

## **DEVELOPING RESISTANCE THROUGH MEANS AND METHODS SPECIFIC FOR THE FOOTBALL PLAY vs DEVELOPING RESISTANCE THROUGH MEANS AND METHODS SPECIFIC FOR ATHLETICS DURING PHYSICAL EDUCATION CLASSES IN HIGHSCHOOL**

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**ABSTRACT.** *Purpose.* Optimizing the Development of the Vital Capacity by Means and Methods Specific to Football. The experimental checking of the efficiency of the means and methods of football in the optimization of the vital capacity; Developing general resistance and resilience specific to football; Developing the general and football-specific ability to play. It is assumed that the systematic and correct implementation of physical and sports education in a system of soccer means and methods can further develop the level of high school students' ability, rather than using traditional means specific to athletics. The experiment was conducted on a study level with 681 subjects out of 28 combined classes from four high schools. Four experimental and four reference samples were randomized. The experimental samples worked in lessons with specific means of playing football for one school year, and the reference ones with traditional means specific to athletics. The subjects of all samples were predictively and summatively evaluated at functional vitality sample. As a result of the implementation of the means and methods of football, the subjects of the experimental samples obtained better results in the summative evaluation compared to the subjects of the reference samples. The difference was significant at the threshold  $p < 0.05$ , so the null hypothesis is invalidated and the hypothesis formulated is accepted. The experiment, through statistical and mathematical calculations, confirms the major impact of the use of means and methods of football in optimizing the vital capacity of high school students compared to the use of traditional means of athletics.

**Keywords.** *Optimization, impact, vital capacity, means and football methods.*

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**REZUMAT.** *Dezvoltarea rezistenței prin mijloace și metode specifice fotbalului VS dezvoltarea rezistenței prin mijloace și metode specifice atletismului în orele de educație fizică la liceu.* Scop. Optimizarea dezvoltării capacității vitale prin mijloace și metode specifice jocului de fotbal. Verificarea experimentală a eficienței mijloacelor și metodelor fotbalistice în optimizarea capacității vitale; Dezvoltarea rezistenței generale și a rezistenței specifice jocului de fotbal; Dezvoltarea capacității de mișcare generală și specifică jocului de fotbal. Se presupune că implementarea sistematică și corectă în lecțiile de educație fizică și sportive a unui sistem de mijloace și metode fotbalistice poate dezvolta mai mult nivelul capacității vitale a elevilor liceeni, decât folosind mijloace tradiționale specifice atletismului. Experimentul s-a desfășurat pe nivel de studiu cu 681 subiecți din 28 de clase cumulate din patru licee. Au fost alcătuite randomizat patru eșantioane experimentale și patru de referință. Eșantioanele experimentale au lucrat în lecții cu mijloace specifice jocului de fotbal timp de un an școlar, iar cele de referință cu mijloace tradiționale specifice atletismului. Subiecții tuturor eșantioanelor au fost evaluați predictiv și sumativ la proba funcțională capacitate vitală. Urmare a implementării mijloacelor și metodelor fotbalistice subiecții eșantioanelor experimentale au obținut rezultate mai bune la evaluarea sumativă, comparativ cu subiecții eșantioanelor de referință. Diferența a fost semnificativă la pragul  $p < 0,05$ , deci ipoteza de nul se infirmă și se acceptă ipoteza formulată. Experimentul, prin calcule statistico-matematice, confirmă impactul major al folosirii mijloacelor și metodelor fotbalistice în optimizarea capacității vitale a elevilor liceeni, comparativ cu varianta folosirii mijloacelor tradiționale din atletism.

**Cuvinte cheie:** *optimizare, impact, capacitate vitală, mijloace și metode fotbalistice.*

## Introduction

The experiment with the above title is intended to verify the following hypothesis: it is assumed that the systematic and correct implementation of a system of means and methods specific to football play in the physical and sports education lessons can further develop the level of high school students' using traditional means specific to athletics. It is supported by the work and experience of a professor at the department, where after a long observation of students' behavior during their work to develop the resistance of their bodies by traditional means specific to athletics and the finding of an increase in the number of students who did not like them, I came to the conclusion that a change i is all the more useful as it manages to stop the emergence and

