated approach. Nervous system. Children. Short-term memory.

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RESUMO

Influência do treinamento de coordenação no desenvolvimento da memória de crianças com diferentes tipologias

Diferenciados de desenvolvimento de habilidades de coordenação das crianças, tendo em conta a sua tipologia, tem um impacto positivo sobre o nível de desenvolvimento de sua memória. O objetivo do estudo é o efeito do treino de coordenação no desenvolvimento da memória em crianças com força diferente do sistema nervoso. O estudo envolveu 60 escolares de 7-8 anos, que foram divididas em 3 grupos de 20 crianças em cada grupo. Determinar o tipo de sistema nervoso, usando o “tocando-teste”. Indicador de memória de curto prazo foi determinado de acordo com o teste de “método de Jacobs”. Indicadores de habilidades de coordenação, em que foram determinados pelo teste “shuttle run 3x10”. Análise matemática e estatística foi realizada utilizando t-student. Depois de 7 meses do experimento, houve alterações em todos os grupos. Em KG, os alunos foram envolvidos em programas habituais para a escola, os indicadores se deterioraram no teste de coordenação do movimento de 10,3 s. para 10,4 s. ($p>0,05$), mas ligeiramente melhorada no teste de “método de Jacobs” a partir de 6,82±0,3 p. para 6,94 ± 0,2 p. ($p>0,05$). No GE-1, em que crianças realizaram exercícios para desenvolver habilidades de coordenação, o desempenho em ambos os testes melhorado, mas não significativamente. No teste “Shuttle run3x10” os valores melhoraram, passando de 10,3 ± 0,6 s. para 10,1 ± 0,5 s. ($p>0,05$), e no teste de “método de Jacobs” os valores melhoraram através de 0,19 pontos ($p>0,05$). No GE-2, as crianças que realizaram exercícios físicos para o desenvolvimento de habilidades de coordenação, tendo em conta a força do sistema nervoso, melhoraram significativamente seu desempenho no “Shuttle run 3x10” teste de 10,3 ± 0,6 s. para 9,7 ± 0,5 s. ($p<0,05$) e melhorou a memória de curto prazo a partir de 6,93 ± 0,5 p. para 8,43 ± 0,2 p. ($p<0,05$). A memória de curto prazo das crianças vai se desenvolver mais rápido se as aulas de educação física para realizar a coordenação de formação, utilizando-se uma abordagem diferenciada, que é baseado na tipologia.

Palavras-chave: Formação. Coordenação. Abordagem diferenciada. Sistema nervoso. Crianças. Memória de curto prazo.

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INTRODUCTION

The importance of coordination abilities for a man cannot be overestimated. The higher the level of development of coordination abilities, the easier it is for people to overcome the difficulties performs a complicated technical operation, especially, child (Issurin and Lyakh, 2017; Lyakh and collaborators, 2011).

There are a lot of coordination abilities, all of them are developing together. There are General and specific coordination abilities (Alexandrova and Shian, 2014).

In primary school age, the level of development of General coordination abilities plays a special role. It is at this age of 6-9 years that General coordination abilities develop more intensively (Feoktistov, 2010).

Short-term memory is associated with the actual human consciousness. It plays a big role in a person's life. Thanks to it, the largest amount of information is processed, unnecessary information is immediately eliminated and potentially useful information remains. Short-term memory is important for the organization of thinking (Furley and Memmert, 2015).

There are studies that talk about the relationship of the mental processes in the cerebral cortex with the development of coordination abilities (Shawkat, 2014; Vespalec and collaborators, 2014). However, we have not been able to find studies that show the effect of coordination training on human memory, especially if people differ in the type of nervous system.

The differentiated approach allows to reveal more deeply individual features of the person, let's see reserves of his organism. This approach is often used in pedagogy and sport activities (Santos and collaborators, 2018).

About the significance of the differentiated approach, which is based on type nervous system said a bit, but such research there is. These studies highlight the importance and effectiveness of differentiating children into groups based on the strength of their nervous system (Drozdovski, 2015; Kostyunina and collaborators, 2010).

The main purpose of the study is to determine the effect of coordination training on the development of memory in children with different strengths of the nervous system.

The hypothesis of the study – it is assumed that systematic training in the development of coordination of movement in children 7-8 years will increase the level of development of not only the coordination abilities, but also indicators of short-term memory, especially those children who are engaged in differentiated, and the criterion of differentiation is the type of nervous system.

MATERIAL AND METHODS

In the pedagogical experiment took part 60 boys and girls from the 1st grade of school number 10 (Kirov, Russia). Age of children 7-8 years.

