Study on the Development of Coordination in Primary School Cycle Pupils (4th Grade)

Ioan Oneț[a]

[a] *"Dunarea de Jos" University of Galati, Romania*

Abstract

The movement degree of coordination, the ease with which these movements are performed and how well they are performed in various situations are the purposes of this work. In the elaboration process of the specially designed model for the development of the coordination capacities, a certain succession in the application of the operating systems was taken into account, both in the developed links and in the lessons taken as a whole. Initially, the operating systems consist of simple, segmented or global exercises. They should not stress or writhe the subjects, so these are known to them. Their practice will be done without time pressure, the workload is small, the intensity is medium, and the complexity is low. The complexity of the exercises and the rhythm of execution will gradually be increased and in the end, by the verified control tests, we can observe the evolution of the pupils from the two groups.

*Keywords: **a**ccuracy; precision; coordinating capacity*

Introduction

In the specialized literature, the meaning of the term "coordination" is synonymous with proficiency, skill, accuracy, delicacy, finesse, grace, balance, all of these representing the ability of an individual to learn and to quickly combine new movements, to perform harmonious and efficient moves in a given time with low energy consumption.

Its multiple definitions and treatment have been determined by its importance in the execution of the exercises and motive acts, starting with the simplest and finishing with the most complex ones, but also by the fact that those dealing with these aspects belong to different fields of activity: physic education and sports, pedagogy, psychology, physiology, medicine, biochemistry, biomechanics, etc.

The degree of coordination of the movement is influenced by the level of mastery of motive skills, their level of automation, but also by disrupting factors or by the intricate characteristics of the environment.

So I will present this branch from the training of an athlete, branch which is at least as important as all other types of training.

Beyond the individual's dependency to perform at a certain level, different movements, depending on his motive development, there is the possibility of differentiating the physical movement from various qualitative parameters, which referrs to the expressiveness, eloquence or relevance of the psycho-physiological features specific to the individual. In other words, certain physical manifestations are, as is natural, the product and expression of the personality structure of the individual, an illustration of his self in various existential hypostases. So, physical movements express certain personality features, as well as certain momentary affectivity states, specific to the individual.

Research hypotheses:

In the current study we started from the following working hypotheses:

- Effectively using the specific conditions of the "Lopătari" School, is there the possibility of developing coordination (in all its forms) in the physical education lessons?
- The methods and the proposed means will influence the development of the coordination of 4th grade pupils.
- To what extent will 4th grade pupils respond to the coordination actions targeted by the proposed experimental program?

Research objectives:

- to emphasize that the methods and means used in the lessons will contribute to the development of the coordination;
- to show that there is a degree of independence between the development of the co-ordination ratios and the effectiveness of basic and specific motive skills of some sporting branches în the structure of which coordination is one of the basic parameters;
- to select the means which can be used in the lessons taking into account the imposed specialties;

- to systematize and set these means in order to increase their efficiency in the lesson;

Research tasks:

- Identification of the peculiarities of the motive skills development at post-puberty age;
- Setting samples for research;
- Determination of the test set;
- Knowing the initial level of coordination development by applying the test set;
- Selection and application of operating systems from athletics that influence the development of motive quality - coordination;
- Tracking the effects of the applied exercises, in terms of coordination development;
- Knowing the final level of coordination development by applying the test set;
- Making charts, data statistical processing and interpretation;
- Reaching conclusions.

Stages of research:

The research was taking place through several stages:

- experimental finding;
- formative experiment.
- establishment of experimental and control groups;
- designing the motive systems;
- performing the initial tests;
- systematization of the coordination specific exercise groups according to the assumptions formulated for the formative experiment;
- identification of didactic strategies and achieving a semestrial curriculum plan, with evaluation of didactic strategies and working algorithms;
- identification of limiting factors and reformulation of some algorithms at the training level of the experimental group;
- performing the final tests;
- statistical processing and interpretation of the obtained data;
- completion of the paper and presentation in it's final form.

Research methods used

For this research, I used the following research methods:

- Method of bibliographic study
- Observation method
- Experimental method
- The statistical – mathematical method
- Arithmetic average
- Standard deviation
- Average error
- „t" student criterion
- Tests method

Research organization and development

The experiment was carried out at the Secondary School No. 26 in Galaţi, between October 1st, 2015 and June 1st, 2016. Our research was carried out on two samples as follows: experimental group - 26 pupils (16 boys + 10 girls) fourth grade A, control group - 26 pupils (15 boys 11 girls) fourth grade B.

