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## FORMATION OF A FUNCTIONAL OPTIMUM IN THE DEVELOPMENT OF MOTOR CONDITIONS IN PRIMARY SCHOOL PUPILS

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**Abstract.** *The program regulating the content of physical education lessons, aimed primarily at the formation of motor skills, is not able to have a significant impact on improving the motor conditions of elementary school pupils. The content of the lessons has a minimal impact on the development of endurance. **The purpose of the study:** optimization of physical education methods of primary school. **Material and methods** The study was conducted on the basis of GUO Secondary School No. 31 named after V. Khoruzhey, Vitebsk, for 12 weeks. The experiment involved schoolchildren 7-9 years old ( $n = 48$ ). Experimental factor - motor tasks of cyclic and complex coordination nature, heart rate 50 - 70% of the maximum, 8-10 min. **Methods:** generalization and analysis of literary data; control tests; pedagogical experiment; anthropometry; methods of mathematical statistics. **The results of the study and their discussion.** The expected, statistically reliable, training effect from the implementation of the development was not achieved. With such a value of V with 17-93% in the indicators of half of the tests, it is impossible to achieve the required reliability of differences. Therefore, it is more legitimate to evaluate the quality of the program by the growth rate of X test indicators. 700 min. for 12 weeks is not enough for changes in motor conditions to be statistically confirmed. Due to the fact that the curriculum is aimed at the formation of motor skills, there is no reason to evaluate its quality by tests reflecting the measure of the development of motor qualities. The development of motor conditions without the use of influences in the developmental mode is very difficult in the conditions of a school lesson. **Conclusion.** The motor tasks installed in the program allowed the subjects of the experimental group to increase their motor conditions to the level of the requirements of the age norm. The fragmentary use of influences stimulating the development of various forms of motor manifestations of endurance not only significantly improved the functionality of the cardiovascular system ( $P 0.02$ ), but also contributed to their effective implementation with power and aerobic modes of motor manifestation. It should be noted that the made changes contributed to the harmonious development of all motor abilities without exception.*

**Keywords:** motor conditions, endurance, schoolchildren 7-9 years-old, physical education lesson.

The education of a harmoniously developed personality is a priority for any level of the educational system. In this regard, the period of study in primary school was no exception. The age of 7-9 years-old is a period of adaptation of pupils to a new lifestyle and

rhythm of life, to the learning environment. Physical education lessons make a significant contribution to the formation of motor competencies among schoolchildren [11, 12 etc.].

The content of physical education classes

is regulated by the program. It states that " .... the development of coordination and conditioned motor abilities in the lessons of "Physical culture and health" is achieved by teaching physical exercises, methods of activity, in the process of outdoor games, during the performance of competitive tasks" [15].

According to the data obtained, the state of motor conditions of the tested contingent was assessed as follows: 72% of pupils aged 6-7 years-old have an average level of training and below. It was revealed that the worst among schoolchildren of this age is general endurance, and best of all - coordination abilities [15].

As expected, the nature of the effects being mastered is reflected in the variability of the formed locomotion and the state of motor conditions. This problem, on the example of children 6-7 years-old, has already been described by us in publications [17, 18 etc.].

According to most experts, the age period of 6-9 years-old cannot be considered sensitive in any way with respect to the development of any forms of motor endurance [2, 3, 7 etc.].

At the same time, a number of authors note the fact that categorical linking in time of the period of accentuated development of motor abilities with periods of their declared sensitivity is not justified in all cases [4, 8].

The increase in motor potential is associated with the reproduction of influences adequate to didactic tasks, positioned in the form of motor tasks. The adequacy of the effects being mastered is evaluated according to 2 criteria: the correctness of their implementation and the multiplicity of reproduction. It is considered that it is expedient to recognize only a process of motor competency training, during which the correctness of the execution of motor tasks will be maintained against the background of developing fatigue. In essence, prolonged performance of motor actions without

reducing their quality is endurance [5, 6, 16 etc.].

