Improving coordination skills in 10-11 year old students using simulation technologies

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Abstract

Objective of the study is to develop coordination skills in primary school children using the imitation aid "coordination ladder".

Methods and structure of the study. The pedagogical experiment involved 104 students, students in the 2nd grades of a comprehensive school, aged 10-11 years. The study was conducted during the school year, the children attended physical education lessons twice a week, the duration of the lessons was 40 minutes. Children from the control group (grades 2A and 2B) were engaged in physical education at school according to the standard school program for physical education. And children from the experimental group (grades 2B and 2G) during the physical education lesson additionally performed a set of physical exercises on the coordination ladder for 5-6 minutes.

Results and conclusions. At the end of the study, the indicators in the "jumping in place" test in the control group improved from 14.3±1.9 to 15.6±2.0, the increase in indicators was 9.1% ($p>0.05$). This is due to the duration of the pedagogical experiment, the effectiveness of the standard program and a favorable period for the development of coordination abilities in primary school age. In the experimental group, the indicators of the ability to connect movements improved from 13.1±2.1 to 16.9±1.8, the increase in indicators was 29.2% ($p<0.05$). This proves the effectiveness of using the coordination ladder in the educational process of students aged 10-11 years.

Thus, the effectiveness of using the coordination ladder in physical education lessons at school with children aged 10-11 years has been proven. A set of physical exercises on the coordination ladder is recommended for use in each physical education lesson at school as a supplement to the standard school program.

Keywords: *coordination abilities, physical inactivity, obesity, physical education, "coordination ladder" in physical education class.*

Introduction. The topic of school-age children's health is quite relevant [1, 2]. There are many studies that touch upon a variety of problems of growth and development of school-age children [1]. For example, one of the acute problems is obesity [2]. Along with metabolic disorders, the obvious lack of physical activity, in other words, a sedentary lifestyle, comes to the fore [3].

One of the first steps in overcoming this problem is physical education classes, especially physical education lessons at school. The main goal of such physical education is the comprehensive harmonious development of children, increasing the level of physical fitness, satisfying mental, motor and motivational needs [6]. In Russian schools, the program for the discipline "Physical Education" is formed with minor differences, but its main content, goals and objectives are unchanged [7]. An important aspect in the process of physical education of schoolchildren is a favorable period for the development of a particular physical quality [8].

The same rule applies to methods of influencing students, for example, the use of a game method or competitive exercises in primary school, the use of a differentiated or individual approach in middle or senior school.

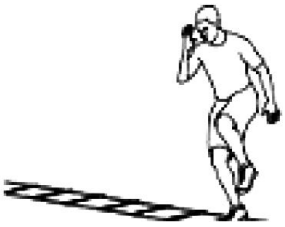
It should be noted that coordination abilities (CA) are best developed in primary school age in both boys and girls [3, 8]. A good level of development of CA is the basis for the development of other physical qualities and the key to the rapid development of technical abilities of children in the future in various sports [4, 5].

CA is understood as the ability of a person to quickly and accurately analyze and perform motor tasks in a wide variety of situations, especially those that arise suddenly [4, 5]. Today, there is a certain classification of all CA. Separately, one of the specific CA should be noted - this is the ability to coordinate (combine into a single whole) movements - this is the ability to combine individual movements and actions into integral motor combinations [5].

Objective of the study is to develop coordination ability in primary school children using the imitation auxiliary tool "coordination ladder".

Methods and structure of the study. The pedagogical experiment involved primary school children aged 10-11 years, who studied in the 2nd grade of comprehensive school No. 623 (Moscow). Of the total number of second-graders (118 children), 104 schoolchildren who were healthy and cleared by a doctor for physical education lessons at school took part in the study. The study was conducted during the academic year from September 10 to May 20, 2024. All schoolchildren were engaged in physical education twice a week for 40 minutes in each lesson. Over the nine months of the study, 72 physical education lessons were held in every second grade. Children from the control group (grades 2A and 2B), 52 students in total, were engaged in physical education at school according to the standard school physical education program [7].

The main objectives of the physical education program: strengthening health, promoting normal physical development of children; teaching vital motor skills and abilities; development of motor skills; acquisition of necessary knowledge in the field of physical education and sports; education of the need and ability to independently engage in physical exercises, consciously use them for rest, training, increasing efficiency and strengthening health; contribute to the education of moral and volitional qualities, development of psychological processes and personality traits. Children from the experimental group (2B and 2G classes), 52 students in total, studied according to the same program, but additionally for 5-6 minutes during the lesson they performed a set of exercises on a special coordination ladder (see figure).