I mention that the subjects were not the result of a prior selection, but they constituted the whole classroom; fourth grade A (experimental group) and fourth grade B (witness, control group). Therefore, the subjects not being intentionally selected, they are representative for the Romanian mass education, and this research can be useful both for teachers and coaches working in this field, for the future teachers and coaches, as well as for researchers in the field of education and sports (mass or not).

Material conditions: The sports facilities consist of: gym, handball field, throwing sector, jumping sector.

Research progress:

In the elaboration of the specially designed model for the development of the coordination capacities it has been taken into account a certain succession in the application of the actuation systems both within the developed links and the lessons as a whole.

In the first phase, the operating systems consist in simple, segmented or global exercises. They should not stress or writhe the subjects, so they are known to them. Their practice will be done without time pressure, the workload is small, the intensity is medium, and the complexity is low. These operating systems practice

will be done individually, by group, team or frontal, and the time allocated will not exceed 20% of the total time dedicated to the thematic link. The more automation of these drive systems, the greater the number of subjects involved in simultaneous exercise.

The second phase involves the reprise of the operating systems from the previous stage, but their practice will be done with a time limit. The time allocated to this phase does not exceed also 20% of the total time involved for this link, while the volume, intensity and complexity remains at the level of the first stage. The number of subjects involved in simultaneous practice is directly proportional to the degree of mastery of that exercise.

The third phase requires changing the internal structure of the exercise, and / or changing the external exercise conditions. It is not recommended that changes to be approached simultaneously from the beginning. First, it is recommended that changes to be made to the internal structure of the movement and then to the exercise conditions. Complexity will be increased compared to the previous phases. The number of pupils enrolled in the simultaneous exercise is small at first, but will be later increased. Up to 60% of the allocated time budget for the thematic links can be assigned.

The fourth phase involves the chaining of several motive acts / actions separately automated and the constraints of execution conditions. Complexity is increased in this case, and the time allowed can reach up to 60% of the time allocated to that link. Practice will be done individually or by groups of pupils as small as possible.

The fifth and last phase involves the resuming of the fourth phase, but under temporal pressure. The complexity is very high and the allocated time can reach up to 60% of the time allocated to that link. Practicing can end up with individualization.

It is contraindicated to use these last two phases without going through the previous phases. One aspect to consider in terms of coordination is that genetic predisposition plays an important role. Less well-coordinated children are likely to never show the tendencies of naturally co-ordinated children, regardless of training. That does not mean that improvements can not be made - on the contrary. It is important to note that the development of coordination is a process that includes years of exposure and is based on diversity and adaptability. Subjects can not be limited to specific stimulus at an early age, expecting them to become elite athletes. Regardless of the complexity of the movement, coordination is the aptitude that is educated by repeating the simple or complex exercises, first slowly and then increasing the speed of execution, on the background of internal and external changes of the exercises.

In conclusion, for the other capacities of the individual, a series of development methods have been established, but for the education of coordination we cannot say that we have a specific method.

Analyzing the results of the motive performance of the experiment, we deduced that in the initial tests there are no significant differences between the control and the experiment group or the girls and boys, demonstrating that they are homogeneous. In the final tests there are significant differences between the performances of the two groups.

The content of the experiment

In the experimental class, during the 2015-2016 school year, it was intended that in every lesson of physical education, at various moments, to work for the development of coordination capacities. For this purpose, several programming and didactic activities were developed and carried out to ensure the fulfillment of the frame and reference competences of the didactic activities carried out with the pupils from this class: the chart of the annual layout of the learning units, the semestrial calendar plan; didactic projects; proposed operational models for the achievement of the training objectives.

Establishment of the proposed simplified prospective training model for the experimental class: For the development of each component of the coordinating capacities, we used the practicing method, under standard and varied conditions adapted by us to concrete conditions in the school. Through the content of elaborated means we tried to solve the following:

a) The development of the ability to combine and coupling the movements by: progressive, partial or total coupling of two known skills, with the accentuation of certain sequences; segmental coordination between the lower and upper limbs; asymmetric exercises; combining skills that require different resistances.

b) Development of the space-temporal orientation capacity by: moving in spaces and on predetermined distances; the use of spaces different from standard ones; the use of unusual positions, situations and movements.

c) Developing the capacity of kinesthetic differentiation by: using exercises requiring a progressive increase in precision level or in pushing (jumps at different heights and distances); kicks of the ball from different distances and positions;

d) The development of balance capacity by: using exercises that require body balance or devices controlled by pupils; using elementary acrobatic exercises.

e) The development of the motive reaction capacity by: using exercises that require reactions to visual, acoustic, tactile, kinesthetic stimulus in a progressive-complex form.
f) The development of the ability to transform movements: create playful situations in which unforeseen action changes (feints) are required; making less known routes, with variations in the environment.
g) The development of rhythmic capacity (sense of rhythm): the use of rhythm variations in practicing; restoring some movement frequencies; acoustic accentuations of execution rhythms.

