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# Study on the Influence of Coordinative Capacities on Motor Performance of Primary School Students

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## *Abstract*

*We can say with certainty about children's coordinative capacities that they have a wide applicability in both daily and sporting activity, which means that they are native and perfectable qualities if subjects act on them selectively, continuously and as early as possible. Coordinative capacities represent a combination of complex qualities, which interfere with all other motor qualities. At the young school age, due to the maturation of the nervous system and as a result of the large number of organized motor skills, the level of coordination improves. The ease of learning the movements is benefited by a certain type of cognitive and sensory development recorded during this period and that materializes in the capacity of perception and observation. As far as the skill is concerned, the muscular strength increases and the ambidextrous character is emphasized, but also the extremities of the left and the right are highlighted. Ossification at this stage is intense at the level of the pelvis in the girls, as well as the calcification processes at the level of the hand, the joints strengthen and the volume of the muscles increases, the fine musculature of the hand develops. With all this in mind, it is important to work with care, as any kind of exaggeration or incorrect positions leads to persistent deformations. The morphofunctional maturity of the young children of school age implies the adaptation of the body to certain physical efforts, to the formation of awareness skills and to the relatively rational coordination of their movements.*

**Keywords:** *coordinating skills, motor performance, students, primary education.*

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## 1. Introduction

The choice to deepen such a complex problem from the point of view of intra- and interdisciplinary notions, but also as a degree of reflection of the theme in the specialized literature, results from the complexity, interdependence and level of application of the educational invoice phenomena included in the relation teaching - learning - evaluation.

In the past and at present as well the attention of psychologists, physiologists and educators has been directed towards the importance of physical education on young school-age children, with movement and physical exercise having a special importance in their multilateral development. This age period is very receptive and flexible to the training process regarding physical school education.

Also, within the specialized scientific manifestations, we have found that there are few works that highlight the importance of knowing the bio-psycho-social potential of this age category, or new methodologies in approaching the instructional-educational activities specific to the physical education hours.

So far, in the field of physical education theory and methodology, a rich material has been developed that represents a starting point for the development of motor skills and especially of the coordinative ones, for students in the primary classes. The specialists of the field of physical education and sport agree that it is necessary to introduce exercises based on coordination at the age of pre-adolescence, because it is not a good time to start the coordination training in the next stage. At the same time, the influence of coordination abilities on the general motor skills in the students of young school age has not been sufficiently studied.

According to the author Balint L., [2] quoting Tudor V. (1999) "Conditional capacities are based on the metabolic efficiency of muscles and devices, and are part of their group: strength, endurance and speed. For Bompa T.O., [1] coordination is the basis of a good physical condition, essential for acquiring and improving skills. Analysing these conceptual delimitations regarding the motor capacity, we consider that the mental and functional processes influence the structural and qualitative characteristics of the motor acts and actions specific to the individual. In conclusion, referring to the claims of the specialists of the field, the motor qualities have inter-conditioning relations, they have characterization elements, they are based on the mobilization of the energy reserves, and their evaluation allows the objectification of the physical training and the physical condition and are components of the motor capacity of the individuals systematized on clear and in-depth criteria.

According to the Explanatory Dictionary of the Romanian Language, the word "coordinate", from the French language - "coordinator", means "to agree the parts of a whole, to guide in a unitary sense a series of activities carried out for the same purpose", and the word "coordinated" means "agreed (with the other parties or in all its parts); harmonized ". In the same source we find the word "skill" which has the following meaning: "the ease of doing something as a result of a good skill or inclination; skill, ability, skill, skill". T. Sbenghe, quoted by Rață G. [5], understand by coordination "the combination of the activity of a number of muscles within a continuous, smooth movement scheme, executed under normal conditions".

The same capacity is also defined as "a psycho-motor quality, which is based on the correlation between the central nervous system and the skeletal muscles during a movement" [7].

Coordination capacities are indispensable at the level and development of physical capacities, as they allow the acquisition of sports skills necessary for the education and body training processes [6], [8].

In conclusion, at the level of the primary stage, we considered 5 forms of manifestation of the coordination capacities, namely: the capacity of appreciation and regulation of the dynamic and spatio-temporal parameters; the ability to maintain balance; sense of rhythm; the ability to orient in space; the ability to coordinate the movements.

This capacity must be developed from an early age, the development of coordinative capacities at the appropriate time being decisive with regard to the degree of education of this later capacity. The main method of developing the coordinative capacity is to practice [3], [4].

