



STUDY CONCERNING THE CONDITIONAL CAPACITY STRENGTH DEVELOPMENT AT THE LEVEL OF 13-14 YEARS OLD STUDENTS DURING THE PHYSICAL EDUCATION CLASS

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Abstract

Purpose. Muscular strength is defined by domain experts as representing the maximum strength from one repetition that an individual can overcome by a single effort; the muscles are characterized by indices of power and control over the movements made long as possible without causing fatigue, along with mobility and flexibility. The development of muscle strength is in a direct proportional relationship with the musculature mass that can be improved by using exercises such as isometric, isokinetic and isotonic ones. The development of local muscle strength can be achieved by using small loads but with a high number of repetitions, the use of strength exercises requires practicing a rhythmic breathing and a good heating of the muscle groups with which we are working on. Achieving a good physical condition by developing muscle strength, entails: maintaining a normal body weight, an increased functional capacity and the decrease of the risk of bone, muscle and joint injuries. Experts in the field have shown that at the muscles level, burning is more intense, force being the individual's ability, that over the years, loses the least from its value. Physical exercises programs are selected taking into account the growing body transformations and are made in such a way as to contribute to the harmonious development of the body, favorably influencing general health and intellectual activity.

Methods. The data collected from assessing the level of conditional capacity - strength, have been processed, analyzed and interpreted using research methods and techniques such as statistical-mathematical and graphical methods and proper investigation methods (observation, experiment).

Results. The consistent use of methodical program established for the 57 students had a positive effect on the level of expression of conditional capability strength. After applying this program to evidence contained in the evaluation system - force, there have been increases in their manifestation values, although some have a value slightly above the minimal standard.

Conclusions. Motor performances obtained in the conditional capacity - strength level, allowed us to calculate statistical indicators for the two samples under investigation, from which we can notice a significant increase in arithmetic means compared with the minimal standard from the national evaluation system for gymnasium. Conditional capacity development - strength, at this age, can be achieved through methods and means used in physical education lesson. The physical education lesson is the only way to train physical activity and to improve general motor skills, health education for a healthy lifestyle. General motor ability, through its objectives to improve conditional capabilities, coordination and intermediate contributes to the increase of physical abilities in order to prevent accidents. Fulfilling the instructive - educational objectives of the secondary school physical education subsystem in order to acquire functional independence in life can be achieved through optimal design and planning of the physical education activity.

Key words: conditional capacity, strength, student, lesson

Introductions

Physical education, as part of general education, has as purpose the harmonious physical development, psychic consolidation, training the student's character traits but also to offer the frame of achieving an optimum physical condition necessary to carry out the individual daily activities. The physical education lessons offers the institutional and organization frame for the development of motor activities having as purpose the development of the manifestation level of students physical condition. Physical education class as school admits selecting the most efficient and desirable physical means, in accordance with the pedagogical, physiological and hygienic principles and norms specific to age, gender

and educational objectives of the secondary school cycle [Dragnea, Teodorescu - Mate, 2002]. The physical means structure for students is similar to the one of teenagers because at this age the level of manifestation of the conditional, coordinative and intermediate capacities increases and we aim at fighting against deficient attitudes determined by vicious positions [Alexandrescu, Tatu, Ardelean, 1983].

Growing body changes should be well known in order to develop methodically programs that contribute to the development of the body, favorably influencing general condition and stimulating the intellectual activity. Prophylactic effects of physical exercises, should be popularized to attract as many children in practicing

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sports or general movement to preserve and strengthen their health [Atkinson, Atkinson, Smith, Bem, 2002]. General motor capacity progresses and there are created the development premises and other conditional capacities, of coordinative capacities, intermediate ones and the motor skills acquired in the previous stages must be strengthened [Finichiu, 2010]. In the last decade we noticed a new approach regarding the motor concerns by the shift from the rigorous and difficult physical means to a variety of physical activities with the well defined purpose to strengthen health, developed under the strict monitoring of parents. These programs of sport activities are supported by the doctors recommendations in order to moderate practice physical exercises, being demonstrated that each individual can make a systematic motor activity. In conducting this research we started from fulfilling the following objectives: Achieving an appropriate frame for the student to freely and creatively manifest himself and to prove initiative. Choosing and using the most efficient methods and means necessary to increase the conditional capacity strength during the physical education lesson.