development of negative consequences: physical and mental involvement appropriate to the development of resistance, deliberate abandonment due to impotence, procurement of medical relief, and decrease in the resistance index. The necessity of changing the means and methods of action, specific to athletics, imposed by the teacher, with the accepted means and methods of football and the pupils was required. The optimization of the vital ability of high school students in free fall in the context of abusive use of computers and our involvement in mass sports activities has become, as a physical education teacher, a basic preoccupation during the lessons. By implementing in the experiment the independent variable (of the integrated work, which calls for the merging of the technical elements of the football game and the physical ones, in which the optimization of the development of the vital capacity was determined as a constant for the improvement of the pupils' quality of life) we aimed to improve the vital capacity of high school students, and by statistic-mathematical calculus to justify the validity of the formulated hypothesis, thus based on a rigorous scientific ground. According to P. Popescu Neveanu, from a psychological perspective, the effort is a "mobilization, concentration, accelerating of the physical and psychic forces within a system with self-conscious and unconscious self-regulation [...] the effort implies a certain finality, and therefore it is characterized by focus, adherence to the obstacle, strain and unification of physical, mental, intellectual resources "(Bota, 2000). Taking into account these considerations, we used the elements of the game of football as a means of physical school education, knowing that they are loved by pupils and that they mobilize them to concentrate on depositing all the physical and mental capacity for the success of the most correct executions effective way to bring success to execution and the game. Based on the rationalization and standardization of football-specific exercises, I succeeded in mobilizing and capturing the interest of students in making a sustained effort specific to the development of their body resistance, in order to increase the level of vital capacity, which I have succeeded.

Using experimental elements and methods of football game, as a means of school physical education, based on the rationalization and standardization of exercises, I managed to attract pupils to a specific effort to develop the resistance of their bodies, resulting in increased vital capacity.

The need to increase the effectiveness of the means of action for the development of resistance has become the main reason for our research. Knowing that football is coveted by students and demanding a lot of fatigue in the body, I decided to confirm or deny my suspicion that the means and methods specific to football, rationalized and standardized, can optimize the vital capacity, the ability of the high school students to work. To pass on the

research we formulated the working hypothesis, which was a provisional assumption that we verified by confronting reality with a longitudinal scientific experiment, during which thinking was channeled to the observation of the impact of the implementation of the variable independent of the vital ability of high school students.

## **Objectives**

The objectives of the research were: experimental verification of the efficiency of the means and methods specific to the game of football in the optimization of the vital capacity; the development of general resistance and resilience specific to the game of football; the development of the general and football-specific ability to move.

## **Methods**

The methods used for the development of vital capacity were those based on uniform efforts, on intervals and on variable efforts, and the research methods used in the experiment were: pedagogical observation, survey by questionnaire, experimental method, test and measurement method, comparison method, analysis and synthesis method, statistical-mathematical method, registration method, graphic method and statistical significance method and validation.

Hollmann and Hettinger define the effort as "a systematic repetition of motor actions aimed at improving performance without obvious morphological changes (Bota, 2000)". As a result, in order to solve the theme of our research, which involved the improvement of the students' vital capacity, we relied on the construction of the means of football, the choice of working methods and their systematic implementation throughout the school year, both in physical education classes, as well as in sports teams. From a physiological perspective, the effort "causes a series of disturbances in the body that affect major functions, adapting apparatus and systems being dependent on its nature" (Demeter, A., Bota, 2000). For a positive adaptation of the apparatuses and systems of the students' body, in the sense of optimizing the vital capacity, we worked during lessons with the means and methods specific to football, rationalized and dosed accordingly to the achievement of the established goals. The variables obtained in the predictive and summative evaluation were recorded, tabulated, statistically mathematical and compared.

In order for the resistance development activity to be effective, it must be attractive and conducted in lessons by means and methods agreed upon by pupils (finding over the years of teaching), which is why I conducted a 28-questions that had an investigative role among students, simple and clear. In setting up the questionnaire I also set the type of questions. The requested answers were closed (yes or no), free and in fan. "Specifying the type of questions: with induced pre-modified responses "yes", "no"; with post coded free answers; with fan responses, that gives us more answers from which the subject holds one or two that matches his way of being; to think, to act, to interpret events, etc. (Niculescu, 2002)". To provide us with objective data, we

**Table 1.** The statistics of the answers given by the 681 students surveyed by questions that directly refer to the preference to work in lessons with athletics or football, to develop vital capacity, effort, the resistance of their body.