Coordination ladder exercises

Approximate set of exercises on the coordination ladder:

1. Jumping on the cells. Starting position – facing the stairs. Jump into each cell from start to finish, without touching the floor with your heels.

2. Legs apart – feet together. Starting position – facing the stairs. Jump, spreading your legs apart, then jump into the cell, feet together.

3. Jumping on one leg. Starting position – standing on one leg facing the stairs, jump into each cell on one leg, without touching the floor with your heel. Then jump on the other leg.

4. Jumping sideways on one leg. Starting position – standing on one leg, sideways to the stairs. If the jump is performed on the right leg, then you need to stand on the right side of the stairs. Jump into each cell on one leg, without touching the floor with your heel. Then jump on the other leg.

5. Running with high hips. Starting position – face the ladder. Run with high hips and place your foot in the center of the cage.

6. Running with high hips to the sides. Starting position – stand sideways to the ladder. Run with your right side, raising your hips high. Each leg should enter each cage of the ladder. Then do the exercise on the opposite side.

7. Running into each cage. Starting position – stand sideways to the ladder. Run, stepping on each cage with your foot.

8. The same as exercise #7, but in the opposite direction, without touching the floor with your heel. It is also necessary to follow the basic rules when performing exercises on the coordination ladder:

- 1. Run into each cage.

- 2. Several coordination ladders are used, and no more than 7-8 people are engaged in each coordination ladder at the same time in order to maintain the dynamics of the exercise.

- 3. Each physical exercise must be repeated 2-3 times.

- 4. At each lesson, change the sequence of exercises and supplement the complex with new exercises.

- 5. When performing exercises, focus not only on the technique of performing the exercises, but also on maintaining a high pace of movement for each student.

At the beginning of the pedagogical experiment and after the end of the school year, all children took the control test "Jumping in place", which determined the level of development of the ability to coordinate (connect) movements.

Starting position – legs together, arms along the body.

On the count of "1" – legs apart, arms along the body;

On the count of "2" – starting position;

On the count of "3" – legs apart, arms to the sides;

On the count of "4" – starting position.

If the student makes a mistake, he returns to the starting position and continues to perform the exercise. The result is the number of movements performed in 30 seconds [7].

Student's T-test was used to process the research results. The level of statistical significance was at $p < 0.05$.

Research results and their discussion. It should be noted that before the start of the pedagogical experiment, no reliable differences between the groups were found ($p>0.05$), which means that the groups were homogeneous. The table shows the average results in both groups from the beginning to the end of the pedagogical experiment.

The table shows that children from the control group who studied according to the standard program were able to improve their performance by 9.1%. Such an increase in results can be associated with three factors:

1. Long duration of the pedagogical experiment.

2. Effectiveness of using the school program for the development of the KS.

3. The sensitive period for the development of the KS is primary school age, which corresponds to the age range of 10-11 years.

However, the increase in indicators in the control group, although positive, is not statistically significant ($p> 0.05$). As for the experimental group, the average indicator from the beginning to the end of the study significantly and reliably improved by 29.2% ($p<0.05$).

Thus, children who additionally used the coordination ladder in physical education lessons at school were able to significantly improve their ability to combine movements. This proves the effectiveness of introducing the coordination ladder into the general educational process of children aged 10-11 years.

A literature review has shown a pressing health problem for schoolchildren [1], primarily obesity [2], which results from a sedentary lifestyle [3]. The solution to this problem is, to a large extent, a physical education lesson at school and, of course, additional physical education and sports classes. A physical education lesson at school is mandatory and is based on the laws of physical education [6]. In primary school age, KS should be purposefully developed, otherwise an omission at this age will be unattainable.

The standard physical education program at school has proven its effectiveness in developing KS in primary school age, namely the ability to combine movements in children aged 10-11. Despite the fact that during the school year, children in the control group failed to achieve reliable differences in the "jumping in place" test, they were able to improve their performance by 9.1%.

The use of the coordination ladder made adjustments to the standard program, but did not change its essence. However, by using a set of exercises on the coordination ladders to develop the ability to combine movements, it was possible to significantly improve the KS in the "jumps in place" test by 29.2%, which is a reliable increase.

Conclusions. The results of the pedagogical experiment have proven the effectiveness of using the coordination ladder in physical education lessons at school with children aged 10-11 years. It is recommended to use a set of physical exercises on the coordination ladder in each physical education lesson at

Average indicators of both groups during the period of the pedagogical experiment

Groups	To	After	%	p
Control (n=52)	14,3±1,9	15,6±2,0	9,1	p>0,05
Experimental (n=52)	13,1±2,1	16,9±1,8	29,2	p<0,05

school as a supplement to the standard school curriculum.

Conflict of interest. The authors declare no conflict of interest.

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