Research hypotheses

The increase of efficiency of physical education lesson can be done by knowing the level of expression of conditional capabilities, coordination capabilities and intermediate capacities of students. The awareness of practicing physical exercises can be based on the specialized theoretical knowledge from physical education domain.

Research procedures and methods

The research was conducted during the instructive-educational process at an elementary school in Ploiesti and comprised 57 pupils (37 girls and 30 boys) from grades seventh, aged between 13 and 14 years, school year 2011 - 2012.

The research was conducted by the development of the 7 common boys/girls tests and 2 specific ones, contained in the evaluation system. At the grades contained in our experiment, the hourly schedule includes two hours per week, pupils will compulsory graded with 2 marks for the execution of each couple of for the conditional capacity strength, that addresses to different segments, according to the choice of pupils. Skills (Table 1) that can be evaluated are addressed to muscle groups of four segments included in the body: arms, abdomen, back and legs. The used evaluation instruments:

Pushups from lying face resting on hands and toes, stretched body, eyes forward, arms bent to the chest near the ground and return to start position, the number of executions is recorded.

Tractions from hanging, from hanging with arms and stretched body, preferred grip, without touching the ground with heels, bending ones arms until the chin is above the bar level and returning to the start position, the number of executions is recorded.

Traction on the gym bench with the face lying on the bench gym, with the pelvis at the end of the bench, arms outstretched in the extension of the body, palms catch the bench edges, simultaneous tractions in arms are performed, the body sliding on the surface of the bench; the ones that executed the return transactions on the length of 2 benches get a 5.

Raising dorsal trunk from dorsal lying with hands at the back head, knees bent at 90 degrees, feet resting on the floor; at the signal the lifting of the trunk at horizontal is realized and reaching the knees with the elbows, followed by return to its original position, the number of executions is recorded.

Raising the legs from dorsal lying, from dorsal lying palms at the back head; at the signal legs stretched vertically are raised and returned to the initial position, without hitting the ground, the correct number of executions is recorded.

Raising the trunk from facial lying, for 30", from facial lying with stretched arms near the body, with hands holding stick's heads, feet fixed on the floor; lifting and extension of the trunk, head and arms must exceed the level of the bench; the correct number of executions is recorded.

Raising the pelvis from sitting for 30", seated with feet together, palms resting on the ground behind the pelvis; at the signal, the raising of the pelvis, the body taken into the extended position, head leaned backwards (girls), boys perform the same movement, but lead alternatively one leg up, with the return to the initial position; the correct number of executions is recorded.

Standing long jump, from standing behind the line, feet apart as the distance between your shoulders; preparing the jump by bending the inferior leg joints, carrying the upper limbs backward, followed by energetic extension and strong impulsion in legs, simultaneously with projecting the upper limbs forward, they landing is balanced on both feet, the length of the jump is measured from the starting line to the first trace left on the ground, the jump's length is expressed in centimeters.

Jumping over the gymnastics bench for 30" from standing laterally to the signal, jumps with detachment on both legs from side to side of the bench, the number of jumps is recorded.

For the good development of the experiment there were used proper investigation methods (method of observation, measurement and recording method, experimental method) and methods of processing and interpretation of collected data - statistical and mathematical method and graphical method.

