52

Fecha de presentación: Junio, 2018
Fecha de aceptación: Julio, 2018
Fecha de publicación: Octubre, 2018

INFLUENCE

OF COORDINATION TRAINING ON THE DEVELOPMENT OF SPEED IN CHILDREN WITH DIFFERENT STRENGTHS NERVOUS SYSTEMS

EFECTO DEL ENTRENAMIENTO DE COORDINACIÓN EN EL DESARROLLO DE LA RAPIDEZ EN NIÑOS CON DIFERENTES SISTEMAS NERVIOSOS

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Suggested citation (APA, sixth edition)

Polevoy, G. G. (2018). Influence of coordination training on the development of speed in children with different strengths nervous systems. Universidad y Sociedad, 10(5), 389-392. Retrieved from http://rus.ucf.edu.cu/index.php/rus

ABSTRACT

The high level of development of coordination abilities has a positive effect on the development of speed in children, especially if on the classes use a differentiated approach to the typological criterion. The aim of the study is to determine the effect of coordination abilities on the development of speed in children with different strength of the nervous system. The study involved 60 schoolchildren 7-8 years. Children were differentiated into 3 of the same group. The speed of movements was determined by the test "Running on the spot". The strength of the nervous system was determined by the method of "Tapping test". The level of coordination was diagnosed by the test "Shuttle run".

Keywords: Type of nervous system, speed, differentiated approach, coordination abilities, schoolchildren.

RESUMEN

El alto nivel de desarrollo de la capacidad de coordinación afecta positivamente el desarrollo de la rapidez en los niños, especialmente si las clases usan un enfoque diferenciado según el criterio tipológico. El objetivo del estudio es determinar el efecto de las habilidades de coordinación en el desarrollo de la rapidez en niños con diferentes fuerzas del sistema nervioso. En el estudio participaron 60 alumnos de 7 a 8 años. Los niños fueron diferenciados en 3 grupos del mismo grupo. La rapidez de los movimientos se ha determinado por la prueba "Correr en el lugar". La fuerza del sistema nervioso se definió por el método "prueba de Tepping". El nivel de desarrollo de la coordinación fue diagnosticado con una prueba de "Lanzadera".

Palabras clave: Tipo de sistema nervioso, velocidad, enfoque diferenciado, habilidades de coordinación, escolares.

INTRODUCTION

Management of human movements is carried out through the development of coordination abilities. Their role in the life of people is beyond doubt (Lyakh, Sadowski & Witkowski, 2011; Jaakkola, Watt & Kalaja, 2017). Primary school age is a favorable period for the development of all coordination abilities (Starosta & Hirtz, 2002).

There are several studies that show the relationship of physical qualities and coordination abilities (Sporiš, Šiljeg, Morgan & Kevi, 2011; Jekauc, Wagner, Herrmann, Hegazy & Woll, 2017; Bozdoan & Kızılet, 2017).

Speed – is the ability of a person to perform actions in the minimum period of time for these conditions. Speed is important not only in everyday life, but it is a decisive factor in many sports (Holodov and Khuznetsov, 2009).

Differentiated approach is one of the key methods of work with children, especially with younger schoolchildren. It allows you to reveal the hidden psychological and physical abilities of children (Solomatin, 2010; Santos, Coutinho, Gonçalves, Schöllhorn, Sampaio & Leite, 2018). During physical education classes, schoolchildren can differentiate according to different criteria, for example, position on the site, age, gender, level of technology (Khasawneh, 2015; Fiorilli, Mitrotasios, Iuliano, Calcagno & Di Cagno, 2017).

One of the effective methods for the differentiation of children into groups is typology. Under the typology refers to the features of the manifestation of the properties of the nervous system, in this case – is the power of the nervous system in the process of excitation (Makarov & Hussain, 2011; Drozdovski, 2011).

The aim of the study is to determine the effect of coordination abilities on the development of speed in children with different strengths of the nervous system.

The hypothesis of the study - the development of coordination, not only improve the performance of coordination abilities of schoolchildren but also increase the speed of movement, especially in children who are engaged in physical culture differentiated and taking into account the strength of the nervous system.

DEVELOPMENT

The study involved 60 schoolchildren 7-8 years, who were healthy and admitted to physical education. All children were differentiated into three equal groups (Shklyar, 2015).

1 – KG, schoolchildren were engaged in the standard program "Physical education for first graders" (Lyakh & Zdanevich, 2010).

2 – EG-1, the children were engaged in the same program (Lyakh & Zdanevich, 2010), but after the warm-up for 12-15 min they performed exercises for development of coordination abilities. In the classroom used different exercises with objects and without objects (jumping with turns, somersaults, ball movements and others). The difficulty of performing physical exercises increased due to the introduction of new elements of exercise or an additional subject (Holodov & Khuznetsov, 2009).

3 – EG-2, children were engaged in the standard program, (Lyakh and Zdanevich, 2010), and performed coordination exercises (Holodov & Khuznetsov, 2009). The classes used a differentiated approach, which is based on the strength of the nervous system. Children with a strong nervous system performed exercises with greater intensity, with a weak-with a large volume. The volume increased due to the increase in the number of repetitions of the exercise and the increase in rest time. The intensity was increased by reducing rest time and increasing the number of exercises (Polevoy, 2017, 2018).

During the study period, 59 physical education classes were held, they were held twice a week for 45 min. Before and after the study, all schoolchildren took control tests. The speed of movements was determined by the test "Running on the spot" The level of development of coordination abilities was determined by the test "Shuttle run". In EG-2, the differentiation of children into groups based on the strength of the nervous system was using the technique of "Tapping test".

