



THE CONDITIONAL MOTOR CAPACITIES – RESISTANCE AND FORCE DURING THE UNIVERSITY PHYSICAL EDUCATION CLASS

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Abstract

Purpose: Physical condition progresses, the premises of speed development are created, but also of strength, resistance and intermediate and coordination capacity, motor skills reinforced in previous stages, pre-university school education should be further improved. The composition of physical exercises for young people is confused with that of adults. Conditional expression level of capacity and the coordination is higher; deficient attitudes caused by vicious positions are identified and work is currently under progress to combat them. Exercise programs are selected taking into account the changes in growth of the body and are made so as to contribute to the harmonious development of body, favorably influencing general health status and intellectual activity.

Methods: The methods and research techniques used are part of proper investigation methods (observation, experiment) and processing methods, analysis and interpretation of collected data (statistical, mathematical, graphic) by measuring and assessing the level of expression of resistance force under local and cardio-respiratory resistance.

Results: The systematic and consistent application of the established motor program had a beneficial effect on the level of expression of the two conditional capacities studied on the 50 young people. After final testing in May 2011 in all 6 assessment tests, increases of their manifestation values were recorded, even if some have a value slightly above the minimal set.

Conclusions: The calculation of statistical indicators of motor performance at the conditional capacity level – strength and resistance, after final testing, for the pattern under investigation, presents a significant increase of the arithmetic means of the motor parameters, compared to initial testing and the minimal set. The university physical education lesson is the only way of preparing and improving physical condition, health education for a healthy lifestyle. Physical condition, through its objectives to improve conditional capacities strength and muscular resistance, can increase the ability to solve problems of daily life to prevent accidents. Designing and planning university physical education allows us to achieve the instructive - educational objectives of university physical education and sports subsystem, in order to achieve a functional independence throughout life.

Key words: conditional motor capacity, resistance, force, lesson, physical education.

Introduction and research objectives

In accordance with the theory of the examination and grading of students, applicable to all objects of education and therefore to physical education, the effectiveness of teachers is evaluated mainly by the progress that the subjects have made in acquiring knowledge, training skills, and developing motor skills. Developing motor skills requires a rigorous objectification of the physical training process of subjects. The objectification of the training process refers to the establishment of some concrete ways of quantitative and qualitative assessment of progress on which to evaluate and value methods, procedures and means used. Motor skills development is an area that gives us ample and concrete opportunities of objective assessment of progresses achieved by subjects, of the quality of work performed by them and teachers.

Physical education and sport practice shows that the level of motor skills development, largely determines the fulfillment of the requirements within the discipline programs regarding the broadening and improvement of the knowledge system, skills and motor habits in students. Their motor abilities are unique parameters through which we can determine the value and contribution of each to achieve different

motor actions. Thus, to determine the amount of force, the standard parameters used is - load, for speed - swiftness of movement, for resistance – the action duration, and for skill - the complexity and precision of the action.

Conditional motor capabilities such as speed, strength and endurance are located in the capacity group directly dependent on physical condition, based on metabolic efficiency of muscles and other equipment and systems (cardio-vascular, respiratory, nervous system). Limiting factors of conditional capacities are related to the amount of energy available in the muscle and the mechanisms that regulate energy flow (enzymes), speed and force of contraction and number of motor units involved in the activity.

Because during the physical education lesson, the means primarily used mainly address the achieving of the physical education objectives, of an optimal physical condition. In the research that we will approach we will address only the physical state conditioned by the health state by which each individual can improve their expression of components of physical condition, even if the motor performance level is low. Cardio-respiratory resistance represents the element that most characterizes the expression level of individual physical condition, systematic and continuous repetition of the program of sports activities



gives the body energy increase without the installation of fatigue.