Results

Table 1. The National Evaluation System for the Secondary School Education

Capacities/ Skills assessed	Evaluation Instruments	7th grade (minimum standard mark 5)		
		Boys	Girls	
Strength	Pushups (no. rep.)	6	4	
	Arms musculature	Tractions from hanging (no. rep.)	3	-
		Tractions on the gymnastic bench (no. rep. bench)	-	2
	Abdominal musculature	Lifting the trunk from dorsal lying (no. rep.)	17	16
		Lifting the feet from dorsal lying (no. rep.)	5	4
	Back musculature	Lifting the trunk from facial lying in 30" (no. rep.)	18	17
		Lifting the pelvis from lying in 30" (no. rep.)	12	10
	Legs musculature	Long jump from standing (cm)	160	140
		Jumping over the gymnastic bench in 30" (no. rep.)	10	8

Table 2. Calculated Statistical Indicators

Capacities/ Skills assessed			Boys subjects n=30 Girls subjects n=37						
			Statistical Indicators						
			X	S	Cv%	Med	Max	Min	W
Arms musculature	Pushups	B	7,23	2,77	9,31	6	10	3	7
		G	3,66	0,51	15,30	3	5	1	4
	Tractions from hanging	B	3,12	0,79	14,27	2	4	0	4
		G	3,53	1,73	9,64	2,5	5	2	3
Abdominal musculature	Lifting the trunk from dorsal lying	B	20,31	3,44	13,54	19	24	17	7
		G	17,56	5,32	12,47	15	20	16	4
	Lifting the feet from dorsal lying	B	7,89	6,22	10,74	6	10	5	5
		G	5,56	5,14	16,77	4	7	2	5
Back musculature	Lifting the trunk from facial lying	B	23,43	5,11	12,33	20	26	18	8
		G	20,09	6,21	16,87	18	23	17	6
	Lifting the pelvis from lying	B	17,32	7,31	11,51	15	20	14	6
		G	14,33	8,32	17,36	12	17	10	7
Legs musculature	Long jump from standing	B	177,21	9,32	17,11	170	195	161	34
		G	156,52	7,32	19,14	150	165	140	25
	Jumping over the gymnastic bench in 30"	B	14,25	5,68	14,32	12	16	10	6
		G	9,06	4,71	12,39	8	11	7	4

B, boys; G, girls; X, the central tendency of values; S, the standard deviation, represents the dispersion indicator, of the scattering level of the values; Cv%, the variability coefficient, the degree of homogeneity of the results from the research sample; Med, median the position that divides in two equal parts the string of data; Max, the superior value of the string; Min, the inferior value of the string; W, amplitude, the difference between the maximum and minimum values.

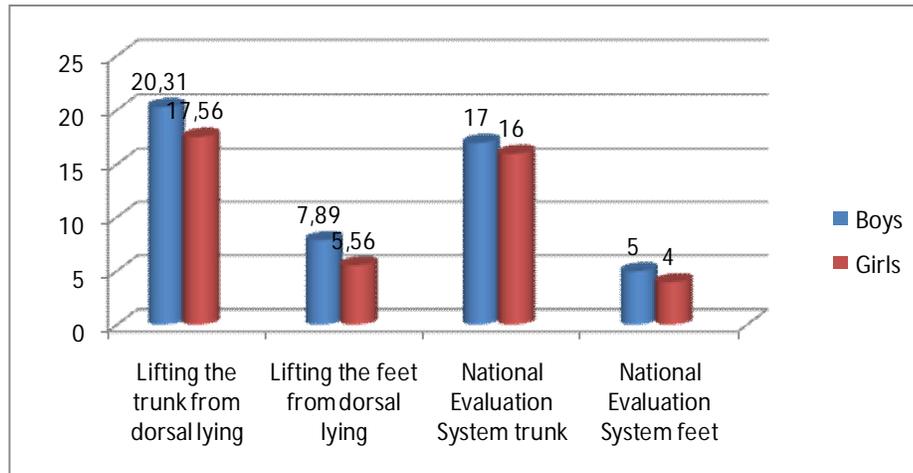


Figure 1. Graphical representation of arithmetic values for abdominal musculature

