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EVOLUTION OF SPEED IN SECONDARY SCHOOL STUDENTS

Gheorghe LUCACIU*
University of Oradea, Faculty of Geography, Tourism and Sport, Department of Physical education, Sport and Physical therapy, e-mail: ghita_lucaciu@yahoo.com

Sergiu HADADE
University of Oradea, Faculty of Geography, Tourism and Sport, Department of Physical education, Sport and Physical therapy, e-mail: spaimander@gmail.com

Luminița Anca DEAC
University of Oradea, Faculty of Geography, Tourism and Sport, Department of Physical education, Sport and Physical therapy, e-mail: anca_deac@yahoo.com

Abstract: Given the multilateral development of the human personality, physical education is an integral part of the training and education of the youth, contributing to the successful fulfillment of the general tasks in the direction of human formation in society. The objective and natural connection with the other components of multilateral education is determined by the social needs, by the context in which people must develop from all points of view, both physically and mentally, in order to be able to work efficiently, creatively. Among the motor qualities/capacities, the forms of manifestation of speed extend their manifestation area either on the development of coordination, force and not least on the capacity of the body to sustain an intense physical effort in order to achieve an objective in the shortest time with a relatively constant efficiency, which justifies the interest of those who approach the subject. Given the biological and physiological conditionality regarding the forms in which the speed is manifested, the moment when the pedagogical intervention on their evolution occurs is one of great importance. The present paper aims to highlight how speed evolves as a result of the effects of practicing physical education.

Key words: evolution, motor qualities, speed, physical education, secondary school

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INTRODUCTION

Given the multilateral development of the human personality, physical education is an integral part of the activity of training and educating the youth, contributing to the fulfillment of the general tasks in the direction of human formation as a member of a community (Cristea and Sabău, 2017). Formation of the students' habit of systematically practicing physical exercise should be carefully followed and guided so that the practice gradually becomes a habit.

The physical and mental qualities are the product of three essential factors: heredity, the natural and social environment and education (Lloyd et al., 2013). What is the contribution of each

* Corresponding Author

factor in the formation of the human personality, in what proportions do they coexist and how are they interwoven are only a few questions to which the specialists are still looking for an answer. But one thing is certain: man and his qualities are perfectable through education (Cârstea, 1999). On the other hand, the achievement of the objectives of physical education is possible only if it is systematically pursued to carry out essential purposes for motor training and their education, among which is the development of motor qualities (Baroga, 1984).

Over time, the ”conditional” character of the level of development of motor qualities in relation to the quality of forming and consolidation of motor skills has often been emphasized (Mitra and Mogoș, 1977); however, sometimes for objective reasons (the amount of physical education activities), the concern oriented towards the development of motor qualities is secondary.

Data from bio-psycho-motor and pedagogical research have shown that in order to organize the instructional-educational process according to the demands of contemporary life regarding the preparation of school youth, it is imperative to have a clear representation on the developmental stages of children (Buhaș et al., 2018). Middle school age or pre-adolescence is the period in which the pupils with whom the pedagogues work in the secondary school falls and is characterized by the beginning of the physical maturity of the individual, being a stage of intense formation of the personality and the moral conscience. ”It is very difficult or almost impossible to establish precisely some temporal benchmarks of these psycho-physical transformations, as there are so many individual and regional differences” (Epuran, 1976, p. 96).

The indices of the development of the motor qualities increase by themselves due to life, up to a certain age and then begin to decrease in a differentiated rhythm, determined by several variables of which are mentioned: nutrition, family environment, social environment, economic environment etc. Through the special training process, the development of the motor quality indices can be accelerated, a phenomenon identified with the syntagma ”motor quality education” (Cârstea, 1999, p. 23).

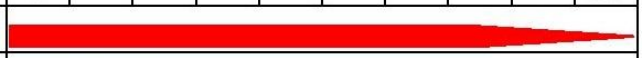
AIM

A recent classification of motor qualities, divides them into three groups, called motor capacities: conditional capacities, coordinative capacities, intermediate capacities (Tudor, 1999), given that the use of the name of motor capacity (conditional and coordinative) is still used in Europe since 1968 (Dragnea and Bota, 1999). Since there is some incompatibility between the international and Romanian terminology due to the difficulties of translation, we will continue to use the phrase ”motor qualities” instead of skills. For a long time, specialists in the field have sought to be as close as possible to the truth in relation to the optimal periods of development of motor qualities (Thiebault and Sprumont, 1998). Table no. 1 summarizes the author's opinion on this aspect (Drăgan, 1997). From the analysis of this graph it follows that the optimal ages most favorable in terms of yield for the development with specific means of speed and coordination are the lowest, which also implies the proper improvement of the vegetative functions that support and serve the motor activity (circulation, respiration, vasomotricity, internal secretion etc.). ”Only the close correlation and the corresponding level of the morphological development and the functionality of the somatic and vegetative systems can ensure the development to a high degree of improvement of the motor qualities, which are necessary to achieve the current performances, extremely high in sports worldwide” (Drăgan, 1997, p. 58).

