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Effective Methods For Assessing General Strength In High School Students

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Abstract

Physical education and sports have particularly large social tasks, and this aspect constitutes a signal of attention for physical education and sports teachers, as high school students are approaching the completion of biological growth

The motor quality strength is present in school curricula at each level of study. In the preparation of students, interdependent relationships are created between the components of the preparation, between the development of motor qualities, the development of morpho-functional indices and the acquisition of motor skills. As research objectives, we aimed to: carry out initial testing on 4 control samples in different classes of the high school cycle and in SAM classes; go through a system of lessons intended for the development of the motor quality strength, a system with increasing intensity and complexity from one year of study to another; establish a set of measures necessary to improve the current teaching and evaluation system in the discipline "Physical Education". The materials, methods and means used were adapted to the working conditions in an improvised gym, with reduced height, width and length. We specify that there is no possibility of developing strength in a coherent system of lessons due to the delicate period we are going through. The development of motor qualities is necessary to achieve the other requirements of the curriculum. Knowing the level of development of the motor quality strength, as well as its evolution curve is of particular importance, therefore, as results, correlating the data obtained from parallel classes, for each test, as well as for the

evolutions recorded in them over the course of one or two years, the values obtained are calculated, differentiated for boys and girls

Keywords: biomotor potential, motor qualities, strength, physical education

Introduction

Researching the biomotor potential of schoolchildren is a topic of constant relevance, which continues to concern specialists in the field of physical education and sports. In this paper, we aim to know the level of development of a component of the biomotor potential (motor quality strength), as well as its evolution curve during the high school years, understanding by this the recording and interpretation of data following the periodic control tests, after having previously gone through a system of lessons intended for its development (Avramoff,1982).

Starting from the premise that general strength does not have an evaluation method in the National School Evaluation System for the discipline of physical education and sports, we issued the following research hypothesis: if we systematically use the circuit method and the applicative paths in Physical Education lessons with students in high school classes, then we can achieve a progress in the strength indices of the main muscle groups (Brata,1996).

The research aimed to:

- conducting initial testing on 4 control tests in different classes of the high school cycle and in SAM classes.
- going through a system of lessons aimed at developing motor quality and strength, a system with increasing intensity and complexity from one year of study to another.
- conducting final testing on the same 4 tests.
- establishing a set of measures necessary to improve the current teaching and evaluation system in the discipline "Physical Education".

Motor qualities are characteristics of the body that offer the individual the possibility of performing various motor acts, related to both his daily and sports activities. They are the characteristics that determine movement, a result of the entire organism. So, even if the motor act is performed by the locomotor apparatus, it functions based on the command of the nervous system and drives the functionality of all apparatuses and systems. In the educational process, an important place among the concerns of the specialized teacher is occupied by finding and using in preparation the most effective methods and means that ensure the development of these qualities (Chirazi ,2006).

Regarding the optimal age for a favorable influence on the development of motor skills, we note that speed can be developed with very good results at the age of 10-12, but the activity of educating it in various forms can begin at 5-6 years. The skill develops well between the same age limit as speed. Strength and endurance, motor skills that are more easily perfected,

can be systematically educated from 9-10 years old, with an ascending evolution and maximum possibility of improvement (Lupea ,2000). Strength is the ability of the neuromuscular apparatus to overcome resistance through movement, the basis of muscle contraction being the result of either the increase in internal tension of the muscle fiber (isometric effort) or the shortening of the muscle fiber (isotonic effort),(Sava, 2014). In the specialized literature we find numerous definitions of this quality, all of which have one thing in common: muscle contraction. Thus, Zaţiorski gives the following definition of strength: "the human capacity to manifest through muscular effort certain values of overcoming force (with shortening or lengthening of the muscles), maintaining force (without changing the length of the muscles) or yielding force.2.

As a result of the current situation, related to the pandemic period, but also to the national situation of the way physical education classes are conducted, this research took place in Arad County, in a high school located in one of the neighboring cities. The teaching staff, through whose kindness we had access to physical education lessons, Mrs. Grade 1 Teacher N. S., provided us with everything that was necessary and useful in conducting our research (Mateescu,2007).

The students of the 2 9th grades took tests on the following 4 tests

- push-ups from support lying on the ground
- long jump from the spot
- raising the trunk from supine position with hands on the back
- extension of the trunk from face position with hands on the back

In order to carry out the study, the learning unit "strength" was placed within the annual planning as the main learning unit during the period November-February, therefore during the work in the gym, for 14 weeks.

