Development of coordination abilities of primary school children
Desarrollo de la capacidad de coordinación de los alumnos de primaria

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Abstract. The study aimed to determine the influence of the traditional classical exercise on the development of the reaction speed of boys and girls studying in the first grade. Methods: The pedagogical experiment was conducted from September 3, 2022 to May 28, 2023. The study involved 100 children aged 7-8 years who studied in the 1st grade of an ordinary school in the Russian Federation. The schoolchildren practiced physical education according to the standard school curriculum 2 times a week for 40 minutes in each lesson. During the 9 months of training, 74 lessons were conducted. Children from the experimental group additionally performed traditional classical exercises for 6-7 minutes during the lesson. To determine the level of development of responsiveness in schoolchildren, the "Ball Touch" test was used. All the indicators of the children were entered into an Excel spreadsheet, the Student's T-criterion was also used, with a significance level of p<0.05 (program – Biostatistica 2022). Results: The indicators of reaction speed in schoolchildren from the control group who studied according to the standard program improved by an average of 2.9-3.0% (p>0.05) during the study period. In the experimental group, in which children additionally performed special exercise classics, the indicators became 9.4% higher in boys from 269.2±5.2 to 243.8±6.2 (p<0.05), and in girls, the indicators increased by 8.6% from 271.2±6.5 to 247.9±6.6 (p<0.05). Conclusion. The physical exercise "classics" has shown its effectiveness for developing the reaction speed of schoolchildren aged 7-8 years. If you perform this exercise for 6-7 minutes at each physical education lesson at school, then the children's reaction speed will significantly and significantly improve.

Keywords: Physical exercises, Coordination abilities, School curriculum, Children's health.

Resumen. El estudio tuvo como objetivo determinar el impacto del ejercicio clásico tradicional en el desarrollo de la velocidad de reacción de los niños y niñas que estudian en primer grado. Métodos: El experimento pedagógico se llevó a cabo del 3 de septiembre de 2022 al 28 de mayo de 2023. En el estudio participaron 100 niños de 7-8 años que estudiaron en el primer grado de una escuela normal en la Federación rusa. Los estudiantes participaron en la educación física de acuerdo con el programa escolar estándar 2 veces por semana durante 40 minutos en cada clase. Durante los 9 meses de entrenamiento, se realizaron 74 lecciones. Los niños del grupo experimental en el curso de la lección, además, realizaron ejercicios clásicos tradicionales durante 6-7 minutos. Para determinar el nivel de desarrollo de la velocidad de respuesta en los escolares, se utilizó la prueba "tocar la pelota". Todos los indicadores de los niños se ingresaron en una hoja de cálculo Excel, también se utilizó el criterio T de Student, con un nivel de significancia de p<0.05 (program-Biostatistica 2022). Resultados: Los indicadores de la velocidad de reacción en los escolares del grupo de control, que estudiaron en el programa estándar, durante el período de estudio mejoraron en un promedio de 2.9-3.0% (p>0.05). En el grupo experimental, en el que los niños realizaron un ejercicio especial clásico, las tasas aumentaron en un 9.4% en los niños de 269.2±5.2 a 243.8±6.2 (p<0.05), y en las niñas, las tasas aumentaron en un 8.6% de 271.2±6.5 a 247.9±6.6 (p<0.05). Conclusión. El ejercicio físico de los "clásicos" ha demostrado su eficacia para el desarrollo de la velocidad de reacción de los escolares de 7-8 años. Si realiza este ejercicio durante 6-7 minutos en cada clase de educación física en la escuela, los indicadores de la velocidad de reacción de los niños mejorarán de manera significativa y confiable.

Palabras clave: Ejercicios físicos, Habilidades de coordinación, Currículo escolar, Salud infantil.

Introduction

Good health, optimal physical development, a sufficient level of motor abilities, knowledge in the field of physical culture and sports are the foundations of physical culture (Doskarayev et al., 2022; Gerber et al., 2022; Husu et al., 2016; Mura et al., 2015; Rodriguez-Negro et al., 2020).

Many authors suggest solving the problem of insufficient physical activity with the help of physical exercises and physical education lessons at school (Ács et al., 2020; de Jesus et al., 2022; Hirschler et al., 2021; Salman et al., 2022 Piercy et al., 2018; Warburton & Bredin, 2017).

Many authors offer ready-made methods that could replace the standard curriculum for schoolchildren (Jussila et al., 2022; Leisterer & Granlich, 2021; Peterson et al., 2022; Silva et al., 2022). However, this approach seems to us too drastic. The work program on physical culture at school is the foundation for the development of the discipline "Physical culture", it includes a full range of educational physical exercises, the development and improvement of physical qualities and comprehensive training of children throughout their studies at school (Kainov & Kurierova, 2019).

One of the problems of the modern physical education lesson at school is the lack of gyms for physical education lessons. During the school year, severe weather conditions in Russia do not allow students to constantly play sports outside. In our opinion, the solution to this problem can be the development and implementation of innovative methods and techniques in working with children in physical education classes at school. The use of such equipment or a set of exercises that is necessary for the development of children's physical abilities and does not take up much space, for example, the world-famous physical exercise "classics". Children play them not only at school, but also in courtyards. The exercise itself implies a playful and competitive approach, which is also important to use when working with primary school children.

