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Effectiveness of resistance development through football at high school students

Alexandru - Radu BĂDOI[1], GheorgheMONEA[2]

Abstract

The purpose of the research is to optimize the development of high school students' resistance through integrated work using means and methods specific to football. Experimental verification of the effectiveness of the specific means of football playing in the development of high school students' resistance. The experiment was carried out on 681 subjects. For the development of resistance, the independent variable was implemented in the subjects of the experimental sample. All subjects were predictive and summative in the 10 samples: three motor samples, three functional samples and four somatic samples. The specific methods used in the experiment for the development of resistance were based on uniform efforts, varying intervals and efforts, with appropriate dosages leading to progress.
In the final evaluation, the subjects of the experimental sample and of the reference sample progressed towards the predictive assessment, but those of the experimental sample progressed more than the subjects of the reference sample to all the samples and tests given. The effectiveness of implementing the independent experimental variable in the experimental sample subjects was 61% compared to the subjects of the reference sample. In the experiment, we used the statistical-mathematical method using arithmetic mean, median, modulus, standard deviation, amplitude, mean error, variability coefficient, Student test, Pearson correlation coefficient, Epsilon test and Z test. Higher progress in the subjects of the experimental sample. The difference between the mean of the experimental sample and the reference sample was significant at the significance threshold p <0, 05, with a probability of 95%. The value of the Pearson correlation coefficient is very high (between 0.9 and 1) to 83.33% of high cases (between 0.7 and 0.9) to 13.88% and mean (between 0.5 and 0, 7) in 2.79% of cases, meaning that the results obtained at each sample are significant. The progress of the subjects in the experimental sample was superior to the progress of the reference sample, so we can state that the dependent variable is significant, the assumptions of the research are verified and validated.
***Keywords**:* resistance, optimization, means, football, integrated.

Rezumat

Scopul cercetării este optimizarea dezvoltării rezistenţei elevilor liceeni prin lucrul integrat folosind mijloace şi metodes pecifice jocului de fotbal si implicit creşterea capacităţii de efort a organismului. Experimentul s-a desfăşurat pe un număr de 681 de elevi. Toţi subiecţii au fost evaluaţi predictiv şi sumativ la cele 10 probe: trei probe motrice de rezistenţă, trei probe funcţionale şi patru probe somatice. Metodele specifice utilizate în experiment pentru dezvoltarea rezistenţei s-au bazat pe eforturi pe intervale şi eforturi variabile, având o dozare corespunzătoare care să conducă la progres. La evaluarea finală, subiecţii eşantionului experimental şi ai eşantionului de referinţă au progresat faţă de evaluarea predictivă, însă cei ai eşantionului experimental au progresat mai mult decât subiecţii eşantionului de referinţa, la toate probele şi testele date. Diferenţa dintre media eşantionului experimental şi cea a eşantionului de referinţă a fost semnificativă la pragul de semnificaţie p<o,o5, având o probabilitate de 95 %. Valoarea coeficientului de corelaţie Pearson este foarteî naltă (între 0,9 şi 1) la 83,33 % dincazuri, înaltă(între 0,7 şi 0,9) în 13,88 % şi medie (între 0,5 şi 0,7) în 2,79 % din cazuri, însemnând că rezultatele obţinute la fiecare probă sunt semnificative. Progresul subiecţilor din eşantionul experimental fiind superior progresului eşantionului de referinţă putem afirma că variabila dependentă este semnificativă, ipotezele cercetării sunt verificate şi validate.
Cuvinte cheie: *rezistenţă*, *optimizare*, *mijloace*, *fotbal*,*integrata*

[1] PhD Student, Babes-Bolyai University, Cluj_Napoca, Romania, Faculty of Physical Education and Sport, *e-mail: alex_colosseum@yahoo.com*
[2] Prof., Babes-Bolyai University, ClujNapoca, Faculty of Physical Education and Sport

Introduction

The above-mentioned research paper contains a longitudinal experiment to verify the hypotheses formulated as a result of the long-term observation of pupils' behavior in physical education lessons when they worked to develop the resistance of the body in the context of diminishing their interest in movement for work on computer and Internet browsing. The research is built on a solid and current theoretical foundation, supported by the author's experience in working at the department. It focuses on the emotional physical and technical problems of the age of high school students, who want to work with their own means in the presence of simpler rules that can induce a state of comfort without being stigmatized. In this context, the level of resistance development is in direct relation to their well-being, mediated by the feeling of personal satisfaction at the time of the effort.