Note that endurance in the survey was evaluated by tests reflecting its aerobic and strength components. The attitude of specialists to the purposeful development of endurance in primary school pupils, through the traditional arsenal of means, is ambiguous.

The purpose of the study: optimization of methods of physical education of primary school pupils.

Methodology and organization of the study. The study was conducted on the basis of the V. Khoruzhey Secondary School No. 31 (Vitebsk, Belarus), for 12 weeks (January - March 2019). Schoolchildren aged 7-9 years-old (n = 48) took part in the experiment, 23 of them boys and 25 girls. As an experimental factor, motor tasks of a cyclic and complex coordination nature are accepted, implemented at a pulse of 50-70% of the maximum, with a duration of 8-10 minutes. Execution methods: uniform, variable, circular, game.

The physical development and functional state of the participants of the pedagogical experiment, the state of their physical fitness were diagnosed twice, before and after mastering the program. The length and weight of the body, the circumference of the chest, and the resting heart rate of the subjects before the experiment were within the age standard [1, 10]. The degree of development of motor conditions was determined by a set of tests. Monitoring the state of motor function was carried out in accordance with the assessment scale [15].

The following methods were used in the study: analysis and generalization of literature data; control tests; pedagogical experiment; anthropometry; methods of mathematical statistics.

The results of the study and their discussion. The planning of didactic material in winter (January-March) included 20 lessons [15] of physical education: skiing (4 lessons), balance exercises (5 lessons), acrobatic exercises (7 lessons), elements of sports games

(4 lessons) [13].

The thematic structure of the lessons indicates the direction of the effects being mastered, and indirectly, the features of the conditions being developed. It was revealed that their accentuated use stimulates the development of mainly speed and coordination of movements. At the same time, it is considered that the development of didactic material should ensure equally the proportionality of the development of all motor abilities.

The results of preliminary studies confirm the above. Thus, according to the data obtained, the level of flexibility development in elementary school pupils is at an average level, coordination abilities are above average, strength endurance is at a high level, speed and "general" endurance are at an average level and below average. The rapid strength of the experimental and control groups of subjects is at a high and low level, respectively.

It was assumed that changing the mode of performing motor tasks would negate the existing contradictions. It should be noted that the educational material recommended for mastering has not undergone significant changes. Its content in the compared groups is

almost the same. Changes were made to the curriculum of the experimental group. In the second half of the ski training lesson, the children performed a steady run with a heart rate of 50-60% of the maximum for 8-10 minutes [9, 11]. The same mode of performing motor tasks simulating movements in sports games was maintained by them at the end of the main part of the lesson allotted for learning their elements. In addition, the development of endurance at a heart rate of 60-70% of the maximum was associated with the implementation of the technical elements of the games when set to play them as much as possible in the shortest time. The remaining classes included aerobics or tai-bo blocks.

Information on the level of physical development and functional status of children aged 7-9 years-old is presented in Tables 1 and 2. The length and weight of the body, the circumference of the chest of the subjects remained virtually unchanged during the experiment. The differences between the indicators of the compared groups are insignificant and unreliable ( $P > 0,05$ ). A slight but significant decrease in heart rate was revealed in the experimental group ( $\bar{X}$  by 3 beats/min).

**Table 1. Physical development and functional state of boys**

Statistical characteristics	Body length, m		Body weight, kg		Chest circle, cm		Heart rate, beats/min	
	Before the experiment	after the experiment	before the experiment	after the experiment	before the experiment	after the experiment	before the experiment	after the experiment
Experimental group (n=11)								
$\bar{X}$	1,356	1,356	29,3	29,3	63,2	63,3	89,5	86,7
S	0,085	0,083	1,8	1,8	2,1	2,1	9,1	6,8
Vc	6,3	6,1	6,3	6,1	3,4	3,2	10,2	7,8
P	–	0,500	–	0,500	–	0,338	–	0,008
Control group (n=12)								
$\bar{X}$	1,365	1,366	29,7	29,9	63,3	63,3	89,5	88,0
S	0,074	0,071	1,8	1,7	2,1	2,3	8,7	8,6
Vc	5,4	5,2	6,2	5,8	3,3	3,6	9,7	9,8
P	–	0,337	–	0,096	–	0,361	–	0,137
Differences between groups								
P	0,399	0,386	0,307	0,196	0,433	0,490	0,495	0,348

