

STUDY ON THE LEVEL OF STRENGTH DEVELOPMENT IN VOCATIONAL TRAINING STUDENTS

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Abstract: *The present work is a study that tracks the level of development of the force of the lowerlimbs, upperlimbs, abdominal muscles but also the posterior muscles of the trunk. The research started with the beginning of the current school year and was carried out on the students of the ninth and tenth grades from the Technological High School I. C. Brătianu, from the vocational education. The students from the Xth grade who expressed their agreement to participate in our study were 22, who participated in the 3 modules of school activity in the two hours of physical education weekly. The subjects in the ninth grade who participated in the physical tests were 30 in number.*

Key words: *vocational education, force, students.*

1. Introduction

The Physical Education discipline for grades IX-XII is provided, according to the official teaching plan, in the Physical Education and Sport curriculum area and is intended to make its specific contribution to the achievement of the complex development of the autonomous and creative personality of the students - purpose provided for in the Education Law.

The revision of physical education programs for grades IX-XII was based on their adaptation to the provisions of the framework plans in force.

Apart from the classes provided per week, in the common core, for Physical Education, there is the possibility of allocating one more class, through CDS (School Decision Curriculum), intended to expand/deepen the contents provided by the common curriculum.

For pubertal age students, work that involves high stress is contraindicated, as

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it leads to very intense neuromuscular tension, overloading the muscles, tendons, ligaments and joints that are still insufficiently strengthened [7]. Also, the effort based on isometric contractions is not indicated in this age category, because it produces serious changes in the development of the cardiovascular system and the respiratory system and favors the installation of some pathological conditions over time [14].

Until the end of puberty, the low concentrations of anabolic androgenic hormones necessary for muscle hypertrophy do not favor the development of strength, and the efforts made in this regard are not consistent with the progress made [8].

The harmonious development of the whole body is a major requirement at this age and is achieved by alternating the muscle groups involved in the effort. The load and the number of repetitions can be put in line with the maturation level of each teenager, the physiological age being determined in the choice of methods and means for strength training [1].

The improvement of muscle strength, especially for beginners, is primarily due to the improvement of neuromuscular coordination [2]. This is done because of acquiring the skills of directing one's own movement, the skill of contracting the muscles and developing a great internal tension within them. For this purpose, strength exercises are introduced during each warm-up, in general physical training, with an emphasis on strength [5].

The major findings were that irrespective of differences in school grade and in cognitive ability, self-efficacy exerted significant influence on various aspects of self-regulation, such as monitoring of working time, task

persistence, and rejection of correct hypotheses, as well as on performance. These results provided support for the construct validity of self-efficacy as different from cognitive competence [4].

As mentioned by Cârstea Gh., the determining and conditioning factors of the force are:

- the ability to operate, in one effort, as many motor units as possible.
- intensity of muscle contraction.
- the ability to concentrate the fundamental nervous processes: excitation and inhibition.
- the amplitude and duration of the muscle contraction: the faster increase in force is determined by the longer duration of the contraction.
- the cross-section (thickness) of the muscle fiber, as well as the number of them engaged in a contraction.
- the quantity and quality of biochemical, physiological, and metabolic processes at the muscle level.
- the biomechanical effects of the engaged segments in the motor action, as well as the optimal action of the segments (angular value) and of the engaged joints in motion.
- diurnal rhythms (maximum strength is obtained between 9⁰⁰ - 10⁰⁰ and 18⁰⁰-19⁰⁰), age and sex.
- some psychological factors such as: will, motivation, emotional states, etc.
- the level of development of other motor skills.
- types of muscle fibers[15].

The forms of manifestation of force (according to Cârstea) are:

1. According to the participation of muscle groups in the effort: general strength (when the main muscle groups participate in the effort), specific strength

(when one or several muscle groups participate in the effort).

2. According to the nature of the muscle contraction: static force (when the size of the muscle fibers does not change), dynamic force (when the size of the muscle fibers changes), mixed force (when both static and dynamic contractions occur).

3. According to the exercise capacity: maximum strength (increases with increasing body weight), relative strength (decreases with increasing body weight).