The work combines theory, research, and practice, thus providing a broad perspective on working with high school students to develop resistance to their body. It is completed by offering an integrative model of adolescent pupils attracted more by the virtual environment than by outdoor movement in a pleasant environment, which can achieve, besides the optimization of resistance and other objectives and requirements of the physical education program.

The content of the paper is structured on three parts plus conclusions and proposals:

- Part I: Theoretical and scientific foundation of the papers(has four chapters);
- Part II: Personal contributions to optimize the development of high school student resistance in extra class physical and sports classes, by means of specific football play (has three chapters);
- Part III: Presentation and statistical processing of the data obtained by the subjects at the evaluations - analysis and interpretation of the results of the experiment (it has a single chapter with two subchapters and four paragraphs).

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 requires a lot of body, due to the alternation of high effort moments (short, medium and long sprints, accelerations and decelerations, jumping, shoulder-to-shoulder hitting with the opponent, changes in direction from running, with and without ball, etc.) of less effort, the fact that he produces fatigue and is loved by the students, I decided that through research I can confirm or deny my suspicions during the years of teaching at the chair, that the means and methods specific to football, rationalized and standardized, can optimize the development of high school students' resistance to a higher index and in a more agreeable and pleasant way than through specific means of athletics that do not attract them and do not mobilize them. By implementing the independent variable in the experiment, we sought to improve pupils' ability to work and, by statistical and mathematical computation, to justify the validity of the proposed hypothesis, based on a rigorous scientific substrate.

According to the preamble of P. Smith-Neveanu (quoted Bota. C. 2000), the psychological perspective, the effort is to mobilize ,,conduct, concentration, physical and mental acceleration forces in a conscious and unconscious self-adjusting system [... .] the effort implies a certain finality and is therefore characterized by focus, suitability to the obstacle, strain and unification of the physical, mental, intellectual resources" [2]. Given these considerations we used in the experiment elements and processes play football as a means of physical education school, knowing that they are loved by the students, and that they mobilize and concentrate to deposit all physical abilities and mental for the success of executions as accurate and effective way to bring success to execution and the game. Rationalizing and standardizing specific exercises football we managed to mobilize and capture the interest of students towards making a sustained effort, specifically their body resistance development, with the aim of increasing exercise capacity, which I did.

Methodology

The aim of the research is to optimize the development of high school students' resistance by integrated work using means and methods specific to football.

In other words, I started the research with the aim of proving that football means develop pupils' resistance more than the specific means of athletics.

The main objective of the research was to increase the efficiency of the development of high school students' resistance in the educational process by means and methods specific to the football game. The research benchmark was the expected result at the end of the experiment, after the implementation of the independent variable, which was achieved through the proposed content (s) for action.

Hypothesis

Based on previous observations in physical education lessons and logic, that a change is all the more useful as it manages to stop the emergence and development of negative consequences, we considered a complex approach to developing the resistance of high school students by implementing a work model based on integrated training, using the means and methods specific to the football game,

right for the car, we formulated the following hypotheses in the desire to increase the capacity of the students' body:

- It is assumed that the systematic and correct implementation of a system of means and methods specific to the football game in the physical and sports education lessons can further develop the level of aerobic resistance of high school students, rather than using only traditional means specific to athletics;
- If in the physical education classes the teacher educates high school students with specific means of football play, optimization of the motor skills indices, which will positively influence the students' lesson during the approach of the themes planned during the two semesters of the school year;
- If you are acting with specific means of playing football, rationalized and standardized at the technical level of high school students, the index of aerobic resistance increases.

The integrated work, using the means and methods specific to the football game, in our research leads to specific complex accumulations from the pupils: biological (through the objective effects in the plan of functional development and at the adaptive level of the body-physical, technical, tactical), pedagogical (through the didactic process with which it operates) and psychological (through the characteristic, moral, emotional implications of the student's personality) "The practice of the game influences the restructuring of the functions of the various organs and systems that favor the mechanism of adapting to the effort of the whole organism to increase its functional capacity" [6]. The football game itself is not only an exercise but a biological and psycho-motor development itself. By nature, football has different content. At the same time he is exercise, recreation, communication with the environment, liberation from everyday tensions, emulation, flexibility and speed in making decisions in the occurrence of various situations, sharpening instincts "football is a very complex system of action, different in content and structure, involving adversity, triggering unique emotions - coaches, players, public - in order to achieve a certain goal" [1].

Results

In both stages of our study, the progress of the subjects in the experimental samples was clearly greater than that of the subjects in the reference samples.