Motor capacity or motor resistance is an easily perfectible quality. As a result of ongoing and systematic specific exercises, it can be kept at peak value for a long period of time. Resistance is the perfectible motor ability that is maintained a long period of time. For it, some basic requirements must be respected, and of these requirements the most important is continuity – the major rule that requires planning per semester or academic year of actions that can help develop resistance; the continuing growth of duration or distance growth and the continuous assessment of progress; the development of running is indicated to be performed through duration running on varied terrain; the interval training method is not indicated during classes, as this method requires knowledge of the possibilities of each individual.

The development of aerobic capacity leads to improvements in aerobic response of the body, manifested by the power of the cardiovascular and respiratory systems to carry a greater amount of O₂, which in turn, can be changed by repeating the physical exercise at “about 60 - 80% of maximum heart rate”, with a duration of 15 – 50 minutes (depending on the intensity of effort), with a training frequency of 3 to 5 days/week and achievable by methods such as walking, running, swimming, cycling, skating, skiing and other long-term activities.

The development of muscle strength is in a direct proportionality relationship with the musculature mass that can be improved by using the strength exercises of an isometric, isotonic and isokinetic type. The development of local muscle strength can be achieved by using small loads but with many repetitions; the use of force exercises require practice of a rhythmic breathing and a good heating of the muscle groups on which we are working on.

Getting a good physical condition by developing muscle strength, entail: maintaining in normal parameters the body weight, an increased functional capacity and the decrease of the risk of bone injuries, muscles and joints; specialists in this field show that at the muscles level the burnings are more intense; the force is the individual's ability, which over the years, loses the least of its value.

A load that causes muscle contraction at a lower intensity of about one third of its maximum power produces no effect towards growing, probably because it is insufficient to produce a deficit of O₂. A load that exceeds two thirds of maximum muscle strength, momentarily lowering the intake of O₂, causes the enlargement of capillaries, increasing their activity by about 40%. (Demeter, A., 1966)

Specialists consider that the most important risk factors are: smoking, hypertension and motor inactivity. To improve cardio-respiratory resistance, it is recommended that exercises to be done with lower

heart rate intensity for a long period of time and practice with high intensity over a short period of time.

By establishing research objectives we seek to determine if:

- During the university physical education lesson can be applied a program of specific means to determine the development of general and local strength, cardio-respiratory resistance and local resistance;

- The expression level of strength, of cardio-respiratory resistance and local resistance, measured after the program, can be mainly determined by the use of specific resources.

Research hypotheses

Our practical and methodological approach was based on the following assumptions:

- Knowing the level of manifestation of the conditional motor capacity – strength and endurance, can direct the methods and used means selections during the university physical education lesson.

- University physical education lesson, as most forms of organized sports activities, is likely to be improved by continuously analyzing its systemic components.

- Recalling our specialized domain expertise, we want to offer another point of view, in approaching the university physical education lesson.

Research procedures and methods

The research was conducted according to the teaching process of the university physical education classes in the academic year 2010 - 2011, included in the curriculum (14 hours/semester). The sample subject to research included students from year I, consisting of 50 students, the selection of these subjects was random. Initial testing (it) took place during physical education classes in October/November 2010 and final test (ft) during physical education classes in May 2011.

Research methods and techniques used are part of proper investigative methods (observation, experiment) and processing methods, analysis and interpretation of collected data (statistical-mathematical, graphical) by measuring and assessing the expression of resistance, local force regime and cardio-respiratory resistance.

Skills evaluated (Finichiu, M., 2010) were addressed to: **a.** abdominal muscle - lifting the trunk from dorsal position for 30" and raising the legs stretched from hanging, **b.** leg muscles – long jump from standing position and vertical jump from standing and squat positions; **c.** muscular arms - pull-ups at the fixed bar from hung position and **d.** cardio-respiratory resistance from a moderate tempo duration run, over the distance of 1000 m.