Strength development was placed in the 6th link of the lessons, for a duration of 15-20 minutes, depending on the class and the level of development of the targeted motor quality. The exercises are differentiated according to gender and level of training. The difficulty of the exercises and their duration increases from one week to another and from one year of study to another, as can be seen in the next chapter (Mentzer,1996,2002).

Methods

The materials, methods and means used were adapted to the working conditions in an improvised gym, with reduced height, width and length. We specify that there is no possibility of developing strength in a coherent system of lessons due to the delicate period we are going through.

The study was conducted between November 15, 2023 and April 1, 2024. The actions were scheduled during physical education classes during 28 lesson systems - 14 weeks aimed at developing motor quality and strength. In order to determine the effectiveness of the exercises used, initial and final checks were carried out

In order to carry out the study, the learning unit "strength" was placed in the annual planning as the main learning unit during the period November-February, therefore during the work in the gym, for 14 weeks. Due to the conditions of conducting physical education classes outdoors at a considerable distance from school, this learning unit cannot be approached with maximum efficiency except in the gym, during the winter.

The lessons of the first week were allocated to the initial testing in all classes for the following tests:

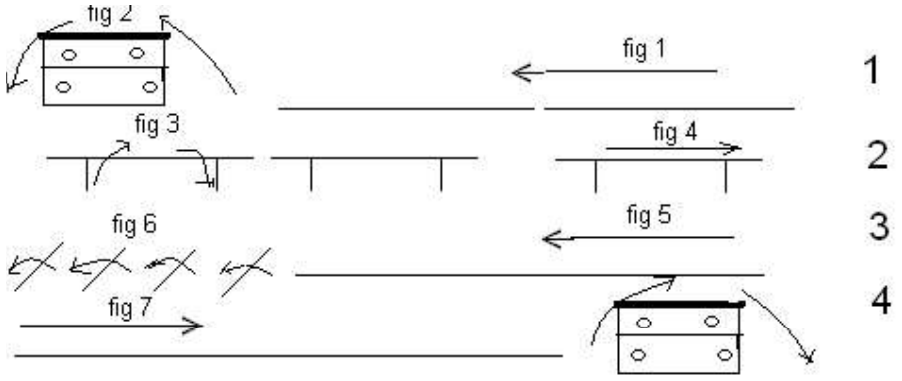
- push-ups from support lying on the ground
- long jump from a standing position
- raising the trunk from a supine position with hands on the back of the head
- extension of the trunk from a face-up position with hands on the back of the head

The following two weeks of the lesson system intended for the development of strength include an applicative course with known elements, the difficulty of which increases depending on the class for which it is intended. In weeks 4-5, the elements of the application course are placed within application relays, thus eliminating the monotony of the lessons. Weeks 6-9 include two short circuits, depending on the existing conditions, and in weeks 10-13, frontal work is carried out. The last week is intended for final testing on the same four tests that were taken during the initial testing.

Strength development was placed in the 6th link of the lessons, lasting 15-20 minutes, depending on the class and the level of development of the targeted motor quality. The exercises are differentiated according to gender and level of training. The difficulty of the exercises and their duration increases from one week to another and from one year of study to another, as can be seen in the next chapter.

Figure 1.

Applicative course for 9th grade



The group of students is divided into four equal groups, rotating after the established working time. Two circuits were designed for each class, one for the first two weeks and one for the next two, thus avoiding monotony.

CIRCUIT I

- push-ups on the knees – girls
- push-ups from a lying position – boys
- half-squats with a jump
- from a support on the elbows, bringing the knees to the chest – girls
- from a support on the elbows, raising the legs extended vertically – boys
- from a face-down position, simultaneously raising the torso and legs in extension

CIRCUIT II

- pull-ups – boys
- push-ups with hands on the bench – girls
- successive jumps on two benches placed parallel
- from lying face down with hands behind the back, legs supported – raising the trunk in extension
- from lying supine, simultaneously raising the trunk and legs – boys
- from sitting cross-legged on the bench, raising the knees to the chest – girls

Two sets of the circuit will be performed every hour, working for 20 seconds, with a 20-second break. The break between sets will be 2 minutes.

Results and Discussions

Correlating the data obtained from the parallel classes, for each sample, as well as for the developments recorded in them over the course of one or two years, the following are calculated, differentiated for boys and girls:

- number of records: the number of students who were subjected to the study;
- arithmetic mean: the sum of the terms of the series divided by their number;
- minimum
- maximum
- amplitude: the difference between the extreme values of the distribution;
- median: the point above which 50% of the set of values is located.