The approach of integrated work using football's means and methods to optimize resistance in physical education lessons has been to the students' motivation and motivation, positive factors for their involvement in sustained effort. Being loved and practiced with pleasure by students, it was found that 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 ones supported by Massimo Giacomini (Romanian Football Federation - TEACHING GUIDE FOR THE FOOTBALL SCHOOL, for children and juniors) - "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 teacher that must be at the core of physical training programs." [4].

As a result of the experiment applied in the first stage, eight representative samples (4 experimental and 4 reference), compiled by years of study from the 681 high school students from four local highschools from Hunedoara County, have registered increases of nature biology and motricity attributed to work with the independent variable (with means and specific methods of football play) introduced in the research on the experimental samples and work with specific means of athletics in the reference samples. The greater progress made by subjects in the summative evaluation of the experimental samples compared to the one observed in the reference samples is due to the implementation, during a school year, of the means and methods specific to the football game (which). These proved to be more effective than those specific to the athletics that the subjects of the reference samples worked over the same period. All the results of the summative evaluation of the subjects in the experimental sample obtained in all the samples included in the experiment indicate increases both in their own predictive evaluation and in the results of the summative assessment of the subjects in the reference sample. Because the statistical values of the mean of the motor, functional and somatic samples are (positive) higher in the final evaluation of the experimental sample compared to the initial one and the averages obtained by the reference sample in the final evaluation of the subjects, the research hypotheses are confirmed.

Knowing that "The degree of representativeness depends, on the one hand, on the composition of the samples, i.e. on the quality of the elements that make them, and on the other hand, on their volume, i.e. on

the number of elements contained in each sample" [3]. (Due to the double research performed) and having a double survey of representative samples of the school population, comprising 681 students, we can assert with greater certainty that the result of our experiment is correct and significant, the hypotheses formulated and can be generalized at the level of the basic population, the high school students in the classes of the schools in Hunedoara County.

Discussions

Participants: The total number of students enrolled in the experiment was 681, coming from 28 grades IX-XII, two at each study level from four high schools in the city, which by randomization formed the classes called "A" formed the reference sample and the classes called "B", which in turn formed the experimental sample. The student subjects were evaluated in the 2015-2016 school year in high schools, under the same conditions at 10 samples, predictive in September-October and summative in May-June. Materials used as measuring instruments were: tensiometers, metronome, pulse oximeters, spirometer, stopwatch, scale, metric band.

Figure 1 The students' response regarding the preference for athletics or football of students

In the two semesters of the school year, students were working with the students to develop resistance according to the protocol (after the calendar development of resistance development).

The methods used for the development of resistance were those based on uniform efforts, on intervals or fractionated and on variable efforts, and the methods of research used in the experiment were: pedagogical observation, questionnaire, experimental, testing and measurement, comparison, analysis and synthesis , statistical-mathematics, registration, graphics and statistical significance method and validation.

Hollmann and Hettinger (quoted by Bota, C., 2000) define the effort as "a systematic repetition of motor actions aimed at improving performance without obvious morphological changes" [2]. 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" [2](Demeter, A., quoted by Bota, C., 2000). For a positive adaptation of the apparatuses and systems of the students' body, in the sense of optimizing the effort capacity, we worked in lessons with the means and methods specific to football, rationalized and dosed accordingly to the achievement of the established objectives.

The variables obtained from the assessments, on samples, were recorded, tabulated, statist-mathematically processed and compared.

Protocol

All subjects included in the experiment were subjected to the same tests: resistance test (Cooper

test, complex test and ascending climb), functional (Ruffier test, vital capacity and pulse oximeter) and somatic (waist, weight, Quetelet nutrition index and thoracic perimeter).
For training, we fit the soccer means into complex technical and tactical structures, in roundand technical and tactical series. We have rationalized and objectified as much as possible the drive systems set out in annexes to the calendar plans to achieve the

Tabel 1 Preferences for athletics or football

Answers		Preferences forathletics		Preferences for football	
		Nr.	%	Nr.	%
The 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
Average		**128**	**18,82**	**553**	**81,18**
The ranking of preferences		**II**		**I**	