Physical education classes were held 2 times a week for 45 minutes. During 7 months of the pedagogical experiment, 59 training were held in each group of schoolchildren. All participants of the experiment were divided into 3 groups by method random sampling (Shklyar, 2015).

The first group - a control group (KG), 20 children who were engaged in the usual program "Physical education for schoolchildren of 1 class" (Lyakh and Zdanevich, 2010).

The second group is the experimental group-1 (EG-1), 20 children who were engaged in the same program, but at the beginning of each training, children performed physical exercises to develop coordination abilities for 12-15 minutes.

The third group - experimental group – 2 (EG-2), 20 children, which were differentiated into subgroups based on the strength of the nervous system. Children in this group also performed physical exercises to develop coordination abilities, but they were offered a different load. Children with a strong nervous system-intensive, and with a weak - volume.

Increasing the number of exercises and reducing the rest time is an increase in intensity, and increasing the volume is an increase in the number of repetitions and rest time.

Features of coordination training for children of primary school age

Physical exercises for the development of coordination of movement can be without objects-running, jumping, somersaults and with objects – this exercise with balls, gymnastic sticks, jump ropes. Also effective are the exercises in the form of runs and sports games. But, as a rule, the method of standard-repeated exercise is used at the beginning, and later - the method of variable exercise.

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One of the main regularities of the development of coordination abilities is to increase the complexity of the exercises. It increased due to changes in spatial, temporal and dynamic parameters, external conditions, changing the order of the projectiles, their weight, height; changing the area of support or increasing its mobility in exercises for balance; combining motor skills; combining walking with jumps, running and catching objects; performing exercises on the signal or for a limited period of time (Holodov and Khuznetsov, 2009).

Before the study, all children were tested for the level of development of coordination and short-term memory. In EG-2 was a test to determine the type of nervous system.

The type (strength) of the nervous system was determined by the "Tapping test" (Raigorodskiy, 2017).

On a sheet of paper A4 size shows 6 squares (3 on top and 3 on the bottom). At the signal-children put a pencil point on the paper in a square at maximum speed. The transition from one square to another takes place in 5 seconds on command. As a result, the number of points in each square is calculated and a graph is plotted, which determines the type of the nervous system.

Indicators of coordination abilities is determined according to the test "Shuttle run 3x10" (Lyakh and Zdanevich, 2010).

At a distance of 10 meters from each other there are 2 lines (start and finish). On the command "GO" schoolchild runs from the start line to the finish line (hand touches line), then returns to the start line (hand touches line) and runs to the finish line (not hand touches).

The result is accurate to 0,1 sec.

Development indicators of short-term memory was determined according to the test "method of Jacobs" (Nemov, 2003). The test consists of four similar series. In each series, one of the sets of the following digital series is read (table 1).

The numbers are called at intervals of 1 second. After reading each row you need to reproduce the numbers in the same order on paper.

Count up:

1) The largest length of the row that is played correctly (A);
2) Number of correctly reproduced rows, greater than A (C);

Short-term memory is calculated by the formula: A+C/4

Statistical analysis of the results of the pedagogical experiment was carried out using the parametric test - t-student. The correlation analysis was performed using the BIOSTAT 2009 program. The result was significant at P>0,05 (Oldham, 1993; Shklyar, 2015).

Table 1 - Material for determining short-term memory.

First set	Second set
5241	7106
96023	89934
254061	856086
7842389	5201570
34682538	82744525
598374623	715843413
6723845207	1524836897
Third set	**Fourth set**
1372	7106
64805	89934
725318	856086
0759438	5201570
52186355	82744525
132697843	715843413
3844528716	1524836897

RESULTS

Before the beginning of the pedagogical experiment at the lessons of physical culture, all students were divided into groups in such a way that the level of coordination abilities was approximately the same (p>0.05). The test results before and after the study were obtained data (table 2).

Table 2 - Indicators of coordination abilities and short-term memory of children 7-8 years before and after the experiment (M ± m).

Indicators	Group	Before	After	t; P
Shuttle run 3x10 (s)	KG	10,3 ± 0,6	10,4 ± 0,6	t=0,49; p>0,05
	EG-1	10,3 ± 0,6	10,1 ± 0,5	t=0,79; p>0,05
	EG-2	10,3 ± 0,6	9,7 ± 0,5	**t=3,18; p<0,05**
Method of Jacobs (points)	KG	6,82 ± 0,3	6,94 ± 0,2	t=1,34; p>0,05
	EG-1	7,12 ± 0,2	7,31 ± 0,3	t=1,09; p>0,05
	EG-2	6,93 ± 0,5	8,43 ± 0,2	**t=13,78; p<0,05**

However, table 2 shows that after the end of the study there were changes in all groups, both in the indicators of the test "Shuttle run 3x10" and in the test "Method of Jacobs". Of course, the increase in short-term memory in all groups is due to the age factor, however, the indicators are different.