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Control samples

Appreciation and adjustment of dynamic and spatial-temporal parameters

- PR1- Jump at marking (cm)
- PR2- Throwing the ball into the target (points)
- PR3- Balance on the bench (sec)
- PR4- The dynamic balance test (cm)
- PR5- Rear balance (points)
- PR6- Sprint in proposed rhythm (sec)
- PR7- ",In square" test (sec)
- PR8- Distance appraisal test (cm)
- PR9- Commutation (sec)
- PR10- The hexagon (sec)
- PR11- "Matorin" test (grd)

Interpretation of test results

Table 1. Boys

Crt. Nr.	*Tests and measurements*	*CONTROL GROUP*				*EXPERIMENT GROUP*			
		TI	*TF*	*t*	*p*	*TI*	*TF*	*t*	*p*
1	**Jump at marking (cm)**	**5.84± 0.24**	**5.84±0.09**	**0.77**	**<0.05**	**6.00±0.11**	**5.11±0.16**	**3.64**	**>0.01**
2	**Throwing the ball into the target (points)**	**5.63± 0.46**	**6.38±1.16**	**1.16**	**<0.05**	**5.88±0.34**	**7.38±0.17**	**3.9**	**>0.01**
3	**Balance on the bench (sec)**	**14,75 ±0,17**	**14.5±0.11**	**1.21**	**<0.05**	**14.34±0.4**	**12.94±0.23**	**4.32**	**>0.01**
4	**The dynamic balance test (cm)**	**45.88 ±0.29**	**48.38±1.95**	**1.27**	**<0.05**	**46.5±0.34**	**43.81±0.52**	**4,33**	**>0.01**
5	**Rear balance (pct)**	**46,5± 0.46**	**48.31±0.69**	**2.19**	**>0.05**	**47±0.8**	**43.25±0.46**	**4.05**	**>0,01**
6	**Sprint in proposed rhythm (sec)**	**0.88± 0.11**	**0.99±0.11**	**0.69**	**<0.05**	**0.93±0.07**	**0.74±0.05**	**2.27**	**<0.01**
7	**„In square" test (sec)**	**9.94± 0.4**	**10.00±0.40**	**0.11**	**<0.05**	**9.94±0.4**	**8.13±0.11**	**4.34**	**>0.01**
8	**Distance appraisal test (cm)**	**104,8 8±1.4 9**	**99.25±1.84**	**2.38**	**>0,05**	**104.5±0.92**	**91.00±2.64**	**4.83**	**>0.01**

9	**Commutation (sec)**	**14,00 ±0.46**	**13.75±0.34**	**0.44**	**<0.05**	**14.13±0.57**	**12.38±0.34**	**2.61**	**<0.01**
10	**The hexagon (sec)**	**22,38 ±0.57**	**22.88±0.56**	**0.56**	**<0.05**	**22±0.69**	**20.56±0.46**	**1.74**	**<0.01**
11	**Matorin test (grd)**	**2.93, 75±2. 87**	**299.38±3.4 4**	**1.25**	**<0.05**	**286.88±5,7 4**	**305.63±3,44**	**2.8**	**<0.01**