development of resistance and other objectives pursued by school physical education "The football game develops on a higher level the general and specific motricity as well as the physical qualities which are also an important objective of physical education"[6].
The established principles of physiology and psychology on the methodology of developing motor skills impose the necessity of multiple repetition of certain means in precise actuation systems for obtaining better indices of resistance in our case. In order for the resistance development activity to be attractive, it must be done in the lesson by means and methods agreed by the pupils, which is why we have conducted a questionnaire survey with 28 formulated simple and clear. In determining the questionnaire type we took them into account: "with pre-modified closed dihotonic answers: yes, no; with free, post-coded responses; with answers in the fan" [7]."Polls are tattered through surveys and the dispersion of answers is being tested" [5].
To provide us with objective data, we interviewed a representative sample of 681 pupils from grades IX through XII 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 about their preferences regarding two kinds of means by which body resistance can develop during physical and sports education: specific means of football or means specific to athletics. The result of the questionnaire survey was edifying: (Table 1) the preferences of the students for football were 81.18% (and) and for the athletics 18.82%.
By the method of investigation we had the opportunity to persuade us once again about the practical reality observed previously in the instructive-educational activity with the pupils that they are making more efforts when they agree with the means with which they work in the lessons, the ones specific to the football game. The data obtained through the investigation gave us more certainty about the truth when we wanted to find out opinions, answers of individuals. From the students' answers to the questions of the questionnaire regarding the notions of regulation in athletics, we found the lack of knowledge of the simplest requirements, while in terms of the notions of football, the knowledge amounts to an overwhelming percentage.
In conclusion, we can say that the means specific to the football game are much more appreciated by the high school students than the traditional means specific to athletics. They, used in the physical education lessons, with appropriate dosage, can optimize the development of the resistance of the students' b

Conclusions

In our research who focused on the development of resistance more effectively, we have implemented a working model based on integrated training. The model expresses a new vision, namely the merging of the technical and physical elements in which the optimization of the resistance development is determined as a constant. He suggests that a change is

all the more useful as it manages to stop the emergence and development of negative consequences (the continual decrease in physical and psychological resistance of the body), succeeding in improving the quality of life of the students.

Throughout the experiment, the model approach has produced a positive effect on student engagement at higher effort, thus increasing their performance and highlighted the existence of complementary goals in addition to the development of resistance, namely: development of general and specific skill, development of lower train force in particular, improving the speed, the courage to fight opponents to win, to acquire a pleasant way of spending free time and last but not least to discover and promote new talents in the football game. The success of the proposed model lies in its simplicity, in the fact that it is applicable in any school unit with or without a specific sports base, but also in its general character that avoids stigmatization ofany pupil.

The positive results obtained by the experiment allow us to conclude:

1. The progress we have made in the final assessment is the effect of educating students with specific means of playing football during a school year, the results of our research confirm the working hypotheses formulated.

2. Our study, through the final research results, highlighted the assumption of the hypotheses formulated, which allows us to assert that the efficiency of integrated training, using the means of football, is an increased development of resistance through athletic means, which are not as attractive for students without the loved object called ball.

3. The idea of dependence on the degree of resistance development is shaped by the pupils agreeing on the means the professor uses, the pleasure with which they work for this purpose. It is therefore necessary to adapt the contents of the training in motivational, morpho-functional and motric terms.

If the means used by the teacher in training are not agreed upon by pupils, then the level of their psychological comfort has decreased and negatively affects the emotions and performances, and the teacher-student relationship has already been altered

4. The positive difference between the mean scores of the subjects in the pilot classes compared to those obtained on the samples in the summative and the predictive assessment shows the increase of the exercise capacity of the students' body. The results of the summative evaluation of the experimental samples obtained in all the samples and tests included in the experiment indicate increases both in relation to its own predictive evaluation and to the results of the summative assessment of the reference classes.

5. The large number of classes in which experimental research was conducted (14 experimental and 14 reference, two parallel on the same level of study, with a total of 681 subjects) constituted a representative sample of lyceum students in Hunedoara County to be able to say that the data recorded in the evaluations, processed, analyzed and synthesized, represents the school population of the county.

The final results recorded in the practical research activity confirm the predictions of the basic hypothesis and support the implementation of the new means.

References

1. Apolzan D.(2013) - *Football - Game Technique - Another Approach.* Rotech, 48;
2. Bota C. (2000), *Ergophiziology.* Globus,7;
3. Epuran. M., Marolicaru M. (1998) *Methodology of Physical Activity Research*. RISOPRINT, 72;
4. F.R.F. *Technical guide of the football school (children and juniors)*.F.R.F., 133:135;
5. Gagea A. (1999).*Methodology of Scientific Research in Physical Education and Sport*. "Romania of Tomorrow" Foundation, 226;
6. NeţaGh., PopovicC. (2000). *Football FEFS 2000. JRC, 40;*
7. Niculescu M. (2002).*Methodology of Scientific Research in Physical Education and Sports*. ANEFS, 331-332;