The main means used in the development of coordinative capacities:

- exercises to imitate some imposed motor sequences;
- variation of information - by limiting information (blindfold, eliminating acoustic information, etc.) or amplifying them (video representations, demonstrations, etc.);
- variation of extreme conditions - modification of dimensions, installations (diameter of the ball, height of the net, limitation of space, etc.);
- combining some (technical) skills already automated - they are executed either simultaneously or one after another;
- the variation of the execution of the movement - it is realized by the partial execution of the phases of a motor sequence or by coupling between them the partial phases of that motor sequence;
- exercises performed on fatigue background - it is avoided to use them when combining several techniques, in the case of beginners, in the periods of correction of mistakes;

- Exercise with time control - the exercises are performed at the fastest pace, or at different intervals. The exercises must be well learned by the subject.

## **2. Problem Statement**

The problem of the research is the insufficient approach to the process of elaboration of the content of the physical education program with the specific of the development of coordinative capacities adapted to the characteristics of the primary cycle, which will allow the maximum exploitation of the bio-psycho-motor potential of the students of this age stage. In this context, we can say that any approach aimed at improving the process of physical education in school is topical, which is why establishing certain links between coordinative skills and other motor skills is a topic of interest in specialized practice and theory.

The current scientific problem concerns the approach of the physical education lesson from the perspective of the predominant use of the means for the development of the coordinative capacities, to the students of the primary education stage. The research (it wants to demonstrate) shows that the rational management of these means during the physical education hour, determines a higher level of manifestation of the coordinative capacities and implicitly of the motor performance, leading to a better achievement of the objectives of the lesson.

Objectives of the paper:

1. Elaboration of models in order to apply the specific means for developing the coordinative capacities and highlighting their influence on the motor capacity.

1. Theoretical and experimental argumentation of the design of the system of specific means for the development of the coordinative capacities within the physical education lessons.

## **3. The purpose of the research**

The aim of the present research is to improve the educational instructional process and to increase the motor performance in the primary education students through the development of coordinative capacities, resulting in concrete influences in the sense of achieving high performances over a long time.

#### 4. Proposed research methodology and availability of research data

In this research I used the following methods: theoretical analysis of the specialized literature; pedagogical observation; test method; graphic and table method; the method of the pedagogical experiment; statistical-mathematical methods for data processing and interpretation.

The research activity was carried out within the "Mihail Sadoveanu" Secondary School, Galati, a school that has a rich material base and qualified teaching staff, for a period of 6 months (November 2018 - April 2019). The sample of work benefiting from the research was made up of the students of the school (a number of 103 students), included in the primary education stage, respectively grades I - IV.

In the training process we also considered the development of the physical factors of the motor performance because:

- force influences the level of coordinating capacities: a minimum of force is required for an agile movement;
- a good speed dosage is needed to quickly solve a given motor problem in a given situation;
- mobility can be considered as the basis of the coordinative capacities to have in the spatial combination of a movement an operating field as large as possible and to adapt to the spatial needs of modification.
- the resistance developed at an early age - through the CNS guidance processes, results in a decrease of the gestural accuracy.

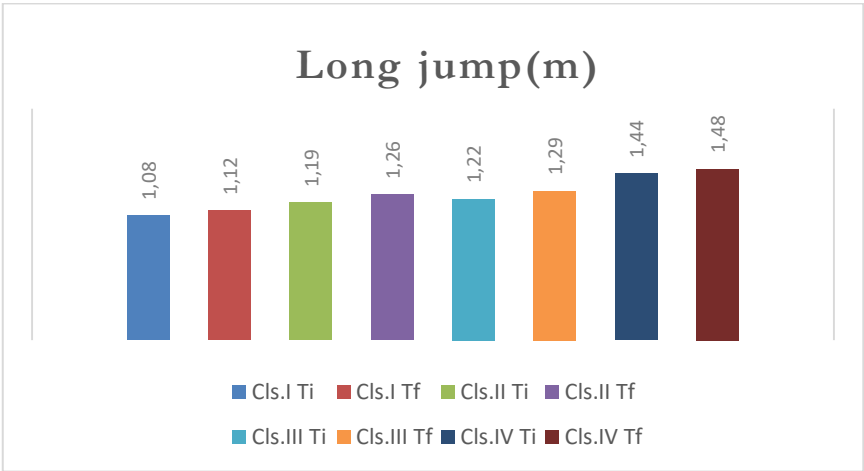
Evolution of the development of the motor skills and the level of manifestation of the coordinating capacities of the students in the primary stage.