Table 2. Girls

Nr. Crt	***Tests and measurements***	***GRUPA CONTROL***				***GRUPA EXPERIMENT***			
		TI	***TF***	***t***	***p***	***TI***	***TF***	***t***	***p***
1	**Jump at marking (cm)**	**6.76± 0.26**	**7.21±0.17**	**1.45**	**<0.05**	**5.91±0.09**	**5.11±0.16**	**4.35**	**>0.01**
2	**Throwing the ball into the target (points)**	**6.25± 0.34**	**6±0.46**	**0.44**	**<0.05**	**6.50±0.46**	**7.38±0.17**	**2.88**	**<0.01**
3	**Balance on the bench (sec)**	**14.85 ±0.46**	**16.06±2.02**	**2.02**	**<0.05**	**16.31±0.34**	**17.88±0.19**	**3.49**	**>0.01**
4	**The dynamic balance test (cm)**	**46.94 ±0.29**	**42.88±0.46**	**7.5**	**>0.05**	**54.5±0.8**	**58.06±0.52**	**3.73**	**>0.01**
5	**Rear balance (pct)**	**48.00 ±0.46**	**53.25±0.57**	**7.14**	**>0.05**	**55.25±0.57**	**58.63±0.8**	**3.42**	**>0.01**
6	**Sprint in proposed rhythm (sec)**	**1.66± 0.04**	**1.26±0.16**	**0.91**	**<0.05**	**1.16±0.07**	**1.3±0.06**	**1.53**	**<0.01**
7	**„In square" test (sec)**	**12.25 ±0.46**	**10.19±0.40**	**3.38**	**<0.05**	**10.06±0.52**	**12.88±0.57**	**3.64**	**>0.01**
8	**Distance appraisal test (cm)**	**1221. 38±1. 15**	**124.75±1.15**	**2.08**	**<0.05**	**123.75±2.87**	**132.5±0.8**	**2.94**	**<0.01**
9	**Commutation (sec)**	**10,00 ±0.46**	**9.63±0.34**	**0,65**	**<0.05**	**9.63±0.34**	**9.69±0.29**	**0.14**	**<0.01**
10	**The hexagon (sec)**	**19.63 ±0,57**	**19.75±0.34**	**0,19**	**<0.05**	**19.75±0,34**	**20.56±0.46**	**1.42**	**<0.01**
11	**Matorin test (grd)**	**310± 2.87**	**310.13±3.44**	**0,03**	**<0.05**	**314.88±2.898**	**301.88±3.44**	**2,85**	**<0.01**

Analyzing the results of the motive performance from the experiment, we deduced that in the initial tests there are no significant differences between the control and the experimental groups or the boys and the girls, which shows that they are homogeneous, but the final tests show significant differences between the performance of the experimental class and the control class.

It is noteworthy that for the coordinating capacity - coordination of the movements, are achieved improvements of the averages for both groups of subjects, only that in case of the experimental group, the progress achieved is superior for each of the three tests.

Regarding the development of coordination capacities, the experimental group was clearly superior to the control one. In the case of final results, significantly different results are registered compared to the initial tests between the control and the experiment group of girls. In the case of results obtained by boys, statistically insignificant results are obtained only for samples 5 and 6 where P> 0.05 for the control group. Within this group the rest of the results obtained are significant and P <0.01 for samples 2, 4 and 11 and P <0.001 for samples 1, 3, 7, 8 and 9. The situation is completely different for the experimental group where the results obtained at all 11 samples have a high degree of statistical significance, and P <0.001.

Thus, the application of the experimental curriculum in the physical education lessons contributed substantially to the development of the coordinating capacities of the pupils of the experimental group.

Comparing the progress made in a year of experimental and classical work, we can see that pupils from the class under experimental work, with specific means of developing coordinating capacities on modern methods adapted to the training, better accomplish the competences proposed by the experiment and the curriculum.

Following the presentation of statistically mathematical processed data and comparing the two ways of achieving them, by experimental and control groups, we consider that the interest of the pupils regarding the themes for education of the motive skills, the motor density, the frequency and the results on the evaluated samples increased significantly In the experimental class, compared to the control class, where the progress was reduced; under these conditions, it can be stated as a partial conclusion, the fulfillment of the competences (objectives) proposed in the research and the confirmation of the working hypothesis.

From the achieved observations, the limiting of the frontal activity creates the conditions for a high autonomy of the pupils in the lesson, requiring with certain limits the ability to self-organize, self-control and self-evaluation, together with differentiated treatment, offering superior transfer potential of those assimilated in the later independent activity, this aspect being one of the goals of school physical education.

Due to the fact that the experimental curriculum included polyvalent motive systems, this aspect favored the simultaneous education of motive skills. As an example, the exercises used for the development of coordinating capabilities also allowed influences on speed, strength, muscle strength, etc.

Following the modeling of the educational instructive process of physical education and the comparison of the initial results with the final results, the conducted measurements confirm that the motive performance and the coordination capacities reach significantly higher values within the group experiment towards the control group.

Conclusions:

- in the case of motive performance, the results confirm that during this period the subjects of both groups are in a stage of accumulation, but the experimental group records a higher level of significance for all indicators, mainly due to the positive transfer of the motive qualities, in this case of the coordinating capacities;
- at the development of coordination capabilities chapter, statistically significant results are recorded for both groups, which explains the sensitive period that the subjects cross over.

The research has demonstrated that the rational management of the methodical procedures and their means in the physical education lesson, by using the proposed theoretical model, determines a superior level of coordination manifestation and, implicitly, of the motive performance, leading to better achievement of the lessons objectives .

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