Research results and their interpretation

By calculating (Niculescu, M., 2002) statistical indicators (Table 1, Figure 1 and 2), based on the data collected, we can make a precise and accurate assessment of central tendency, by finding the maximum (Max) and minimum (Min) and also the values with the highest frequency, and distribution of

knowledge level data collected by the objective assessment of the degree of scattering data and the arithmetic average recovery (X). They were calculated

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

Table 1. Calculated statistical indicators

Evaluated competences		Minimal Set	Testing	Statistical indicators						
				X	S	Cv	Med	Max	Min	W
Abdominal musculature	Lifting the trunk from dorsal position for 30" (no.rep.)	22	it	22,08	12,67	17,98	21	27	18	9
			ft	24,33	12,88	16,54	23	29	21	8
	Raising the legs stretched from hanging (no.rep.)	5	it	5,23	9,08	15,34	5	10	2	8
			ft	7,44	9,33	14,21	6	12	4	8
Inferior limbs musculature	Long jump from standing position (cm)	220	it	209,35	17,45	19,09	204	234	185	49
			ft	222,04	16,35	17,73	219	254	200	54
	Vertical jump from standing position (cm)	30	it	27,18	13,23	18,43	25	38	20	18
			ft	32,11	11,79	15,21	29	43	24	19
Superior limbs musculature	Tractions from hanging at the fixed bar (no.rep.)	5	it	3,98	8,67	23,44	3	9	1	8
			ft	5,18	9,01	19,11	4	12	3	9
Cardio – respiratory resistance	Duration run over a 1000 m distance (min.)	4'30"	it	4,36	7,32	21,66	4,40	3,55	5,10	1,15
			ft	4,19	5,69	19,02	4,25	3,40	4,43	1,03

a. Abdominal musculature

By collecting data from the task „*lifting the trunk from dorsal position for 30"*„, which determined the expression of resistance level under the abdominal muscle strength can make the following interpretations:

➤ The arithmetic mean calculated after initial testing (22,08), is approximately equal to the minimal set, but less than 2,25 no. rep., compared with the arithmetic mean value after final testing (24,33). The difference between the arithmetic mean after final testing and minimal scale is 2,33 no. of repetitions.

➤ The lowest recorded minimum value (18), after initial testing is less with 4 repetitions than the minimal set, and with a repetition after the final testing.

➤ The amplitude, standard deviation and coefficient of variation, after initial and final testing, show a collective with average homogeneity and a normal distribution of results.

By collecting data from the task "*raising the legs stretched from hanging*" that determined the resistance manifestation level in strength regime of the abdominal muscle we can make the following interpretations:

➤ The arithmetic mean calculated after initial testing (5,23) is higher than the minimal value set of 0,23 no. rep.; after the final testing, calculating the arithmetic mean shows the arithmetic average value of

➤ 7,44 no. repetitions, greater than 2,44 no. rep. from the established minimum scale and greater than

the arithmetic mean value of 2,21 no. of repetitions after initial testing.

➤ The lowest recorded minimum value after the initial testing (2) and after the final testing (4) is lower by a total of three repetitions and 1 repetition than the minimal set (5).

➤ Amplitude, standard deviation and coefficient of variation, both after the initial testing and after the final testing, show a group with high homogeneity and normal distribution of results.

b. The musculature of inferior limbs

Testing the explosive force of the inferior limbs on horizontal through the task „*long jump from standing position*“, the following statistical values were calculated:

