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# Development to Coordinate (Connect-Unit) Movements of Children Aged 8-9 Years Using a Coordination Ladder

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## ABSTRACT

The problem of developing coordination abilities can be solved by using a coordination ladder in physical education classes at school. To determine the effect of a set of exercises using a coordination ladder on the development of indicators of coordinate (connect-unit) movements of children 8-9 years old. A pedagogical experiment was conducted at school No. 60 Kirov, (Russia) during the academic year. 104 students took part in the study. The children in the control group were engaged in the usual school physical education program, and the children from the experimental group additionally performed a set of exercises on the coordination ladder. All children were engaged in physical education 2 times a week for 40 minutes, a total of 72 physical education lessons were conducted in each class during the study period. The ability to coordinate (connect-unit) movements were determined by the test "Jumping on the spot". The Student's T-criterion was used in statistical processing. After the end of the pedagogical experiment, the indicators of children in the control group improved by 13.2% ($p>0.05$), the positive dynamics can be explained by a natural increase in coordination abilities at the age of 8-9 years and the effectiveness of using the standard physical education program in Russian schools. The indicators of children in the experimental group improved by 34.9% ($p<0.05$). The indicators of coordinate (connect-unit) movements will significantly improve if children aged 8-9 will additionally perform a set of physical exercises on the coordination ladder during physical education lessons at school.

**Keywords:** Coordination abilities, Motor activity, Physical education, Schoolchildren.

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## INTRODUCTION

The topic of health and a healthy lifestyle is always relevant [1-3]. Today, more and more children are obese [4, 5] this is a consequence of a sedentary lifestyle [6, 7]. In this case, an important role is played by a physical education lesson at school.

The main purpose of the physical education lesson at school is the comprehensive harmonious development of the student, increasing the level of physical fitness, and satisfaction of motivational, mental, and motor needs [8].

The standard physical education program at schools in Russia is designed in such a way as to emphasize the development of physical qualities in a favorable period of their development. These can be game and competitive exercises in the lower grades, a differentiated approach in the middle level, and the upper grades – an individual approach [8]. When performing physical exercises and doing physical activity, it is important to take into account sensitive periods of development of physical qualities. For example, coordination abilities are intensively developed in primary school age, speed of movement in the middle level, and strength and endurance in high school [9, 10].

In primary school age, from the first grade, it is important to use a large number of coordination exercises in physical education lessons. A good level of development of coordination abilities is

the foundation for the development of other physical qualities and the key to the rapid development of technical abilities of children in the future in a variety of sports. Coordination abilities are the ability of a person to solve motor tasks most completely, quickly, expediently, accurately, and resourcefully, in the event of complex and unexpected situations. The variety of coordination abilities is quite large [11-14]. One of the important coordination abilities for children is the ability to coordinate (connect-unit) movements is the ability to combine individual movements and actions into integral motor combinations [15].

## MATERIALS AND METHODS

*Participants*

The pedagogical experiment was attended by children in junior grades 8-9 years old. The students studied in the second grade at an ordinary school. The study involved. Of the total number of second graders (118 children), 104 schoolchildren who were healthy and admitted by a doctor to physical education lessons at school (56 girls and 48 boys) took part in the study.

All procedures met the ethical standards of the 1964 Declaration of Helsinki. Informed consent was obtained from all parents of the children included in the study.

*Research procedure*

The pedagogical experiment was conducted at secondary school number 60, Kirov, Russian Federation from September 1 to May 30, 2021. Students were engaged in physical education 2 times a week for 40 minutes each lesson. During the 9 months of the study, 72 physical education lessons were conducted in every second grade.

Children from the control group (class 2A and 2B) – 30 girls and 22 boys were engaged in the standard school program in physical culture at school [8].

The main objectives of the physical education curriculum are:

*To achieve this goal, the following tasks are being solved*

1. Health promotion, promotion of normal physical development of children;
2. Teaching vital motor skills and abilities;
3. Development of motor abilities;
4. Acquisition of necessary knowledge in the field of physical culture and sports;
5. Education of the need and ability to engage in physical exercises independently, consciously apply them for recreation, training, improving performance, and strengthening health;
6. To promote the education of moral and volitional qualities, the development of psychological processes and personality traits;

Children from the experimental group (2B and 2G) – 26 girls and 26 boys were engaged in the same program, but in addition, for 5-6 minutes during the lesson, they performed a set of exercises on the coordination ladder.

*An approximate set of exercises on the coordination ladder (further – Ladder Exercises)*

1. Jumping on the cells
   The starting position is facing the ladder. Perform jumps into each cell from start to finish without touching the floor with your heels.
2. Jumping legs to the sides - legs together
   The starting position is facing the ladder. Perform a jump, spreading your legs apart, then jumping into the cage, legs together.
3. Jumping on one leg
   The starting position is on one leg facing the ladder.
   Perform jumps on one leg in each cell without touching the floor with your heels. Then jumping on the other leg.
4. Jumping sideways on one leg
   The starting position is on one leg sideways to the ladder. If the jump is on the right foot, then you need to stand on the right side of the ladder. Perform jumps into each cell on one leg without touching the floor with the heel.
5. Running with a high hip lift
   The starting position is facing the ladder. Run and raise your hips high, and put your foot in the center of the cage.
6. Running with a high hip lift sideways
   The starting position is to stand sideways to the ladder. Run right sideways with a high hip lift. Every foot must get into every cell of the ladder. Then perform the exercise with the other side.
7. Running in every cell
   The starting position is to stand sideways to

the ladder. Run by stepping on each cell with your foot.