4. According to the way of combination with the other motor qualities: force in speed mode, (also called explosive force), force in skill mode, force in resistance mode [19].

The factors that influence muscle strength are the following:

1. Age and gender: general strength increases until the age of 20-30.

2. Psychic factors: emotional states, motivation, attention, will.

3. The body's daily rhythms.

4. The initial level from which strength development begins.

5. Frequency of strength development lessons.

6. Intensity and duration of muscle contraction [9, 10].

Muscle strength depends on the number of motor units recruited during contraction and the number of muscle fibers within the motor unit, which varies from 20 to 500 (the average being around 200)[6]. The more varying fibers a motor unit has, the greater the produced force is. Genetics determines the number of fibers and explains why some people can easily increase the muscle size and strength, while others must fight for every little extra. A motor unit stimulated by a nerve impulse responds with a "twitch" or

a very rapid contraction followed by relaxation [11].

Generally, there is a relationship between the level of practice, attitude and sustainable noble value, and the level of environmental awareness in the concept of sustainable development amongst secondary school students [12].

There are other studies in this regard we mention that study compared health-related fitness variables of high school students (14 to 19-years-old; 120 males, 67 females) participating in physical education (PE) and school-sponsored sports (SSS) to students participating solely in PE. Cardiovascular fitness, the primary variable of interest, was measured using the 20-Meter Shuttle Run (number of completed laps, 20MST). Secondary analysis compared upper body strength (90° push-ups), flexibility (sit and reach), and body mass index (BMI kg/m²)[3].

Peter C. Scales and all have examined how middle-school students' motivation, belonging, school climate, and grade point average (GPA) are affected by students experiencing developmental relationships – those that go beyond teachers being caring (e.g., showing warmth to students) and providing challenge (e.g., high expectations) to also include teachers providing support, sharing power, and expanding students' sense of possibilities. We also examined variations in those associations by student socioeconomic status (SES) [16].

In the spirit of the above-mentioned aspects and in order to be able to ensure a modern didactic process, based on an optimal educational offer, as well as on the differentiated training of students, in the wake of applying individual or group learning paths, it is necessary,

corresponding to the practical reality, for the IX-XII students to acquire the necessary knowledge to act on physical development and motor skills, as well as to be offered the initiation/consolidation in the practice of some sports disciplines/tests, namely [13], [17, 18]:

For 9th grade students:

- two athletic tests, preferably from different groups.
- static and dynamic acrobatic elements from acrobatic gymnastics (from those studied in grades V-VIII) and variants of connecting elements.
- a jump on the gymnastic apparatus, at the choice of the students, from those provided by the curriculum.
- two sports games, chosen by the students, from those provided by the curriculum.

For 10th grade students:

- the two athletic tests done in the 9th grade.
- acrobatic gymnastics.
- jumping on the gymnastic apparatus provided by the curriculum.
- two sports games, chosen by the students, from those provided by the curriculum.

The following can be considered as tests for the checked classes: prone trunk extensions, sitting trunk raises, supine trunk raises, supine leg raises, upper and lower limb muscle strength, the traction on gymnastic bench, the standing long jump, the complex strength structure. Our team of teaching staff considered the following tests to be conclusive for determining the level of development: abdominal strength (from supine lying), back strength (from facial lying), upper limb strength (push-ups), lower limb strength (squats and the long jump from the spot).

2. Objectives

By carrying out the lesson topics, as planned, do you get increases in the values of the tests performed?

3. Materials and methods

Are accessible to each teacher, so we used the timer to measure the time (seconds) in which the students participating in our study performed the repetitions as quickly and correctly as possible. Roulette was used to measure distance (centimeters) for long jump from the spot.

4. Results

4.1. Squats – were made from standing far away with your arms forward. The number of repetitions achieved in 30 seconds was recorded.