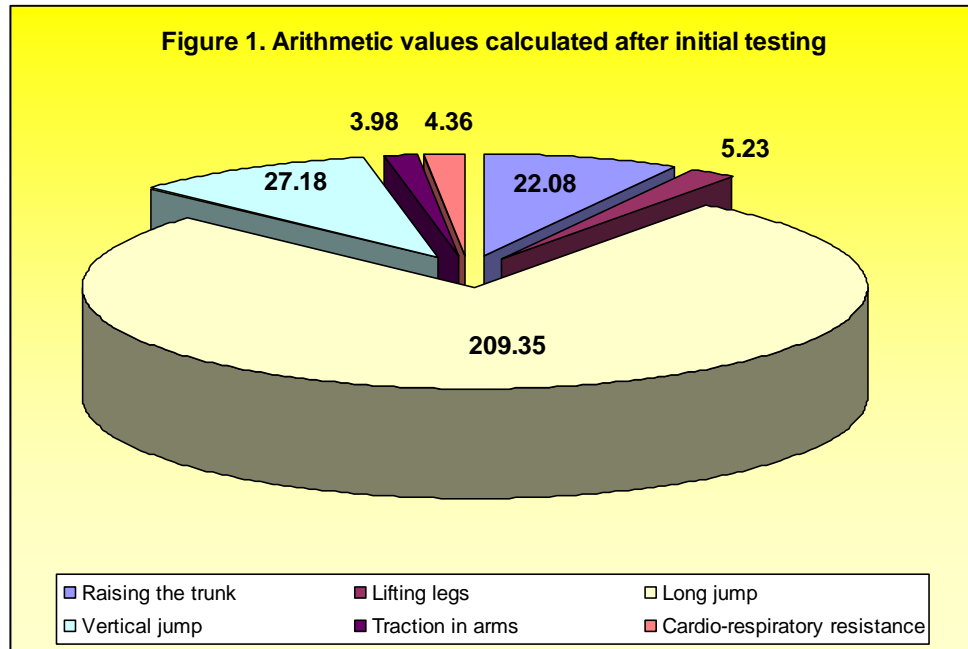
➤ By calculating the arithmetic means, after the two tests, we can observe the lowest value of the arithmetic mean, after the initial testing (209,35), with 10,65 cm comparative with the minimal set and 12,69 with the arithmetic mean after the final testing. The arithmetic mean calculus, after the final testing, (222,04) revealed a higher value compared with the minimal established set, the difference between these two values being of 2,35 cm.

➤ After initial testing, the lowest recorded minimum value (185) is 35 cm lower than the minimal set, after final testing this minimum was 200 cm by 20 cm lower than the minimal set.

➤ After the calculation of central tendency, after the two tests, amplitude, standard deviation and

coefficient of variation show a collective average

homogeneity and normal distribution of results.



The task “vertical jump from standing position, from squat” that tested the explosive strength of the inferior limbs on vertical, allowed us to obtain the following statistical values:

➤ The arithmetic mean calculated after initial testing (27,18) is less than the minimum scale (30) for this age is less than 2,32 cm to 4,43 cm compared with the arithmetic mean value calculated after final testing (32, 11).

➤ The lowest recorded minimum value (20), after initial testing is less than 10 cm, than the minimal set; after final testing the lowest recorded value (24) was 6 cm less than the minimum scale.

➤ The amplitude, standard deviation and coefficient of variation, after the two tests, show us a collective with average homogeneity and normal distribution of results.

c. The superior limbs musculature

The task “tractions from hanging at the fixed bar”, through which the resistance in force regime of the scapular-humeral flexors was tested, allowed us to obtain the following statistical values:

➤ The calculus of arithmetic mean (3,98), for the recorded values at this task after the initial testing, reveal the fact that this is lower by 1,02 no. of repetitions, compared with the minimal set (5). After final testing, the calculated arithmetic mean (5,18 no. rep.) is higher by 0,18 no. rep. compared with the minimal value set and with 1,20 no. rep. compared with the arithmetic mean value calculated after initial testing.

➤ The lowest recorded minimum values, Low = 1, after initial testing, and Min = 3, after final testing, are lower by a total of four repetitions, and respective 2 repetitions, than the minimal set established for this age category.

➤ The amplitude, standard deviation and coefficient of variation show a weak collective consistency (23,44) after the initial testing and an average homogeneity (19,11) after the final testing and a normal distribution of results.