8. The same thing, but, backward, without touching the floor with the heel.

*Basic rules when performing exercises on the coordination ladder*

1. No more than 7-8 people are engaged in each coordination ladder at the same time to maintain the dynamics of the exercise.
2. Each physical exercise must be repeated 2-3 times.
3. The number of ladders depends on the number of children who are engaged in the lesson.
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 exercises but also to maintain 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 passed the control test "Jumping on the spot", which determined the level of development of the ability to coordinate (connect-unit) movements.

«Jumping on the spot»

Starting position (SP) – legs together, arms along the body.

On the count of "1" - Legs apart, arms along the trunk;

On account of "2" - SP;

On the count of "3" - Legs apart, hands apart;

On account of "4" - SP.

If a student makes a mistake, he returns to SP and continues to perform the exercise. The result is a constant amount of SP in 30 seconds [15].

*Statistical analysis:*

The results of the study were entered into the Excel program. Using the Student's T-test, we determined the mean and standard deviation. The statistical significance level was set at $p<0.05$.

## RESULTS AND DISCUSSION

There were no significant differences between the groups before the study ($p>0.05$). **Table 1** shows the test results at the beginning and at the end of the study, which determines the level of development of the ability to coordinate (connect-unit) movements.

**Table 1.** Results of the "Jumping on the spot" test at the beginning and the end of the study

| Indicators | Before | After | % | p |
|---|---|---|---|---|
| **Control group (n=52)** | 12.1±1.6 | 13.7±1.3 | 13.2 | p>0.05 |
| **Experimental group (n=52)** | 12.9±1.6 | 17.4±1.5 | 34.9 | p<0.05 |

Children from the control group who studied according to the standard program were able to improve their performance by 13.2%. Despite the positive dynamics of the results, the reliability of the results was insignificant ($p>0.05$). This can be explained by the effect of the impact on students of the standard physical education program and the possible natural increase in coordination abilities at the age of 8-9 years.

In the experimental group, children's indicators improved significantly ($p<0.05$). Children who additionally performed exercises on the coordination ladder during physical education lessons were able to improve their indicators by 34.9%. Such results prove the effectiveness of the implementation of the coordination ladder in the educational process of students aged 8-9 years.

A review of the literature on the problem of health, and rejuvenation of several diseases showed that a big problem is hidden in a sedentary lifestyle [4-7]. Part of the solution to this problem is to have a physical education lesson at school. It is a compulsory discipline along with other classes. In school lessons, each teacher uses a standard physical education program at school for students in grades 1-11. It is aimed at the comprehensive development of students (physical, mental, moral, volitional, and other indicators). The physical education program is designed in such a way that in each favorable period for the development of physical qualities of schoolchildren, the most appropriate methods of influence and a set of exercises are used [8]. This is important because children's physical qualities are formed at different periods of their lives. For example, the younger school age is a favorable period for the development of coordination abilities, and it is important to pay special attention to the development of the ability to coordinate (connect-unit) movements [9, 10].

The results of the study in the control group

showed the effectiveness of using the standard physical education program in Russian schools. Children who were engaged in such a program were able to improve their performance, albeit not significantly.

At the beginning of the study, we assumed that if a set of coordination exercises on the coordination ladder were added to the process of physical education at school in working with younger schoolchildren, then the indicators of the ability to coordinate (connect-unit) movements would significantly improve. This hypothesis was solved by the indicators of children from the experimental group at the end of the study.

It should be noted the uniqueness of the exercises on the coordination ladder. Performing exercises on the coordination ladder do not require a lot of space or expensive equipment, which solves several problems at once. Coordination physical exercises are not difficult to perform, they do not require special training, and a free but differentiated approach is used in the process of performing, despite the teacher's requirements to perform correctly and quickly, each child chooses a feasible pace for himself, this is important for the health, well-being, and development of the child [16-18]. Also not unimportant is the emotional aspect of students during physical education classes, meeting not only the motivational but also the motor needs of children in primary school age. In the process of performing exercises on the coordination ladder, children at this age tend to overtake each other and perform the exercise faster, this is one of the most important components for the development of coordination abilities [11-14].

Some studies have proven the effectiveness of using a coordination ladder in training sessions in various sports [19-21]. However, there are no studies that show the influence of a set of exercises on the coordination ladder on such an important coordination indicator – the ability to coordinate (connect-unit) movements.

Thus, despite the effectiveness of the application of the standard physical education program at school at primary school age, we recommend that you additionally perform exercises on the coordination ladder. Of course, the study is relevant and promising for further study. For example, how exercises on the coordination ladder affect other coordination abilities or maybe develop other physical qualities.

## CONCLUSION

In the course of the study, the literature on the topic of health and development of primary school children was studied. The problem of a sedentary lifestyle is determined and the important role of a physical education lesson at school in solving this problem is established. As a result of the study, the effectiveness of using the coordination ladder in physical education lessons at school with children aged 8-9 years has been proven. A set of physical exercises on the coordination ladder is recommended to be used in every physical education lesson at school as an addition to the standard school curriculum.

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