For children aged 7-8 years, one of the most important
physical qualities is responsiveness (Guskov et al., 2022; Ivashchenko, 2020; Lyakh et al., 2022; Moseychuk et al., 2020). Responsiveness is a person’s ability to react as quickly as possible to a certain signal (whistle or clap). The development of human reaction speed is necessary not only for sports, but also in everyday life. A good reaction speed allows pedestrians to catch a green traffic light or stop abruptly when a car unexpectedly approaches, in some life situations, a good reaction speed can even save a person’s life. In any sport, reaction speed is one of the main criteria for athlete training. Including in esports. The main sign of a strong player is the reaction speed (Polevoy, 2021; Reigal et al., 2019; Villodres et al., 2023).

The issue of the sensitive period for the development of physical qualities is key in the implementation of the physical education program. It is known that primary school age is favorable for the development of most motor abilities, including responsiveness (Lagunes-Carrasco et al., 2022; Polevoy, 2024; Robles et al., 2023).

Thus, a review of literature sources has shown that primary school children need to actively develop responsiveness, while it is necessary to find a new approach to solve the problem. To date, no studies have been found that would determine the effect of the exercise “classics” on the development of responsiveness of schoolchildren.

Therefore, the aim of the study was to determine the influence of the traditional classical exercise on the development of the reaction speed of boys and girls studying in the first grade.

Methods

Study participants

100 schoolchildren aged 7-8 years (54 girls and 46 boys) took part in the pedagogical experiment.

All the children studied in the 1st grade of the ordinary school No. 60 in the Russian Federation.

It should be noted that at the beginning of the study there were only 118 children in classrooms, but some of them did not have a doctor’s admission to physical education classes (14 children). The parents of some students refused to participate in the study (4 students).

The Ethics Committee

All procedures met the ethical standards of the 1964 Declaration of Helsinki and were approved by the Research Ethics Committee of Vyatka State University (January 17, 2022 №1). Informed consent was obtained from all the parents of the adolescents included in the study.

The research procedure

The pedagogical experiment was conducted from September 3, 2022 to May 28, 2023. The students practiced physical education 2 times a week for 40 minutes in each lesson. During the 9 months of the study, 74 lessons were conducted. Children from the control group (grades 1A and 1B) – 28 girls and 22 boys – were engaged in the standard school physical education program (Kainov & Kurierova, 2019). Physical education at school is aimed at promoting the formation of a comprehensively developed personality in physical improvement (Kainov & Kurierova, 2019).

The achievement of this goal is ensured by solving related tasks aimed at:

- health promotion, promotion of normal physical development;
- training in vital skills and abilities;
- development of motor (training and coordination) abilities;
- acquisition of necessary knowledge in the field of physical culture and sports;
- education of the need and skills to engage in physical exercises independently, consciously apply them for rest, training, improving performance and strengthening health;
- assistance in the education of moral and volitional qualities, mental processes and personality traits.

Children from the experimental group (1C and 1D) – 26 girls and 24 boys were engaged in the same program.

Additionally, they performed the traditional exercise classics for 6-7 minutes during the lesson (Figure 1).

Figure 1 shows the standard "Classics" exercise. In the gym, you need to draw a few squares with simple chalk. After performing the jumps on the right leg, it was necessary to repeat the exercise on the left leg.

For 6-7 minutes, the children took turns jumping into the desired squares. There were 6-7 schoolchildren in each drawing, so the motor load on each student was maximum. In total, 4 drawings were drawn in the hall.

It should be noted that the time interval of 6-7 minutes is not random. You can use the "classics" exercise during physical education classes only by optimizing each training session. At the same time, it is important to fulfill the main goals and objectives of the physical education lesson according to the curriculum as a whole. An example of a physical education lesson in the control and experimental groups is shown in Table 1.

Table 1.

An example of a physical education lesson at school

<table>
<thead>
<tr>
<th>Tasks</th>
<th>Control group</th>
<th>Experimental group</th>
</tr>
</thead>
<tbody>
<tr>
<td>The formation of students in a row, the message of the lesson tasks</td>
<td>3 minutes</td>
<td>2 minutes</td>
</tr>
<tr>
<td>Running part</td>
<td>5 minutes</td>
<td>5 minutes</td>
</tr>
<tr>
<td>Stretching exercises</td>
<td>6 minutes</td>
<td>5 minutes</td>
</tr>
<tr>
<td>Learning the &quot;somersault forward&quot; exercise</td>
<td>11 minutes</td>
<td>10 minutes</td>
</tr>
<tr>
<td>Exercise &quot;classics&quot;</td>
<td>6 minutes</td>
<td>6 minutes</td>
</tr>
<tr>
<td>Outdoor game &quot;fishermen and fish&quot;</td>
<td>12 minutes</td>
<td>10 minutes</td>
</tr>
<tr>
<td>Summing up the lesson, the message of the homework</td>
<td>3 minutes</td>
<td>2 minutes</td>
</tr>
<tr>
<td>Total lesson time</td>
<td>40 minutes</td>
<td>40 minutes</td>
</tr>
</tbody>
</table>
Table 1 shows that children in both groups performed the same tasks, but at the same time, students from the experimental group managed to perform the "classics" exercise.