Answers		Preferences for athletics		Football Preferences	
		Nr.	%	Nr.	%
Number of questionnaire questions addressed to students	3	124	18,209	557	81,791
	5	146	21,439	535	78,561
	6	123	18,062	558	81,938
	7	160	23,495	521	76,505
	8	133	19,530	548	80,470
	9	86	12,628	595	87,372
	11	153	22,467	528	77,533
	12	151	22,173	530	77,827
	13	133	19,530	548	80,470
	17	117	17,181	564	82,819
	23	92	13,510	589	86,490
	24	107	15,712	574	84,288
	25	145	21,292	536	78,708
26	124	18,209	557	81,791	
<b>Average</b>		<b>128</b>	<b>18,82</b>	<b>553</b>	<b>81,18</b>
<b>The ranking of preferences</b>		<b>II</b>		<b>I</b>	

interviewed a representative sample of 681 pupils from IX to XII grades studying in the four local high schools chosen for the experiment. We used this mode of investigation because we were interested in the views of the students regarding their preferences over two kinds of means by which to develop vital capacity, exercise capacity, body resistance during physical education classes, and sports: means specific to football or specific means of athletics. The result of the questionnaire survey was enlightening: the preferences of the students for football were 81.18% and for the athletics only 18.82%. By the method of investigation we had the opportunity to get reassured once again about the practical reality observed previously in the instructive-educational activity with the pupils that they are making greater efforts when they agree to the means with which they work during the lessons. The data obtained through the investigation gave us more certainty about the truth when we wanted to find out opinions, answers of individuals and "the purpose of most surveys is only to provide information" (Epuran & Marolicaru, 1998).

In conclusion, on the basis of the overwhelming number of students who prefer football to the detriment of athletics, we can say that the specific means of football play are more appreciated by the high school students than the traditional means specific to athletics. These, used in physically-education classes, with appropriate dosage, can optimise the vital capacity of the student's body.

## **Results**

Approaching integrated work using football-specific means and methods to optimize vital capacity, effort capacity in physical education lessons has been to the liking of the students, has a positive effect on their involvement in sustained effort. Being loved and practiced with pleasure by students, it was found that the deliberate abandonment ceased. In this context, we noticed a much better participation in the sustained effort and an increase in time of the index of the resistance of their body, which confirms the opinion supported by Massimo Giacomini: "The development of resistance is limited by other factors, the first of which is the psychological factor: children are adapting hard to slow-running, which stretches over a longer period of time. In recent years, intermittent methods of resistance training have developed a lot, especially in team sports, so long and slow exercises for the development of aerobic resistance have been

almost completely abandoned " [...]". To train the resistance, use ball-specific exercises, exercise cycles or mixed exercises (with and without a ball), matches and other activities designed to maintain a high level of motivation. The physical-objective game to be achieved is the doctrinal framework that must be at the core of physical training programs (F.R.F.- *Technical guide of the football school (children and juniors)*)". This has increased functional performance, vital and, implicitly, driving power. At the same time other requirements of the physical education program have been solved: the development of general and specific skill, the development of the lower train force, the improvement of the speed, the increase of the courage to fight with the opponent to win, to acquire a pleasant and useful way of spending leisure time and discovering and promoting new talents for performance football.

The success of the integrated model using preparatory means and methods of football was its simplicity, the fact that it can be applied in any school unit with or without a special sports base, but also in its general character that prevents stigmatization of any pupil. Using the means and methods specific to the game of football in order to optimize the vital capacity, the effort capacity, has stopped the deliberate abandonment of the students. In this context, we noticed a much better participation in sustained effort and an increase in the resistance index of their body.

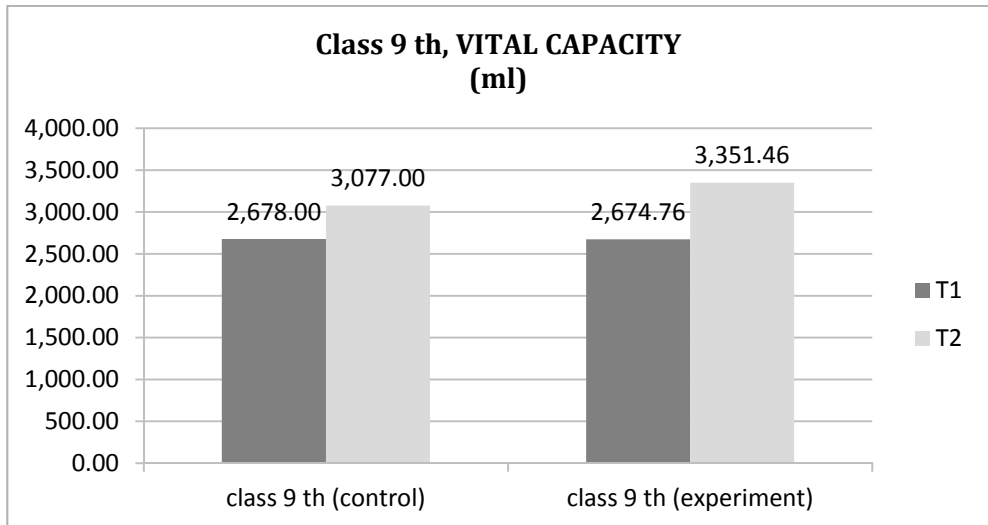
As a result of the experiment applied on eight representative samples (4 experimental and 4 reference), made up by years of study in the 681 high school students in four local high schools, there were biological and motor growths attributed to work with the independent variable (with specific means and methods of football play) introduced into the experimental sample and working with specific means of athletics on the reference samples. The greater progress achieved by the subjects in the summative evaluation of the experimental samples compared to the one recorded in the reference samples is due to the implementation, during a school year, of the means and methods specific to the football game. These proved to be more effective than those specific to athletics with which the subjects of the reference samples worked over the same period, as can be seen from the tables and graphs below on the study level (9<sup>th</sup> and 10<sup>th</sup> grades only, due to the 12-page restriction) with the rigorous comments, which were based on the statistical and mathematical calculations applied to the variables collected from the experiment to the vital capacity sample.