Table 1.

Results recorded by research subjects in the Push-ups test

No. crt	Statistical quantities	Initial evaluation		Final evaluation		Progress	
		B	G	B	G	B	G
1.	Number of records	22	48	22	48	22	48
2.	Arithmetic mean	20,77	5,9	27,5	9,14	6,7	3,25
3.	Minimum	2	0	5	0	2	0
4.	Maximum	50	20	55	25	13	7
5.	Amplitude	48	20	50	25	11	7
6.	Median	19,5	4	27,5	10	6	3

Figure 2.

Graphical representation of the results of the Push-ups test - b

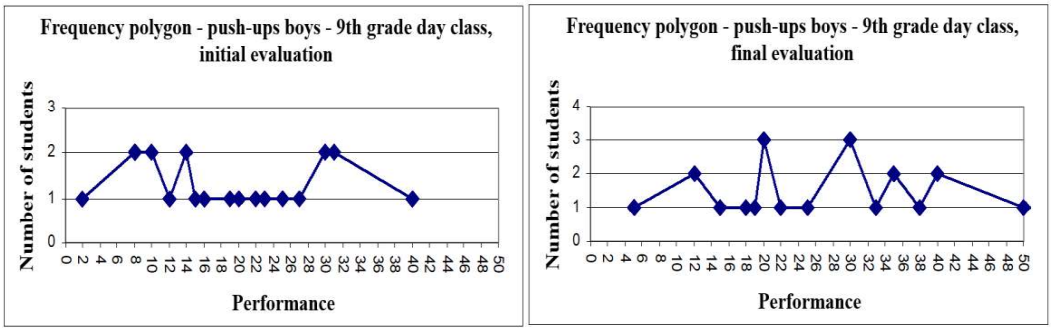
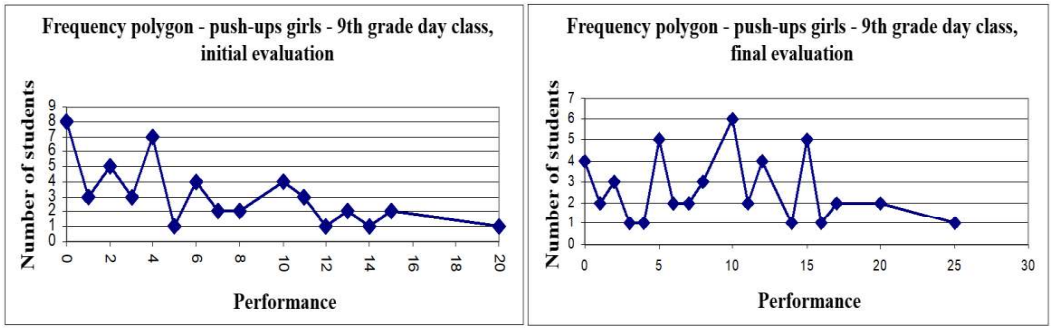


Figure 3.

Graphical representation of the results of the Push-ups test – g



In contrast, girls had 8 performances of 0(zero) push-ups initially, and a median of 4, meaning 50% of them did less than four push-ups. However, their progress is not negligible, with only 4 cases of 0(zero) push-ups ultimately being recorded, a median of 10, 83% recording progress of up to 5 push-ups and 17% a progress between 6 and 10 push-ups.

Table 2.

Results recorded by the research subjects in the Long Jump test

No. crt	**Statistical quantities**	**Initial evaluation**		**Final evaluation**		**Progress**	
		B	G	B	G	B	G
1.	Number of records	22	48	22	48	22	48
2.	Arithmetic mean	1,96	1,49	2,11	1,6	0,15	0,1
3.	Minimum	1,3	1	1,5	1,1	0,1	0
4.	Maximum	2,6	2,05	2,7	2,15	1,2	0,2
5.	Amplitude	1,3	1,05	1,3	1,05	0,1	0,2
6.	Median	2,02	1,47	2,15	1,57	0,15	0,1

Figure 4.