**Table 1.** Evolution of the arithmetic means of the motor performances

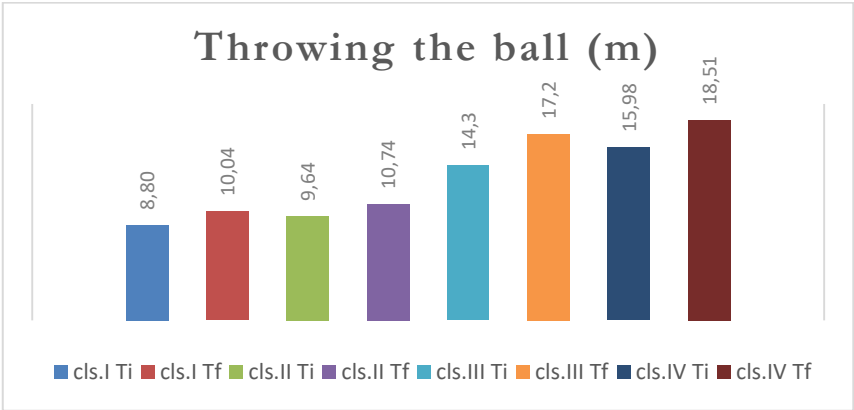
Name of the test	Cls I		Cls II		Cls III		Cls IV	
	Ti	Tf	Ti	Tf	Ti	Tf	Ti	Tf
Long jump (m)	1,08	1,12	1,15	1,26	1,22	1,29	1,44	1,48
Throwing the ball (m)	8,80	10,0	9,64	10,74	14,3	17,2	15,98	18,5
		4						1
Racing run 25m (s)	7,87	7,05	7,48	6,53	6,39	5,99	5,56	5,42
Running resistance	228,	227,	218,	217,3	201,	200,6	195,1	195,
600m	4	8	1	5	4	5	8	1

In table no. 1, the arithmetic averages are centralized for each of the tests performed for each class's motor performance.

Analyzing the evolution of the motor performance by differentiating the results of the final tests from the initial ones, we can say that the means used influenced the students of the third class the most, who had the most obvious evolutions (jumping in the field-0.07m, throwing the ball foot-2.9m, running speed-0.4sec, endurance running-0.75sec, but we can say that the same obvious influences were observed in the students of the second class, especially in the following tests: long jump on place - 0.07m, speed run - 0.99sec and endurance run - 0.75sec.



**Figure 1.**Graphical representation of the results obtained at the Long jump in the field



**Figure 2.** Graphical representation of the results obtained at Throwing the ball

For evaluating the development of coordinative capacities, a battery of 9 tests was used for the following forms of manifestation: appreciation and adjustment of the dynamic and spatio-temporal parameters of the motor act, maintaining the balance, the sense of rhythmicity, the orientation in space, the coordination of the movements.

**Table 2.** Evolution of arithmetic means of coordination capacities

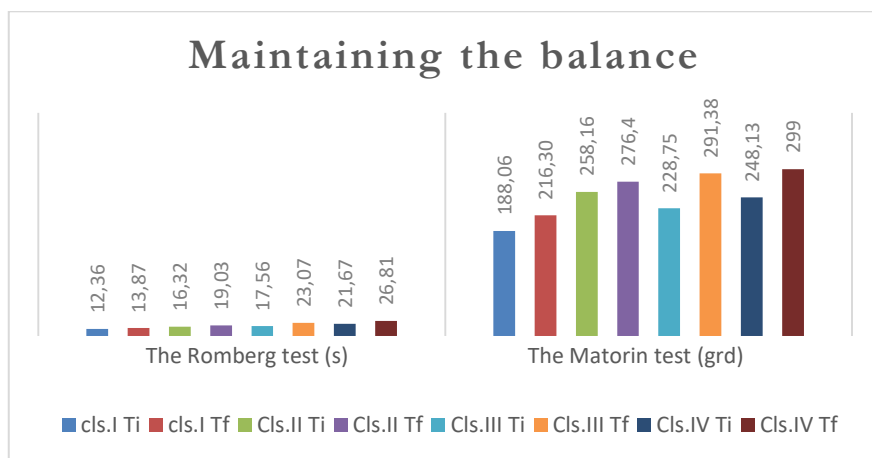
Name of the test	Coordinating capacities	Cls I		Cls II		Cls III		Cls IV	
		Ti	Tf	Ti	Tf	Ti	Tf	Ti	Tf
The Romberg test (s)	Maintaining balance	12,36	13,87	16,32	19,03	17,56	23,07	21,67	26,81
Matorin test (grade)		188,06	216,3	258,2	276,4	228,75	291,38	248,1	299
The Tapping test (pct.)	The sense of rhythm	30,98	34,75	33,16	38,42	41,59	48,14	47,62	51,26
Sprint at the proposed pace		2,02	1,82	1,95	1,78	2,44	1,64	2,44	1,65
Distance assessment test (cm)	Orientation in space	204,16	201,3	183,97	182,01	-135	-91	101,2	88,91
Hexagonal obstacle (s)		38,1	37,61	34,97	33,12	33,97	31,72	25,57	24,06
Test in square (cm)	Appreciation and adjustment of dynamic and spatial-temporal parameters	16,36	15,8	13,52	11,97	13,09	12,48	11,51	10,46
Basketball ball management (s)	Coordination of movements	18,56	17,87	19,25	17,40	16,86	14,87	14,3	13,06
The inter-pluri-seg coordination test.		7,65	8,2	7,89	8,56	7,52	9,67	8,07	9,56

Table no. 2 centralizes the arithmetic averages for each of the tests performed, performed to evaluate the level of development of the coordinating capacities.

