

## THE EFFECTIVENESS OF DEVELOPMENT PROGRAMMING STRENGTH IN PRIMARY SCHOOL CHILDREN

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**Annotation.** The problems of optimizing development strength in primary school children. The purpose of the program is to validate the technology development strength abilities in the classroom physical education at school. A program of strength training by taking into account the effects of power loads. Found that the use of the combined method (option I) makes it possible to obtain positive results in force readiness school classes 2-4 through 3-9 sessions. The combined method (option II) significantly affects the dynamics of the forces of the local group of muscles. The use of mobile gaming allows for a higher level of emotional strength to develop the ability of students. The dynamics of power indices (option II) significantly affects operation: dynamic method - 25-45 reps (rest interval between sets 30-60 seconds), the method of maximum effort - 18-30 reps (rest interval between sets 30-60 seconds) method of isometric effort - 15-25 reps (rest interval between sets 30-60 seconds), the method of repeated efforts - 36-60 reps (rest interval between sets 30-60 seconds).

**Keywords:** programming, technology, force, loading, schoolchildren.

### Introduction

One of problems of physical education at schools is optimization of process of development of junior pupils' motion abilities. In the process of their motion training special attention is paid to development of accurate movements, coordination, general endurance. However, scientific-research literature contains little data about effectiveness of power training of junior pupils [9, 11, 5, 4], there is no foundation of systemic approaches to development of strength abilities of junior school age children, there is a contradiction between evaluation of an indicator and multi-dimensional essence of motion preparedness [2, 3, 12, 13, 14]. In connection with all these, there appears a question about purposefulness of strength development in junior school age. Change of motion level of junior school age children is regarded in aspect of formation of motion function (S. Semybrat, V. Pogrebniy [6], A. Gavryliuk [1], S.I. Marchenko [4]).

As per the data of S. Semybrat and V. Pogrebniy [6], T. Skaliy [7] junior school age is the most perceptible for development of quickness, endurance, coordination and flexibility. The previous researches established that factorial structure of motion level of 2<sup>nd</sup> - 4<sup>th</sup> forms boys includes: "strength level", "general endurance", "coordination". Physical condition influences on manifestation of motion abilities [10]. Factorial structure of motion level of 2<sup>nd</sup>, - 4<sup>th</sup> forms girls includes: "strength level", "speed-power abilities". Physical condition influences on manifestation of motion abilities. Discriminant analysis permits to affirm that motion conditions of 2<sup>nd</sup>, - 4<sup>th</sup> forms girls are determined by "strength level", "speed-power abilities" and "physical conditions" [8].

So, junior school age is perceptible for development of strength. Optimization of strength development is connected with application of different regimes of physical exercises' fulfillment, different methods and programming of motion abilities' development.

### Purpose, tasks of the work, material and methods

*The purpose of the work* is to develop technology of programming of junior forms pupils' strength development.

*The methods of the research:* analysis and generalization of data of scientific-methodic and special literature, theoretical general-scientific methods, such as analogy, analysis, synthesis, abstracting, as well as empirical general-scientific methods, such as observation, testing, experiment.

### Results of the researches

The results of earlier fulfilled researches permitted to develop program of strength development, on the base of power loads' training effects [8, 10]. It was established that application of combined method, variant 1, brings to positive results in power conditions of 204 forms pupils after 3-9 trainings; combined method, variant 2, substantially influences on strength dynamics of local groups of muscles. Using of outdoor games permits to develop pupils' power abilities at higher emotional level.

In experimental classes trainings on strength development were carried out by schema: combined method, variant 1 – 1-3 trainings; combined method, variant 2 – 4-6 trainings; game method – 7-9 trainings. In control classes complex development of motion abilities was fulfilled at physical culture lessons as per academic program. In the process of experiment the results of the following tests were registered:

1. Pressing ups in lying position.
2. Pressing ups in lying position 3 times for quickness.
3. Bending-unbending of hands, hanging on rope (chin ups).
4. Hanging on bent arms.
5. Rising from lying position in sitting for 30 sec.

6. Rising of torso from lying on belly position for 10 sec.
7. Long jump from the spot.

Testing was carried out before experiment and after three, six and nine trainings. Testing results are presented in table 1-2.