KG, in which children were engaged in the usual program and did not perform special exercises for the development of coordination abilities worsened the indicators in the test

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"shuttle run 3x10" from 10.3 ± 0.6 s. to 10.4 ± 0.6 s. (p>0,05). In the test "method of Jacobs" indicators improved, but slightly from 6.82 ± 0.3 p. to 6.94 ± 0.2 p. (p>0.05).

EG-1, children who were engaged in the standard program, but at the same time performed exercises to develop coordination abilities without load differentiation improved performance in both tests, but not significantly. In the test "shuttle run 3x10" the values improved from 10.3 ± 0.6 s. to 10.1 ± 0.5 s. (p>0.05), and in the test "method of Jacobs" the values improved by 0.19 points (p>0.05).

EG-2, schoolchildren who performed physical exercises for the development of coordination abilities, taking into account the strength of their nervous system, significantly improved their performance in the test "Shuttle run 3x10" from 10.3 ± 0.6 s. to 9.7 ± 0.5 s. (p<0.05) and improved indicators short-term memory from 6.93 ± 0.5 p. to 8.43 ± 0.2 p. (p<0.05).

DISCUSSION

The importance of coordination abilities for life and active movement of a person is known enough. The role of coordination in the performance of precise and complex motor elements is very important. A good level of coordination ability development allows to perform any technical movements with high accuracy (Issurin and Lyakh, 2017; Lyakh and collaborators, 2011; Sadowski and collaborators, 2015).

The Foundation for the development of special coordination abilities is the General coordination abilities, which are more effectively developed in primary school age (Alexandrova and Shian, 2014; Feoktistov, 2010; Ljach and Witkowski, 2010).

The value of short-term memory for human life is also great, thanks to this memory a large amount of information is processed and unnecessary information is filtered out. Without a good short-term memory, the normal functioning of long-term memory is impossible. There are some studies connections have been reported about the connection between brain processes, mental processes and the development of coordination abilities (Furley and Memmert, 2015; Greig and collaborators, 2007; Vespalec and collaborators, 2014).

Often a differentiated approach is used in physical education classes or in sports sections with children. It is right. This approach allows us to reveal the abilities and internal reserves of the organism of every person, schoolboy (Santos and collaborators, 2018).

The differentiation of schoolchildren into groups can be according to different criteria, the type of constitution, biological age, playing role, and others (Holienka, 2017; Ion, 2018; Shakhanova and collaborators, 2016).

When differentiating children into groups, one of the effective criteria is the type of the nervous system. Previous studies have proved this (Polevoy, 2017, 2018a, 2018b).

The most important feature of this approach is that children, performing the same exercises, but with different loads, are able to achieve a much greater result than if they performed the same exercises the same number of times.

An intensive load will be more effective for children with a strong nervous system, and for children with a weak nervous system, a volume one. In this case, not only does the ability that trains develop, but also has a positive effect on other abilities and processes in the human body.

Some other authors dealt with the typology of the nervous system. The results of their studies confirm the effectiveness of this approach (Drozdovski, 2015; Kostyunina and collaborators, 2010; Serova and Voronov, 2013).

However, we have not succeeded in discovering studies that are devoted to the effect of coordination training on the short-term memory of schoolchildren of 7-8 years who have different types of nervous system, such a study was conducted for the first time. In the course of the pedagogical experiment, specific recommendations are given and a methodology for developing the coordination abilities of schoolchildren is given, taking into account the type of nervous system that not only improves their coordination abilities, but also enhances the quality of mental processes, such as short-term memory.

The study found the effect of coordination training on the short-term memory of younger schoolchildren, it turned out to be positive.

At the same time, if you systematically perform physical exercises for the development of coordination abilities taking into account the strength of the nervous system, the effect will be higher and the indicators of short-term memory will increase.

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CONCLUSION

The conducted research allows one to make several important and promising conclusions at once.

If the coordination abilities are systematically developed, then, undoubtedly, the level of their development will grow.

A differentiated approach is one of the most effective methods of revealing all the potentials of children, schoolchildren, and athletes.

Especially if the criterion is the type of nervous system. The effect of coordination training on the level of development of short-term memory is established.

At the same time, the higher the level of development of coordination abilities, the higher the indicators of short-term memory.

The results of the research are relevant and promising for studying new influences and interrelations of different indicators.

Such results can be useful for teachers of physical culture, coaches and other educators.

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