Test "Running on the spot" (Holodov & Khuznetsov, 2009). Within 10 sec, the schoolchildren performs an exercise - running on the spot. The result is the number of steps (movements) on the spot.

Test "Shuttle run" (Lyakh & Zdanevich, 2010). Between the start line and the finish line 10 meters. The schoolchildren must overcome the distance 3 times. They must touch the line with his hand 2 times, in the first and in the second case. The result is a time with an accuracy of 0,1 sec.

The method of "Tapping-test" (Raigorodskiy, 2017). On a sheet of A4 depicts 6 squares. At the command of "go" schoolchildren quickly put a many point in the first square for 5 sec, then in the second square, and so on. After the sixth square the command "stop" sounds. The points are plotted and the strength of the nervous system is determined by the process of excitation.

The arithmetic mean was calculated using Excel 2016. Correlation analysis was performed using the program Bio-stat 2009. Mathematical and statistical processing of the research results was carried out using the parametric

t-student test. The result was significant at P<0,05 (Clark-Carter, 2007; Kim, 2015).

Prior to the study, coordination ability was approximately equal in all three groups (P>0,05).

Children in EG-2 were differentiated into two subgroups according to the strength of the nervous system. The following results were obtained after the study (table 1).

Table 1. Change of indicators the coordination abilities and speed of movement schoolchildren 7-8 years (M±m).

Indicators	Group	Before	After	P
Shuttle run (second)	KG EG-1 EG-2	10,3±0,6 10,3±0,6 10,3±0,6	10,4±0,6 10,1±0,5 9,7±0,5	>0,05 >0,05 <0,05
Running on the spot (steps)	KG EG-1 EG-2	28,1±1,4 26,3±1,4 24,5±1,6	29,4±1,5 30,7±1,6 34,5±1,7	>0,05 <0,05 <0,05

The analysis of table 1 allows to interpret the following results. During the study period there were changes in all groups.

In KG, in which schoolchildren were engaged in the standard program, the indicators became worse in the test "Shuttle run" on 0,1 sec. (P>0,05), however, in the test "Running on the spot" indicators slightly improved from 28,1±1,4 to 29,4±1,5 (P>0,05).

In EG-1, in which schoolchildren were engaged in the standard program and performed coordination exercises, indicators improved in both tests. In the test "Shuttle run" from 10,3±0,6 to 10,1±0,5 (P>0,05), and in the test "Running on the spot" from 26,3±1,4 to 30,7±1,6 (P<0,05).

In the EG-2, in which schoolchildren were engaged in the standard program and performed coordination exercises based on the strength of the nervous system, the indicators improved significantly in both tests. In the test "Shuttle run" indicators increased from 10,3±0,6 to 9,7±0,5 (P<0,05), and in the test "Running in place" indicators increased by 10 steps (P<0,05).

The results obtained in the course of the study indicate the effectiveness of the use of coordination training during physical training with schoolchildren 7-8 years. Especially, significant and reliable results on both indicators achieved schoolchildren in EG-2, who were engaged in differentiated, taking into account the strength of the nervous system in the process of excitation.

The high level of development of coordination abilities allows a person to effectively and quickly deal with complex tasks, especially those that arise unexpectedly (Holodov & Khuznetsov, 2009). Despite the variety of coordination abilities, they can be classified as General and special (Dveyrina, 2014). At the same time, General coordination abilities are the Foundation for the development of special coordination abilities. Primary school age is favorable for the development of General coordination abilities (Starosta & Hirtz, 2002).

Some authors have established the relationship of physical qualities and coordination abilities (Sporiš, et al., 2011; Jekauc, 2017; Bozdoan & Kızılet, 2017). It is confirmed by the results of our study. Children who performed coordination exercises for 12-15 min increased their level of proficiency in coordination abilities and speed of movement, unlike children who were engaged in the standard program.

The use of a differentiated approach in the classroom with children is also an effective method of influence on them (Solomatin, 2010; Santos, et al., 2018). Despite the variety of criteria by which children are differentiated in the performance of physical exercise, one of the most effective and little studied is the typological criterion (Makarov & Hussain, 2011; Drozdovski, 2011).

Differentiated approach in physical education classes, which is based on the strength of the nervous system in the process of excitation, significantly increases the level of coordination and speed abilities of children, as confirmed by the results of this study. The strength of the nervous system determines the load for the development of coordination abilities. For schoolchildren with a strong nervous system, the load should be intense, and for schoolchildren with a weak nervous system, it will be volumetric (Polevoy, 2017, 2018). Schoolchildren who have a weak nervous system are not weak in principle, they along with children with a strong nervous system have a number of advantages, such as the function of working out they have developed better, as well as the ability to monotonous movements. Such children go to the same goal but in other ways.

For the first time the interrelation of coordination and speed abilities indicators in children 7-8 years was established. It was the influence of coordination abilities on the speed ability. The effectiveness of coordination training in children 7-8 years using a differentiated approach based on the strength of the nervous system in the process of excitation is established, thus the aim of the study is achieved, and the hypothesis is solved.

CONCLUSIONS

In physical education classes with schoolchildren of primary school age for 12-15 min, it is necessary to develop

coordination abilities. The higher the level of development of coordination abilities, the better performance speed abilities. In working with children should use a differentiated approach, which allows to reveal the internal reserves of the body of schoolchildren.

If you conduct coordination training with a differentiated approach, which is based on the strength of the nervous system, the performance of coordination and speed abilities will improve significantly.

New research results are useful for teachers, coaches, and athletes. The study is promising for the study of new relationships of coordination abilities and physical qualities.

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