Table 1

*Testing results of power level of control group's boys*

№	Description of test	2 form (n=12)					3 form (n=13)					4 form (n=14)				
		BE		AE		p	BE		AE		p	BE		AE		p
		X	s	X	s		X	s	X	s		X	s			
1	Pressing ups in lying position.	20.417	8.836	21.667	6.443	>0.05	13.923	2.465	14.385	2.219	>0.05	18.786	5.381	18.929	4.906	>0.05
2	Pressing ups in lying position 3 times for quickness.	3.053	1.284	2.899	1.134	>0.05	3.172	1.095	2.877	.632	>0.05	2.661	.476	2.594	.440	<0.013
3	Bending-unbending of hands, hanging on rope (chin ups).	5.917	2.151	6.000	1.706	>0.05	4.539	1.050	4.692	1.182	>0.05	6.357	1.008	7.000	1.301	<0.05
4	Hanging on bent arms.	11.499	11.819	1.528	11.033	>0.05	4.272	3.435	5.111	4.204	>0.05	1.924	8.173	15.079	7.921	>0.05
5	Rising from lying position in sitting for 30 sec.	19.667	3.676	1.833	3.639	>0.05	15.846	1.519	15.692	1.182	>0.05	20.500	3.205	20.214	2.914	>0.05
6	Rising of torso from lying on belly position for 10 sec.	12.083	1.240	12.000	1.045	>0.05	10.539	2.066	11.000	1.826	<0.008	13.357	1.447	13.359	1.082	>0.008
7	Long jump from the spot.	134.583	13.892	133.750	12.455	>0.05	114.615	14.785	115.385	14.925	>0.05	136.714	9.186	135.786	8.675	<0.021

BE – Before experiment; AE – After experiment.

Table 2

*Testing results of power level of experimental group's boys*

№	Description of test	2 form (n=12)					3 form (n=13)					4 form (n=14)				
		BE		AE		p	BE		AE		p	BE		AE		p
		X	s	X	s		X	s	X	s		X	s			
1.	Pressing ups in lying position.	17.417	6.302	19.417	6.934	<0.001	14.462	6.280	17.385	7.567	<0.025	16.071	5.012	17.714	5.312	<0.001
2.	Pressing ups in lying position 3 times for quickness.	2.659	.476	2.583	.474	>0.05	2.971	.793	2.769	.671	<0.002	2.829	.551	2.760	.503	>0.05
3.	Bending-unbending of hands, hanging on rope (chin ups).	6.000	2.045	6.083	1.975	>0.05	4.154	.899	5.462	.776	<0.001	5.571	.852	6.214	.893	<0.001
4.	Hanging on bent arms.	10.722	6.273	10.163	5.550	>0.05	11.248	9.166	11.278	8.508	>0.05	15.749	11.254	15.503	11.244	>0.05
5.	Rising from lying position in sitting for 30 sec.	15.667	3.229	15.833	2.691	>0.05	19.539	2.727	19.462	2.961	>0.05	19.857	3.634	19.500	3.032	>0.05
6.	Rising of torso from lying on belly position for 10 sec.	11.750	1.215	11.750	1.138	<0.008	12.077	2.060	12.077	1.320	>0.05	12.286	1.490	12.071	.997	>0.05
7.	Long jump from the spot.	129.750	9.526	134.083	9.110	<0.003	120.539	6.091	122.462	7.434	<0.001	134.071	10.838	137.500	10.697	<0.05

BE – Before experiment; AE – After experiment.

In the process of experiment the boys of control group by most of indicators did not show statistically confident improvement of testing results (see table 1). For example, 2 form boys had trend to improvement of results in test 1 “Pressing ups in lying position”, 4-form boys had improved results in test 3 “Bending-unbending of arms, hanging on rope (chin-ups)” ( $p < 0.05$ ), but they had statistically worse results in test 7 “Long jump from the spot” ( $p > 0.05$ ).

Boys of experimental group showed statistically confident improvement of results in tests 1 “Pressing ups in lying position”, test 2 “Pressing ups in lying position, 3 times for quickness”, in tests 3 “Bending-unbending of arms, hanging on rope (chin-ups)”, in test 6 “Rising of torso from position: lying on belly for 10 sec.”, and in test 7 “Long jump from the spot”.

For example 2<sup>nd</sup> form boys had statistically confident improvement of test 1 results “Pressing ups in lying position”, ( $p < 0.001$ ), of test 6 test 6 “Rising of torso from position: lying on belly for 10 sec.”, ( $p < 0.008$ ), test 7 “Long jump from the spot” ( $p < 0.003$ ).