**Table 2. Physical development and functional status of girls**

Statistical characteristics	Body length, m		Body weight, kg		Chest circle, cm		Heart rate, beats/min	
	before the experiment	after the experiment	before the experiment	after the experiment	before the experiment	after the experiment	before the experiment	after the experiment
Experimental group(n=12)								
$\bar{X}$	1,279	1,279	23,2	23,2	57,8	57,9	87,5	85,0
S	0,064	0,061	1,8	1,8	1,7	1,6	7,4	8,8
Vc	5,0	4,8	7,8	7,8	2,9	2,7	8,5	10,4
P	–	0,500	–	0,500	–	0,361	–	0,009
Control group(n=13)								
$\bar{X}$	1,276	1,275	23,6	23,7	58,2	58,5	87,2	86,3
S	0,048	0,045	2,2	1,8	2,5	2,8	4,0	5,2
Vc	3,7	3,5	9,4	7,6	4,2	4,9	4,5	6,0
P		0,361		0,500		0,193		0,169
Differences between groups								
P	0,448	0,431	0,291	0,236	0,320	0,278	0,456	0,330

Characteristics of the state of motor students training in the process of pedagogical experiment are given in Tables 3 and 4.

During experiment  $\bar{X}$ , the result in running 4x9m in all groups significantly ( $P<0,05$ ) improved by 0.1 s, with the exception of girls in the control group. The differences in this indicator between the groups compared in the experiment are insignificant ( $P>0,05$ ). The reasons for the low growth rates in this parameter include the predominant orientation of the effects being mastered during this period

of the academic year, the experimental factor and the specifics of the test itself.

In all groups, there was a minimal increase ( $\bar{X} = 0.01$  m) in the results in the long jump test from a place during the experiment. Shifts are also unreliable ( $P>0,05$ ) between the compared groups. Insignificant ( $\bar{X} = 0.1$  s) improvement of results in 30 m running in all groups was revealed. The dynamics of the analyzed indicator shows the same pattern as in the jump test.

**Table 3. Indicators of physical training in boys**

Statistical characteristics	Sittingtilt, cm		Running 4x9 m, s		Push-ups in the emphasis lying on the bench, once		Long jump s/m, m		Running 30 m, s		Running 1000 m, s	
	before the experiment	after the experiment	before the experiment	after the experiment	before the experiment	after the experiment	before the experiment	after the experiment	before the experiment	after the experiment	before the experiment	after the experiment
Experimental group(n=11)												
$\bar{X}$	6,1	6,8	11,7	11,6	6,8	8,4	1,28	1,29	7,1	7,0	374,2	363,2
S	5,7	5,6	0,5	0,5	4,8	5,5	0,24	0,24	0,7	0,7	62,3	63,1
Vc	93,6	81,6	4,3	4,3	70,9	66,0	18,6	18,3	9,8	9,7	16,6	17,4
P		0,060		0,017		0,003		0,339		0,118		0,001
Control group(n=12)												
$\bar{X}$	2,9	3,4	11,8	11,7	5,8	6,3	1,15	1,16	6,8	6,8	361,5	359,3
S	2,4	2,5	0,5	0,5	4,4	4,8	0,12	0,12	0,6	0,5	31,8	32,3
Vc	82,0	72,2	4,4	4,2	76,8	76,3	10,3	10,0	8,2	7,5	8,8	9,0
P		0,162		0,022		0,083		0,064		0,196		0,102
Differences between groups												
P	0,055	0,042	0,459	0,377	0,294	0,170	0,055	0,060	0,190	0,157	0,277	0,429