Graphical representation of the results in the Long Jump from the spot –b

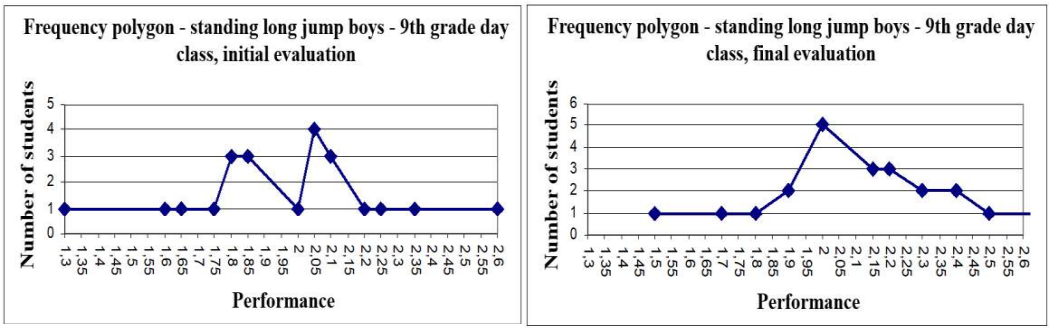
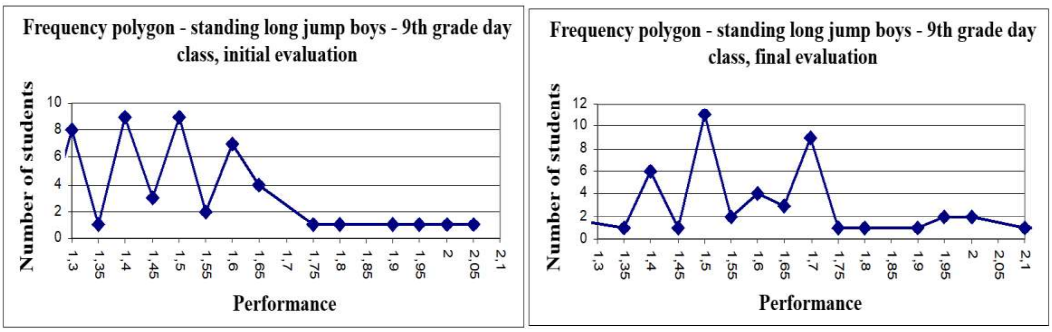


Figure 5.

Graphical representation of the results in the Long Jump event - g



Following the completion of the experiment, the interpretation of the results obtained in the research, we developed the conclusions, discussing also what would be required at the level of the Framework Plan, but also about the revision of the School Evaluation System in the Physical Education and Sports Discipline.

Below we present the summary of the conclusions and discussions:

Strength development is one of the primary objectives of physical education. It is important because it is the basis for the acquisition of motor skills, promotes the increase of effort capacity, ensures harmonious physical development, its improvement can be done in simple conditions and can be a particularly attractive activity.

The level of development of the targeted motor quality in the current generation of students is on average within good limits. It is necessary to give even greater importance to the development of strength in middle school classes and even in primary school classes because the level of this motor quality influences the development of morpho-functional indices and the acquisition of motor skills. Thus, it is the basis for achieving the other requirements of the curriculum.

None of the students included in the study regressed. Each student progressed or stagnated. Thus, we can conclude that the lesson system used was effective.

At the high school level, special importance must be given to the development of the strength of all muscle groups because students are approaching the completion of biological growth, this being the age conducive to its development. Thus, a more adequate selection of the capacities and competencies evaluated would be necessary, in accordance with one of the main objectives of physical education: harmonious physical development. We can observe that the assessment of the strength of the back muscles is missing in the 9th grade. It appears only in the 10th grade of high school, not being addressed in the 11th and 12th grades. We recommend including in the curriculum for each grade the assessment of the level of development of all muscle groups, ensuring continuity in their development and implicitly a positive influence on the state of health and on the physical attitude.

It is necessary to revise the School Evaluation System for the Physical Education and Sports Discipline.

The provision of requirements only for awarding a grade of 5 (five) can no longer be maintained under the conditions in which national unitary evaluation standards for educational disciplines will be developed.

Providing tests whose lack of difficulty allows for a large volume of executions unnecessarily consumes lesson time.

Solving special individual situations in which students may find themselves, generated by atypical morphological and functional particularities, restricted for certain categories of effort, with physical deficiencies, in postoperative periods.

Adapting to the diversity of conditions in which the educational process in this discipline is carried out.

The framework plan also requires a review of the number of hours allocated to the Physical Education and Sports discipline in high school classes. We consider it necessary to allocate a minimum of two hours per week of physical education. These are necessary to ensure an appropriate density of effort in a week, an effective contribution to maintaining health, to compensating for intense intellectual efforts, to the positive evolution of motor capacity.

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