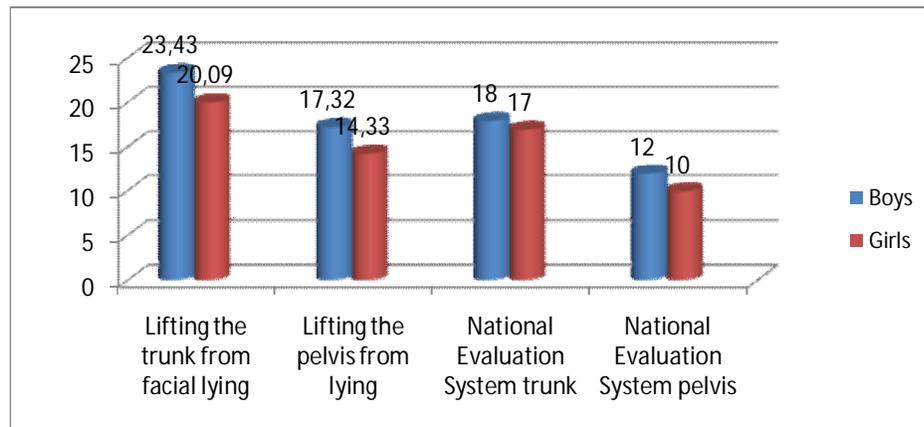


Figure 2. Graphical representation of arithmetic values for back musculature

Discussion

In the instructional design, measurement and evaluation of motor skills represented operational objectives for the establishment of general motor ability level of the students, using the lessons of physical education, of specific means. By calculating the statistical indicators (Table 2), based on the primary data collected and placed into tables [Niculescu, 2002], we achieve an accurate assessment of central tendency, by knowing the maximum and minimum values with the highest frequency, of the distribution degree of data collected by objective assessment of the of scattering data degree and development of the arithmetic mean (X). We have calculated the most commonly used

indicators of dispersion: amplitude (W), standard deviation (S) and coefficient of variation (Cv%).

a. Arms musculature

Applying the three motor tests for determining the level of strength expression of arm musculature allows us to make the following interpretations:

➤ Pushups (Table 2) – the calculated arithmetic mean for the boys sample is of 7,23 no. of repetitions higher with 1,23 no. of repetitions than the minimum scale for this age from the National Evaluation System (Table 1). The sample of girls recorded an arithmetic mean of 3,66 no. of repetitions, lower than the minimum scale of the evaluation system, which is of 4 no. repetitions. The lowest value (Min = 3) from the string of collected



data and recorded in the boys sample is lower than the minimum scale, also at the sample of girls (Min = 1).

The maximum value achieved at the boys sample, Max = 10 is greater with 4 repetitions compared with the minimal scale and it ranges, as value, between grade 8 and grade 9. In the string of collected data after the girls execution, the highest value is of 5 repetitions and is graded with the mark 6. Amplitude, standard deviation and coefficient of variation, show a group of normal distribution of the results and a high homogeneity of the data collected for the sample of boys and medium for the girls one.

➤ The arithmetic mean calculated for the sample of boys is 3,12 no. reps higher with 0,12 repetitions compared with the minimal scale of the national evaluation system. The lowest value recorded after this test is 0 repetitions and the highest value in the data string is 4 repetitions. Amplitude, standard deviation and coefficient of variation, show a group of average homogeneity and normal distribution of results

➤ Traction on the gymnastic bench (Table 2) - the calculated arithmetic mean for the girls sample is of 3,53 no benches higher with 1,53 benches in comparison with the minimum scale from the evaluation system. The lowest value recorded after the test is of 2 benches and the highest one from the string of data is of 5 benches. Amplitude, standard deviation and coefficient of variation, show a group of high homogeneity and a normal distribution of results.

a. Abdominal musculature

Applying the three motor tests for determining the level of expression of abdominal musculature strength allows us to make the following interpretations:

➤ Lifting the trunk from dorsal lying (Table 2, Figure 1) – the calculated arithmetic mean is higher both for the boys and girls samples in comparison with the National Evaluation System (Table 1) from the level of the secondary school cycle. From the string of collected data the minimum recorded value both for boys and girls is equal with the minimum norm of the evaluation system. Amplitude, standard deviation and coefficient of variation, show a group of average homogeneity and normal distribution of results.