The formation of a broad base of motor skills, as well as the development of motor qualities, is one of the basic objectives of physical education in schools (Trifa, 2016). The motor qualities have to be approached and developed in a balanced way according to the particularities of age, gender, level of training, material conditions.

The purpose of this approach is to highlight the correlation between scientific knowledge data and objective reality

Table 1. The evolution of the motor qualities
(Data source: Drăgan, 1997)

No.	MOTOR QUALITIES	AGE
		0 ... 30+
1	SPEED	
2	STRENGHT	
3	COORDINATION	
4	ENDURANCE	

OBJECTIVES

To conduct preliminary research (applicative type) we proposed the following goals:
- the study of the specialized literature;
- establishing the sample classes;
- performing the tests;
- the statistical-mathematical interpretation of the results and the comparative study of the values;
- conclusions regarding the results obtained.

MATERIALS AND METHODS

The sample under evaluation consisted of a number of 96 people (52 boys and 44 girls) in each grade of the secondary school (5^{th} to 8^{th} grade), students of ARTS HIGH SCOOL in Oradea (table 2).

Table 2. Sample structure

GRADE	GIRLS	BOYS	TOTAL
V	12	11	23
VI	15	13	28
VII	8	13	21
VIII	9	15	24
Total/grade	44	52	96

The test of speed capacity assessment consisted of running on the distance of 50 m. The starting line as well as a corridor with a width of 1.25 m were marked with milestones placed every 5 m. The timing was done manually, with the help of an electronic stopwatch. The 50 m speed running test was run with free start (self-controlled) and timing on the move, with each subject entitled to 2 attempts; the best attempt was counted.

The collected data were processed using the statistical tools of Microsoft Office 2010, using those indicators that allow a more complex analysis of the samples. The graphics were realized using the EXCEL program, which is efficient and easy to use.

RESULTS

The synthesis of the results obtained at the 50 m speed test, measured in seconds, tenths and hundredths of a second, are materialized in table 3.

As can be seen, the evolution of speed development is neither linear nor in total agreement with the evolution of biological, physiological or psychological age features (Epuran, 1976; Dragnea and Bota, 1999), and can be influenced by other factors, of a subjective nature.

The rate of evolution of the average by both gender and class expressed as a percentage is illustrated in table 4.

Table 3. Synthesis of the results on 50 m speed test

Gender	Av./grade		Boys		Girls	
Initial/Final Test	IT	FT	IT	FT	IT	FT
Grade/Class						
5th grade	8.90	8.61	8.61	8.31	9.18	8.88
6th grade	8.89	8.60	8.70	8.43	9.08	8.80
7th grade	8.40	8.31	8.40	8.04	9.25	8.71
8th grade	8.48	8.30	8.33	8.14	8.86	8.60

Table 4. Evolution of average performance (in percentage) by gender and classes from IT to FT

Class	**IT → FT Boys** (%)	**IT → FT Girls** (%)	**IT → FT Average by classes** (%)
5th	3.49	3.27	3.26
6th	3.11	3.09	3.27
7th	4.29	4.84	1.18
8th	2.29	2.94	2.13

The optimal difference from the previous class (the vertical difference) and the evolution of the maximum value makes us say that:

- maximal increasing was registered in the 7th class (compared to the 6th), both for girls and boys;
- the largest increase was for girls on the same level;
- the smallest increase was registered in the 8th class (compared to the 7th), both for girls and boys;
- the increase was better for girls then boys on this level;
- the highest increase in class average was in 6th class (compared to 5th);
- the smallest increase of the class average was in the 7th class (compared to the 6th).

DISCUSSIONS

Finding by comparison the trends of evolution, involution or plateau of the somatic and motor parameters, offers a relevant synthesis on the determining factors regarding the morphological and functional growth and development of the students in the secondary school. The speed evolves according to the maturation of the morpho-functional substrate nervous and muscular (Wilmore and Costill, 2002) and because these two systems do not evolve in parallel, the speed can be efficiently influenced only during certain periods of life (Manno et al., 1993).

The results highlight by confirming known aspects of the specialized literature, but also paradoxes:

- 12-15 years is the period when the reaction time reaches the value of the adult (Manno, 1996) and the evolution of the velocity occurs mainly on account of the increase of the force;
- The evolution of the performances shows a very low degree of homogeneity, highlighted by the difference between the genres and the class averages (7th class);
- Although at the level of the 8th class the expectations are the highest due to the level of hormonal metabolism, the maturation of the cerebral cortex, the balance of the superior nervous processes, the natural acquisition of force etc. (Wilmore and Costill, 2002), the results are modest especially for boys;
- In part, the objective situation may be due to the insufficient evolution of the technique in relation to the level of development of the supporting motor qualities;

Given the biological and physiological conditioning, the development of speed at this age level should be a priority objective, combined with the acquisition of an appropriate technical component and the development of the other forms of manifestation of motor qualities and combined motor qualities (Marinău, 2017). All methods and means are likely to give results, but they must be chosen according to subject (age, level of training, other characteristics), the objective pursued and its particularities as well as the material means available.

Aknowlegments

The data are part of the graduating paper of the second author, guided by the first author. All three authors had the same contribution.

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