### The level of the 9<sup>th</sup> grades

**Table 2.** The indicators of the 9<sup>th</sup>-grade statistical parameters, the blank sample and the pilot sample, at T1 and T2, cumulated from the four high schools, at the functional sample Vital Capacity

Indicators of statistical parameters		VITAL CAPACITY (ml)	
		Classes 9 <sup>th</sup> Control	Classes 9 <sup>th</sup> Experiment
<b>T1</b>	amount	267.800,000	275.500,000
	minimum	1.700,000	1.400,000
	maximum	4.100,000	5.000,000
	number	100,000	103,000
	Half	50,000	52,000
	<b>arithmetic mean</b>	<b>2.678,000</b>	<b>2.674,757</b>
	median	2.600,000	2.500,000
	standard deviation	611,160	671,864
	amplitude	2.400,000	3.600,000
	coefficient of variation	22,821	25,119
	the Student test	43,818	39,811
<b>T2</b>	amount	307.700,000	345.200,000
	minimum	1.700,000	1.600,000
	maximum	4.600,000	5.500,000
	number	100,000	103,000
	Half	50,000	52,000
	<b>arithmetic mean</b>	<b>3.077,000</b>	<b>3.351,456</b>
	median	3.000,000	3.300,000
	standard deviation	679,684	802,407
	amplitude	2.900,000	3.900,000
	coefficient of variation	22,089	23,942
	Student Significance Index	45,271	41,768
<b>The Pearson correlation coefficient</b>		<b>0,980</b>	<b>0,953</b>
<b>Epsilon Test</b>		9,751	9,628
<b>Test Z</b>		36,270	4,239





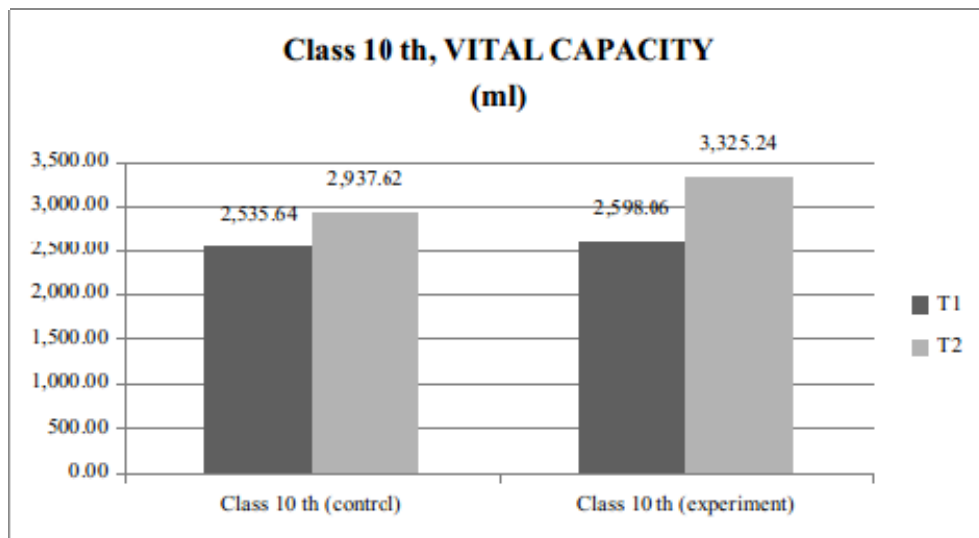
**Figure 1.** Arithmetic mean values of Vital Capacity Level, calculated in classes 9<sup>th</sup>, control and experiment samples, predictive (T1) and summative (T2) testing

The mean VITAL CAPACITY level at baseline was 2678 ml in the control and 2674,757 ml in the experiment class. It increased to final testing to 3077 ml, respectively increased to 3351,456 ml. In the control class there was an increase in the average level by 399 ml, and in the experiment class an increase of 676,699 ml. This results in greater efficiency (+ 70%) in the experiment group assigned to work with the independent variable.