➤ Lifting the feet from dorsal lying (Table 2) - the calculated arithmetic mean is higher both for the boys and girls samples at the level of the national evaluation system from the level of the secondary school cycle. The minimum value recorded for the boys sample is equal with the minimum norm and for the girls sample is lower. The calculated variability coefficient, amplitude and standard deviation show us that the results distribution is normal.

b. Back musculature

Applying the three motor tests for determining the level of expression of back musculature strength allows us to make the following interpretations:

➤ Lifting the trunk from facial lying (Table 2, Figure 2) – the calculated arithmetic mean is higher both for the boys and girls samples at the level of the National Evaluation System (Table 1). The lowest recorded results from the two strings of data are better than the minimum value of the norm at this test. Calculating the variation coefficient shows us that the two samples presents an average homogeneity of the results. Calculating the statistical indicators, amplitude and standard deviation shows us that the results distribution is normal.

➤ Lifting the pelvis from lying (Table 2, Figure 2) – by calculating the arithmetic means ($X_{boys} = 17,32$, $X_{girls} = 14,33$) at the tow samples, there were recorded values that can be graded with marks between 8 and 9 for the boys and for the girls with 8. The lowest values recorded both for the boys and girls samples are higher than the minimum norm. The calculated variation coefficient shows us that we have groups with an average homogeneity. The results distribution is normal after the calculation of the indicators, of the amplitude and standard deviation.

d. Legs musculature

Applying the three motor tests for determining the level of expression of legs musculature strength allows us to make the following interpretations:

➤ Long jump from standing (Table 2) - the calculated arithmetic mean is positioned over the mark 9 for the boys ($X = 177,21$) and also for the girls ($X = 156,52$). The minimum recorded value is equal with the minimum norm value. The calculated variation coefficient shows us that we have groups with an average homogeneity. Calculating the statistical indicators, amplitude and standard deviation shows us that the results distribution is normal.

➤ Jumping over the gymnastic bench (Table 2) - the arithmetic means calculated for the boys sample is of 14,25 no. of repetitions, higher with 4,25 no. of repetitions in comparison with the minimum norm for this age from the National Evaluation System (Table 1). The girls sample recorded an arithmetic mean of 9,06 repetitions, higher than the minimum norm from the evaluation system that is of 8 repetitions. The minimum recorded value is equal with the minimum norm value for the boys and lower for the girls sample. Amplitude, standard deviation and variation coefficient show us a group with an average homogeneity and a normal distribution of the results.

These results correspond with Beihoff, and Pop, (2009) and Deacu, (2008) results.

Conclusions

The obtained motor performances obtained at the level of conditional capacity - strength, allowed us to calculate the statistical indicators for the two samples from the research from which we can see a significant increase of the arithmetic means in



comparison with the minimum norm from the National Evaluation System from the secondary school cycle.

The development of the conditional capacities - strength, at this age level, can be realized through methods and means used in the physical education lesson.

The physical education lesson is the only way to prepare the physical activity and to improve the general motor capacity, education for health, for a healthy lifestyle.

The general motor capacity through its objectives to improve the conditional capacities, coordinative and intermediate, brings its contribution in the increase of the physical abilities in order to prevent accidents.

Achieving the instructive-educational objectives of the secondary physical education subsystem in order to achieve functional independence in life can be obtained through an optimal projection and planning of the physical education activity.

School is an efficient instrument in knowing the manifestation level of the general motor capacity, of knowing one self.

Educating students to continuously and systematic practice the physical exercises and to participate in different sport activities depending on everyone's aptitudes.

The variety of means used in the practice of physical education field, the multitude of connections with other related fields, requires choosing and using methods and exercises with the highest efficiency in educational practice, in order to achieve an optimum overall general motor capacity for this age.

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