**Table 4. Indicators of physical training in girls**

Statistical characteristics	Sitting tilt, cm		Running 4x9 m, s		Push-ups in the emphasis lying on the bench, once		Long jump s/m, m		Running 30 m, s		Running 800 m, s	
	before the experiment	after the experiment	before the experiment	after the experiment	before the experiment	after the experiment	before the experiment	after the experiment	before the experiment	after the experiment	before the experiment	after the experiment
Experimental group(n=12)												
$\bar{X}$	7,4	7,8	12,0	11,9	20,8	24,8	1,26	1,27	7,3	7,2	360,0	357,5
S	5,0	5,3	0,6	0,6	3,5	2,9	0,14	0,13	1,2	1,2	40,8	39,7
Vc	66,9	68,7	5,3	4,9	16,7	11,5	11,1	10,3	17,0	16,7	11,3	11,1
P		0,209		0,013		0,0001		0,391		0,019		0,021
Control group(n=13)												
$\bar{X}$	7,8	8,4	11,8	11,7	26,9	27,7	1,14	1,15	6,5	6,4	349,4	351,5
S	4,2	4,6	0,6	0,6	6,1	6,4	0,10	0,09	0,4	0,4	36,4	39,7
Vc	53,6	55,4	5,1	4,7	22,5	23,0	8,4	8,1	6,0	5,7	10,4	11,3
P		0,377		0,076		0,073		0,079		0,019		0,230
Differences between groups												
P	0,425	0,377	0,173	0,195	0,003	0,080	0,010	0,011	0,022	0,018	0,250	0,356

During the study, the values of the parameter reflecting the level of flexibility development have practically not changed. The differences between the experimental and control groups in girls are unreliable ( $P > 0,05$ ), in boys on the contrary ( $P < 0,05$ ). This can be explained by a decrease in the Vc parameter in both groups.

In the experimental group, the increase in indicators in "push-ups" and "trunk lifting" was higher ( $P < 0,02$ ) than in the control group. However, by the end of the experiment, these changes were so insignificant that they could not provide the required level of reliability ( $P > 0,05$ ) when comparing them.

The subjects of the control group initially covered a distance of 800 m - 1 km faster. This circumstance, apparently, was the reason for their lag in the growth rate of results in endurance running. In the experimental group, in contrast to the control group, a significantly ( $P < 0,02$ ) higher increase in results in running at distances of 800 and 1000 m was revealed.

It should be noted that the expected,

statistically reliable, training effect from the implementation of the developed was not achieved. Firstly, with such a value of Vc with 17-93% in the indicators of half of the tests, it is impossible to achieve the required reliability of differences. As a result, it is more legitimate to evaluate the quality of the program according to the growth rate of  $\bar{X}$  test indicators. Secondly, 700 min. for 12 weeks is not enough for changes in motor conditions to be statistically confirmed. Thirdly, due to the fact that the curriculum intended for mastering is mainly aimed at the formation of motor skills, there is no reason to evaluate its quality by tests reflecting the measure of the motor abilities development. Fourthly, the development of motor conditions without the use of influences in the developmental mode is very difficult in a school lesson.

**Conclusions.** The program regulating the content of physical education lessons, aimed primarily at the formation of motor skills, is not able to have a significant impact on improving the motor conditions of elementary school students. The content of the lessons has a

minimal impact on the development of endurance. The adjustment of the program provided for an increase in the number of repetitions while stabilizing the time of their execution, the introduction of motor tasks of a cyclic and complex coordination nature, implemented at a pulse of 50-70% of the maximum, with a duration of 8-10 minutes.

Nevertheless, the motor tasks installed in the school curriculum allowed the subjects of the experimental group to increase their motor conditions to the level of the requirements of

the age standard. The fragmentary use of influences stimulating the development of various forms of motor manifestations of endurance not only significantly improved the functionality of the cardiovascular system ( $P < 0,02$ ), but also contributed to their effective implementation with power and aerobic modes of motor manifestation.

It should be noted that the changes made contributed to the harmonious development of all motor abilities without exception.

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