### The level of the 10<sup>th</sup> grades

**Table 3.** Indicators of the statistical parameters of the 10<sup>th</sup> grades, the control sample and the experiment sample, at T1 and T2, cumulated from the four high schools, at the functional capacity Vital Capacity.

Indicators of statistical parameters		VITAL CAPACITY (ml)	
		Classes 10 <sup>th</sup> Control	Classes 10 <sup>th</sup> Experiment
<b>T1</b>	Amount	256.100,000	267.600,000
	Minimum	1.600,000	1.400,000
	Maximum	4.400,000	4.700,000
	Number	101,000	103,000
	Half	51,000	52,000
	<b>arithmetic mean</b>	<b>2.535,644</b>	<b>2.598,058</b>
	Median	2.400,000	2.500,000
	standard deviation	640,944	678,087
	Amplitude	2.800,000	3.300,000
	coefficient of variation	25,277	26,100
	the Student test	<b>39,561</b>	38,315
<b>T2</b>	Amount	296.700,000	342.500,000
	Minimum	1.600,000	1.600,000
	Maximum	5.000,000	5.400,000
	Number	101,000	103,000
	Half	51,000	52,000
	<b>arithmetic mean</b>	<b>2.937,624</b>	<b>3.325,243</b>
	Median	2.900,000	3.200,000
	standard deviation	733,208	842,294
	Amplitude	3.400,000	3.800,000
	coefficient of variation	24,959	25,330
	Student Significance Index	40,065	39,478
<b>the Pearson correlation coefficient</b>		<b>0,975</b>	<b>0,950</b>
<b>Epsilon Test</b>		9,751	9,591
<b>Test Z</b>		32,215	3,432



**Figure 2.** Arithmetic mean values of Vital Capacity Level, calculated in 10<sup>th</sup> grades, control and pilot samples, predictive (T1) and summative (T2)

The mean VITAL CAPACITY level at baseline was 2535.644 ml in the control and 2598.058 ml in the experiment. It increased to final testing to 2937.624 ml, respectively increased to 3325.243 ml. In the control class there was an increase of the average level by 401.98 ml, and in the pilot class an increase of 727.184 ml. It results in greater efficiency (+ 81%) in the pilot group assigned to working with the independent variable.

In class 11<sup>th</sup>, the mean VITAL CAPACITY level at baseline was 2859.494 ml in the control and 2976.106 ml in the pilot. It increased to final testing to 3360,759 ml, respectively up to 3732,743 ml. In the control class there was an increase in the average level by 501,266 ml and in the pilot class an increase of 756,637 ml. It results in greater efficiency (+ 51%) in the pilot group assigned to work with the independent variable.

In class 12<sup>th</sup>, the mean VITAL CAPACITY level at baseline was 2913,793 ml in the control and 2392,308 ml in the pilot. It increased to final testing to 3348,276 ml, respectively increased to 3013,462 ml. In the control class there was an increase of the average level by 434,483 ml, and in the pilot class an increase of 621,154 ml. This results in greater efficiency (+ 43%) in the pilot group assigned to work with the independent variable.

## Conclusions

For the four experimental samples (made up of the 9<sup>th</sup>, 10<sup>th</sup>, 11<sup>th</sup> and 12<sup>th</sup> grade students) at the VITAL CAPACITY sample, we can state that due to working with the means and the specific methods of the game of football applied in the experiment, there resulted a higher efficiency than the reference ones who worked with the traditional means of athletics. The mean values of the vital capacity level had increases in the summative evaluation of the experimental and reference samples, but higher in the experimental samples. The Pearson correlation coefficient was positive in the positive sense and has a high correlation. The Student Significance Index is higher than the critical table value (1.96) at the threshold  $p < 0.05$ , so it is significant with a probability of 95%. The progress of the maximum expired air volume is due to increased chest elasticity and ventilation capacity, which have been improved by our intervention in training with specific means of football play, the independent variable introduced into the experiment. The systematic development of exercise capacity through football means enriches the content of physical education and creates important physiological and psychological effects for general physical training, providing valuable impulses for self-improvement.

Finally, we can say that the impact of the use of football means and methods in high school students' physical education is favorable to the optimization of vital capacities compared to those specific to athletics.

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