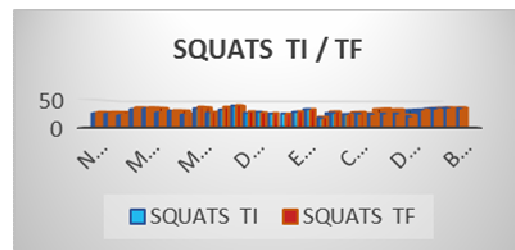


Fig. 1. Squats initial and final test Class IX

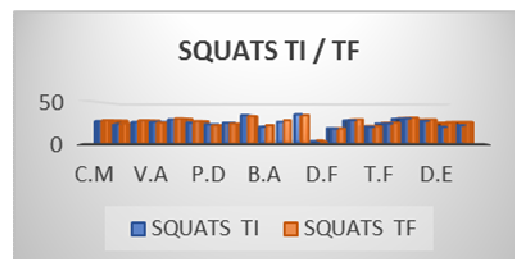


Fig. 2. Squats initial and final test Class X

4.2. Pushups - were made from the facial support position. The number of correct executions was recorded in 30 seconds.

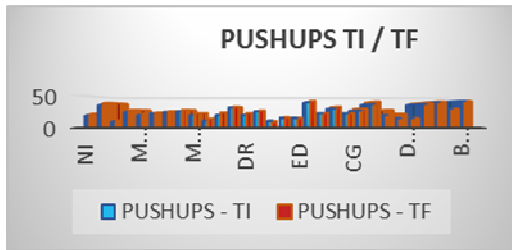


Fig. 3. *Pushups initial and final test Class IX*

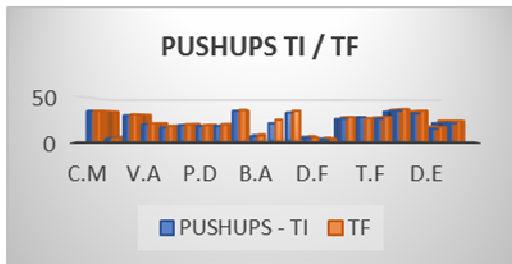


Fig. 4. *Pushups initial and final test Class X*

4.3. Abdominal strenght – the students began the repetitions from the dorsal lying with their hands at the nape of the neck and carried out the raising of the trunk to the vertical within 30 seconds.

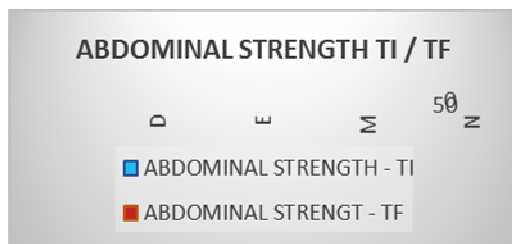


Fig. 5. *Abdominal strenght initial and final test Class IX*

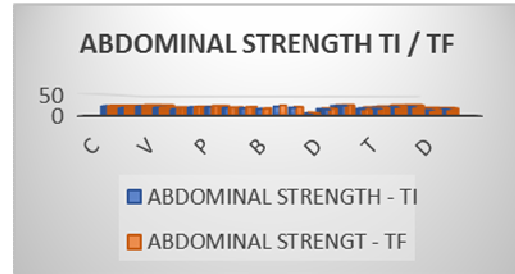


Fig. 6. *Abdominal strenght initial and final test Class X*

4.4. Back force – from the facial lying position with the hands at the nape of the neck, in 30 seconds the number of correct repetitions was recorded.

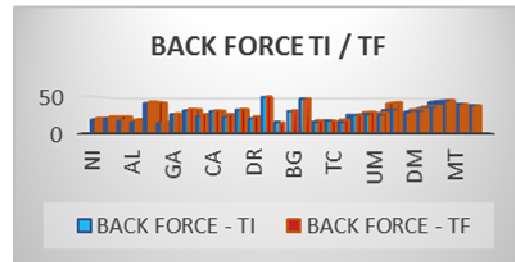


Fig. 7. *Back force initial and final test Class IX*

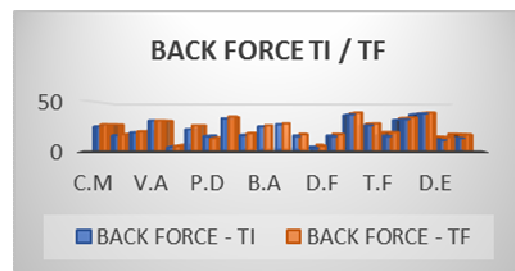


Fig. 8. *Back force initial and final test Class X*

4.5. Long jump – the starting position was standing slightly far away with the tips of the feet at a line marked on the ground.