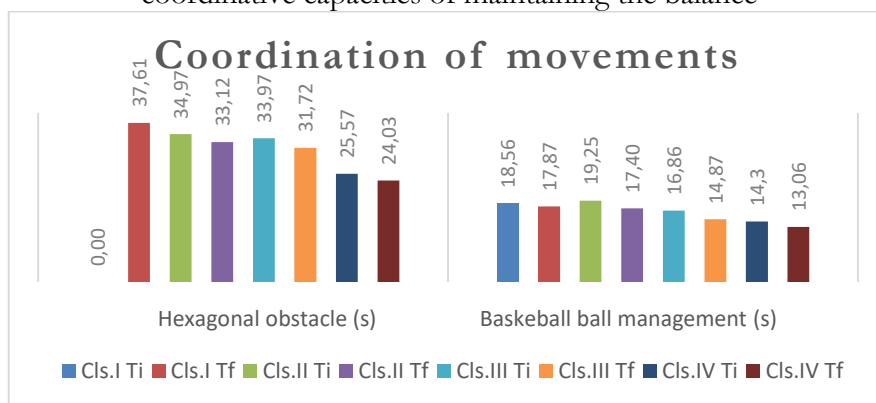
As in the case of the motor performance, when analysing the evolution of the performance of the coordinating capacities by



differentiating the results of the final tests from the initial ones, we can say that the means used influenced the most all the students of the third class, which had the most obvious evolutions in all the tests as follows: Tapping test - 6.56 pts, Sprint at the proposed pace - 0.8sec, Hexagonal obstacle - 0.83sec, Distance appreciation - -0.44m, Square test - 1.42sec, Romberg test - 5.47sec, Matorin test - 13<sup>0</sup>, Basketball ball management - 1.21sec, Inter-pluri-segmental coordination - 2.15pct but we can say that obvious influences were observed both in the students of the second class especially in the tests: Tapping test - 5.26pct, and Leadership basketball balls - 1.99sec, as well as the students of the fourth class, in the tests: Romberg - 5.14 and Sprint in the proposed rhythm - 0.79sec.



**Figure 3.** Graphical representation of the results obtained for the coordinative capacities of maintaining the balance



**Figure 4.** Graphical representation of the results obtained for the coordinating capacities for the coordination of the mics

## 5. Conclusions

Following the application of the elaborated model, and the comparison of the initial and final results, to the measurements made, we can say that the motor performance and the coordinative capacities reach significantly better values.

Analyzing the motor performance by differentiating the results of the final tests from the initial ones, we can say that the means used have positively influenced all the students, the most obvious being observed in the students of the class III, who had the most obvious evolutions, as follows: we can say that the same obvious influences were observed also in the students of the second class, especially in the tests of long jump, on the spot, running speed and endurance running.

As in the case of the motor performance analyzing the evolution of the performance of the coordinating capacities by differentiating the results of the final tests from the initial ones, we can say that the means used most influenced the students of the third class, who had the most obvious evolutions in all the tests, but we can say that obvious influences were observed both in the students of the second class, especially in the Tapping Test and the management of the basketball, as well as in the students of the fourth class, in the tests: Romberg and Sprint in the proposed rhythm.

In view of the results presented above, we consider the third class to be the most representative, as an age stage, for the development of the coordinating capacities;

### **Recommendations:**

For the development of the coordinative capacities in the physical education lessons with the students of the primary education stage, we used the theoretical model in any of the links II - V of the physical education lesson;

- in the second link, the body's preparation for exertion can be used variants of walking, running or jumping on the spot or with forward movement, backwards or laterally, with various additional motor tasks and alternation of the movement formations.

- in the third link, the selective influence of the locomotive apparatus, all forms of manifestation of the coordinative capacities can also be developed by means whose complexity gradually increases involving simultaneously different segments, with different execution times.

- within the first thematic link, a great variety of means were used. Exercises can be used individually, in pairs, groups, teams or in front, specially designed especially for the development of coordinative capabilities. It is always obligatory for the means used in the first stage to be

known, simple and accessible to the student body. Subsequently (after approximately  $\frac{1}{4}$  of the total time allotted to the ring), their complexity increases by means of chain linking and with temporal pressure;

In this context, in the practice of physical school education, the method of developing the coordinative capacities through the movement games was developed and applied.

The results of the experiment show that following the application of this methodology, the level of motor training increased and the indications of the development of the students' coordinating abilities were visibly improved.

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