Control test
The control test "Touch the ball" determined the development level of the ability to react quickly (Kainov & Kuryerova, 2019; Lyakh et al., 2022; Moseychuk et al., 2020; Polevoy, 2021). This test was chosen because it is often used in pedagogical research on physical culture and has high validity. Two gymnastic benches are attached with one side to the gymnastic ladder at the height of 1.5 m from the floor at a distance of 5 cm from each other. The benches are marked with a 5 cm marking. A volleyball ball is installed on top. The child is standing with his back to the benches at a distance of 4 meters. At the teacher's signal, the ball is lowered down the bench from top to bottom. The child should quickly turn around, run up to the gym benches and touch the ball with his hand. The result is obtained with an accuracy of 5 cm (Kainov & Kuryerova, 2019; Lyakh et al., 2022; Polevoy, 2021).

Statistical analysis:
All the indicators of the children who participated in the study were entered into an Excel spreadsheet, the arithmetic mean and standard completion were determined, and the Student’s T-criterion was also used, with a significance level of p<0.05 (program – Biostatistica 2022).

Results
Before the study, no significant statistical differences existed between the control and experimental groups (p>0.05). Table 2 shows the results of the average results at the beginning and at the end of the study.

Table 2. The results of the "Touch the ball" test in both groups before the start of the study and at the end of the study

<table>
<thead>
<tr>
<th>Schoolchildren</th>
<th>Before</th>
<th>After</th>
<th>%</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control group</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Girls (n=28)</td>
<td>268.3±3.1</td>
<td>260.5±3.9</td>
<td>2.9</td>
<td>p&lt;0.05</td>
</tr>
<tr>
<td>Boys (n=22)</td>
<td>268.0±6.9</td>
<td>259.9±7.7</td>
<td>3.0</td>
<td>p&lt;0.05</td>
</tr>
<tr>
<td>Experimental group</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Girls (n=26)</td>
<td>271.2±6.5</td>
<td>247.9±6.6</td>
<td>8.6</td>
<td>p&lt;0.05</td>
</tr>
<tr>
<td>Boys (n=24)</td>
<td>269.2±5.2</td>
<td>243.8±6.2</td>
<td>9.4</td>
<td>p&lt;0.05</td>
</tr>
</tbody>
</table>

Discussion
The analysis of literary sources pointed to the problem of the study. Despite the fact that schools have a single standard physical education program, there are some shortcomings in it that can be filled with new approaches in the process of physical education (Kainov & Kuryerova, 2019).

According to the results of this study, students from the control group proved the effectiveness of the usual physical education program at school, as they were able to improve their performance from the beginning to the end of the study, albeit not significantly. The improvement in indicators was 3% for boys and 2.9% for girls (p>0.05). Also, the probability of an increase in the responsiveness of schoolchildren in the control group can be explained by a favorable period for the development of this ability in primary school age (Lagunes-Carrasco et al., 2022; Polevoy, 2024; Robles et al., 2023).

As for the results of the study in the experimental group, the indicators for both boys and girls significantly improved. It should be noted that the girls’ response rate improved by 8.6% (p<0.05), and the boys' rate increased by 9.4% (p<0.05). Such results indicate the effectiveness of the introduction of the exercise "classics" in the process of physical education at school. The process of performing the exercise took only 6-7 minutes per lesson of the total duration of the lesson.

An important aspect in working with children is a positive emotional background during a physical education lesson. Pedagogical observation of students during the exercise "classics" showed the effectiveness of the exercise in this direction. At the same time, an individually differentiated approach is used, that is, each child chooses for himself the speed of performing physical exercises, focusing on his well-being (Arsenyev et al., 2020; Sitovsky et al., 2019).

It should be noted that the "classics" exercise does not
The study involved only first-graders who were admitted by a doctor to physical education lessons in the general group. In the future, it would be possible to study the development of reaction speed for older children, as well as use several other informative tests.

**Conclusion**

The physical exercise "classics" has shown its effectiveness for developing the reaction speed of schoolchildren aged 7-8 years. If you perform this exercise for 6-7 minutes at each physical education lesson at school, then the children's reaction speed will significantly and reliably improve. At the same time, a positive emotional background of physical education classes will be provided.

**Acknowledgment**

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**Conflict of interest**

None. The authors declare no conflict of interest

**Author contributions**

Author Contribution: Study design; Data collection; Statistical analysis; Manuscript Preparation; Funds Collection – Georgiy Polevoy.

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**References**


Reigal, R. E., Barrero, S., Martín, I., Morales-Sánchez, V., Juárez-Ruiz de Mier, R., & Hernández-Mendoza, A. (2019). Relationships Between Reaction Time, Selective Attention, Physical Activity, and Physical Fitness in...


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