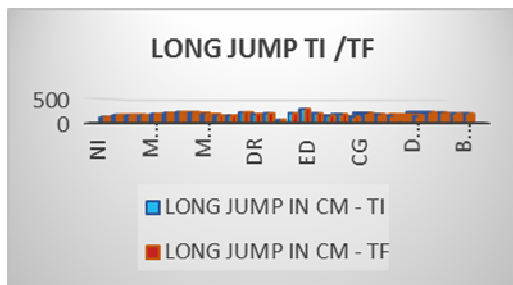


Fig. 9. Long jump initial and final test Class IX

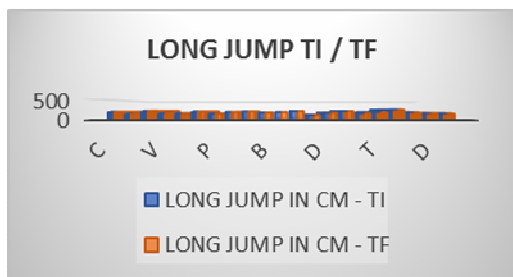


Fig. 10. Long jump initial and final test Class X

5. Discussions

Quantitative research, as presented in our article, differs from qualitative research, in the sense that the emphasis is placed on the discovery of general principles about the field of study, more than on the in-depth understanding of the nature of a single element. Thus, quantitative research is focused on groups and not on specific topics.

There are several types of primary quantitative research. They can be distinguished in the following four distinctive methods, which are: survey research, correlational research, causal-comparative research and experimental research.

Experimental research, as the name implies, is usually based on one or more theories. This theory has not been proven

in the past and is just a guess. In experimental research, an analysis is made around proving or refuting the claim. This method of research is used in the natural sciences. Traditional research methods are more effective than modern techniques.

In experimental research there may be several theories. A theory is a statement that can be verified or disproved.

Once the claim has been established, efforts are made to understand whether it is valid or invalid. This type of quantitative research method is used mainly in the natural or social sciences, since there are various claims that must be proven to be right or wrong.

Traditional research methods are more effective than modern techniques.

As a result of studying the literature, I found that alternative high school students are at risk of negative social, emotional, and academic outcomes. School-based group counseling is often implemented by mental health professionals to address these risk factors. This study explores benefits of school-based group counseling utilizing mindfulness meditation to help students improve functioning [20].

The authors consider that, however, regular and serious participation in this type of sport from athletes is related to the performance of extremely large and intense loads and requires athletes to have highly developed physical and psycho-functional capabilities. Nowadays, the sport of gymnastics is developing rapidly in many countries of the world [21].

In another study it is stated that, these findings reflect a higher prevalence of concussion in high school football players than previously reported in the literature. The ultimate concern associated with unreported concussion is an athlete's

increased risk of cumulative or catastrophic effects from recurrent injury. Future prevention initiatives should focus on education to improve athlete awareness of the signs of concussion and potential risks of unreported injury [22].

6. Conclusions

It is noticed (from figures 1 and 2) that in squats the maximum number of repetitions is higher for students in the ninth grade, also most of them have performed over 25 repetitions in the two tests.

According to figures 3 and 4 and when testing the force of the upper limbs, the students in the ninth grade obtain clearly superior results.

From figures 5 and 6 we note that the level of development of the strength of the abdominal muscles corresponds to the somato-functional peculiarities of the age of the tested students.

Regarding the posterior force of the trunk muscles (Figures 7 and 8), the students in the Xth grade had a constant evolution, even if this time to the fewest repetitions were also performed by the older students.

For the last test (Figures 9 and 10), the students of the Xth grade obtained better results per group, as it is noticed the weakest jump is of the student from the ninth grade.

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