3<sup>rd</sup> form boys showed statistically confident improvement of results in test 1 “Pressing ups in lying position”, ( $p < 0.001$ ), test 2 “Pressing ups in lying position, 3 times for quickness”, ( $p < 0.002$ ), test 3 “Bending-unbending of arms, hanging on rope (chin-ups)”, ( $p < 0.001$ ), test 6 “Rising of torso from position: lying on belly for 10 sec.”, ( $p < 0.001$ ).

4<sup>th</sup> form boys manifested statistically confident improvement of results I test 1 “Pressing ups in lying position”, ( $p < 0.001$ ), test 3 “Bending-unbending of arms, hanging on rope (chin-ups)”, ( $p < 0.001$ ), test 7 “Long jump from the spot” ( $p < 0.05$ ).

Comparison of power levels of experimental and control groups boys showed that 2-form boys have statistically not confident differences between results.

3<sup>rd</sup> form boys from experimental group had statistically confident better results in tests 4 and 5 ( $p < 0.05$ ). The differences in results of 4-form boys were statistically not confident.

Thus, programming of power development, using of programs for development of strength statistically confidently influences on increment of relative and speed power of 2-4 forms boys ( $p < 0.001$ ).

Concerning girls of control group, by most of indicators they did not have statistically confident improvement of testing results (see table 3-4). For example, 2<sup>nd</sup> form girls showed trend to improvement of results in test 2 “Pressing ups in lying position, 3 times for quickness”, 4<sup>th</sup> form girls had statistically confident improvement of results in test 2 “Pressing ups in lying position, 3 times for quickness”, ( $p < 0.05$ ), but the also had statistically confident worsening of results in test 7 “Long jump from the spot” ( $p < 0.05$ ).

Table 3

*Testing results of power level of control group's girls*

№	Description of test	2 form (n=12)					3 form (n=13)					4 form (n=14)				
		BE		AE		p	BE		AE		p	BE		AE		p
		X	s	X	s		X	s	X	s		X	s	X	s	
1.	Pressing ups in lying position.	9.625	4.838	10.375	3.543	>0.05	7.133	2.924	7.400	3.542	>0.05	7.300	3.889	7.300	3.302	>0.05
2.	Pressing ups in lying position 3 times for quickness.	3.179	1.218	2.988	.636	>0.05	3.328	.658	3.449	.755	>0.05	3.263	.524	3.168	.575	<0.05
3.	Bending-unbending of hands, hanging on rope (chin ups).	3.875	1.959	4.375	1.506	>0.05	2.467	1.187	2.533	1.302	>0.05	3.200	.632	3.500	.707	>0.05
4.	Hanging on bent arms.	2.075	2.469	2.466	1.928	>0.05	6.395	6.239	6.536	6.578	>0.05	4.265	2.938	4.613	3.500	>0.05
5.	Rising from lying position in sitting for 30 sec.	15.625	5.878	14.125	6.490	>0.05	15.200	3.707	15.333	2.920	>0.05	16.900	2.923	17.100	2.424	>0.05
6.	Rising of torso from lying on belly position for 10 sec.	11.625	1.302	11.500	1.309	>0.05	10.733	.961	10.667	1.047	>0.05	14.000	1.054	13.400	1.506	>0.05
7.	Long jump from the spot.	108.125	13.076	105.000	7.559	>0.05	110.000	11.802	110.333	10.768	>0.05	120.000	9.129	114.700	9.238	<0.05

BE – Before experiment; AE – After experiment.

Table 4

*Testing results of power level of experimental group's girls*

№	Description of test	2 form (n=12)					3 form (n=13)					4 form (n=14)				
		BE		AE		p	BE		AE		p	BE		AE		p
		X	s	X	s		X	s	X	s		X	s	X	s	
1.	Pressing ups in lying position.	10.125	1.885	11.250	2.765	<0.015	7.300	2.791	9.000	2.582	<0.001	8.444	2.297	10.778	1.563	<0.001
2.	Pressing ups in lying position 3 times for quickness.	2.911	.437	2.845	.364	>0.05	3.271	.689	3.218	.660	>0.05	3.229	.265	3.111	.254	<0.02
3.	Bending-unbending of hands, hanging on rope (chin ups).	4.625	1.923	6.000	2.138	<0.028	2.800	1.317	4.500	1.269	<0.01	3.000	.866	3.000	1.000	>0.05
4.	Hanging on bent arms.	5.426	3.539	5.135	2.941	>0.05	4.329	5.329	4.624	5.958	>0.05	5.461	5.271	5.439	5.202	>0.05
5.	Rising from lying position in sitting for 30 sec.	15.500	1.195	16.375	.744	>0.05	16.600	3.239	16.300	2.830	>0.05	19.333	1.581	18.556	1.236	>0.05
6.	Rising of torso from lying on belly position for 10 sec.	11.25	1.408	11.125	1.126	>0.05	11.100	1.370	11.300	1.418	>0.05	12.444	2.007	13.778	3.073	<0.022
7.	Long jump from the spot.	110.000	15.811	117.750	11.171	<0.026	101.700	11.206	108.500	8.515	<0.014	119.889	6.827	127.778	5.652	<0.001