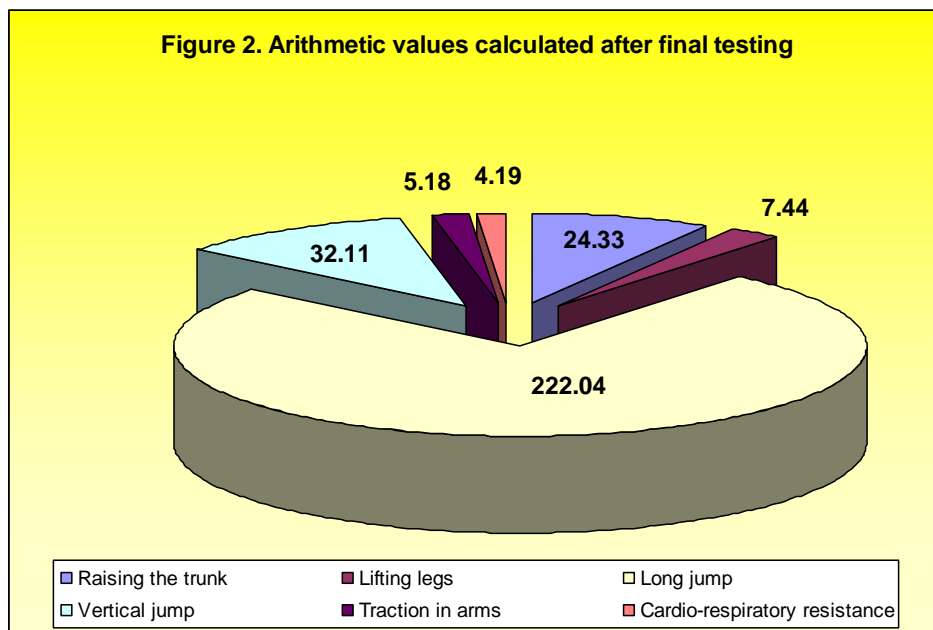
d. Cardio-respiratory resistance

Cardio-respiratory resistance tested through the test “duration run over a 1000 m distance” allowed, after recording the data, to calculate the following values of statistical indicators:

➤ The arithmetic mean calculated after initial testing (4,36), is less than the minimal set with 0,06 minutes (4,30); after the final testing there is a clear increase in the arithmetic mean calculated at the value of 4.19 minutes higher with 0,11 minutes comparative with the established minimal set.

➤ The lowest recorded minimum (5,10), after initial testing, is lower by 0,40 minutes compared with the minimal set (4,30); after the final testing the lowest value recorded was 4,43 minutes less than the established minimal set with 0,13 minutes.

➤ The amplitude, standard deviation and coefficient of variation show a weak collective consistency, after the initial testing and a collective with average homogeneity after the final testing, there is a normal distribution of results.



Conclusions

- The calculation of statistical indicators of motor performance at the conditional level capacity - strength and power, after final testing, for the sample under investigation, presents us a significant increase of the arithmetic means motor parameters, compared to the initial testing and the established minimal set.

- The university physical education lesson is the only way to prepare for physical activity and to improve the physical condition, education of health, and a healthier lifestyle.

- Continued presence in physical education classes provides a minimum of movement and allows the knowledge and learning of the techniques and physical activities that must continue throughout life.

- Rigorously developed educational programs for health can help young students gain more knowledge, to develop attitudes and behavioral habits to promote and maintain a physically active lifestyle.

- Physical condition, through its objectives to improve conditional capacities strength and muscular resistance, can increase the ability to solve problems of daily life to prevent accidents.

- Designing and planning university physical education allows us to achieve the instructive - educational objectives of university physical education

and sports subsystem, in order to achieve a functional independence throughout life.

- School is an effective tool in providing education for physical activity and self-knowledge of individual fitness conditions.

- Implementing an active lifestyle, physically, adopted at an early age, can be maintained over the entire lifetime.

- The components of physical fitness provide a continuous physical functionality as man gets older and include muscular strength, muscular resistance and flexibility.

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