BE – Before experiment; AE – After experiment.

The girls of experimental group showed statistically confident improvement of results in test 1 “Pressing ups in lying position”, test 2 “Pressing ups in lying position, 3 times for quickness”, test 3 “Bending-unbending of arms, hanging on rope (chin-ups)”, test 6 “Rising of torso from position: lying on belly for 10 sec.”, and in test 7 “Long jump from the spot”.

For example, the 2<sup>nd</sup> form girls had statistically confident improvement of results of test 1 “Pressing ups in lying position”, ( $p < 0.001$ ), test 6 “Rising of torso from position: lying on belly for 10 sec.”, ( $p < 0.008$ ), test 7 “Long jump from the spot”, ( $p < 0.003$ ). The 3<sup>rd</sup> form girls had statistically confident improvement of results of test 1 “Pressing ups in lying position”, ( $p < 0.001$ ), test 2 “Pressing ups in lying position, 3 times for quickness”, ( $p < 0.002$ ), test 3 “Bending-unbending of arms, hanging on rope (chin-ups)”, ( $p < 0.001$ ), test 6 “Rising of torso from position: lying on belly for 10 sec.”, ( $p < 0.001$ ). The 4<sup>th</sup> form girls had statistically confident improvement of results in test 1 “Pressing ups in lying position”, ( $p < 0.001$ ), test 3 “Bending-unbending of arms, hanging on rope (chin-ups)”, ( $p < 0.001$ ), test 7 “Long jump from the spot”. ( $p < 0.05$ ).

Comparison of power levels of control and experimental groups’ girls after experiment showed that 2<sup>nd</sup> form girls had statistically confident differences in test 4 “Hanging on bent arms” ( $p < 0.05$ ) and test 7 “Long jump from the spot”, ( $p < 0.05$ ). The 3<sup>rd</sup> form girls had statistically confident better results in test 3 “Bending-unbending of arms, hanging on rope (chin-ups)”, ( $p < 0.001$ ). The 4<sup>th</sup> form girls manifested statistically confident differences in results of test 1 “Pressing ups in lying position”, ( $p < 0.001$ ), and test 7 “Long jump from the spot”. ( $p < 0.01$ ).

Thus, programming of strength development, using of programs for strength development statistically confidently influences on increment of relative and quickness strength of 2-4 form girls ( $p < 0.001$ ).

### **Summary**

1. Improvement of power level of 2-4 forms pupils is possible if power loads result in significant changes after working at every place, after classes in TTE and in twenty four hours after loads (VTE). The more dynamics of TTE and VTE are the better improvement of power tests’ results can be observed already after three trainings.

2. The dynamics of power indicators in the process of combined method’s application, variant 2, is influenced statistically confidently, for 2-forms boys and girls the following regime of work: method of dynamic loads – 25-45 repetitions with rest intervals of 30-60 seconds; method of maximal loads – 18 – 30 repetitions with rest interval of 30-60 seconds between each exercise; method of isometric loads – 15-20 repetitions with rest interval of 30-60 seconds between each exercise; method of repeated loads – 36-60 repetitions with rest interval of 30-60 seconds between each exercise.

3. Programming of strength development, using of programs for strength development statistically confidently influences on increment of relative and quickness strength of 2-4 form girls ( $p < 0.001$ ). Effectiveness of strength development increases if at 1-3 lessons combined method is used, variant 1; at 4-6 lessons – combined method, variant 2; at 7-9 lessons – game method. The basis of programming of junior pupils’ power training is results of complete factorial experiment.

4. Further researches stipulate simulation of power training of pupils of junior forms.

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