

STUDY ON THE DEVELOPMENT OF COORDINATING CAPACITIES IN GYMNASIUM EDUCATION STUDENTS

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Abstract: *The purpose of the current theme is to determine the level of knowledge and research, to identify the ideas underlying the study, but also the premises of the research ideas. The aim is to identify the optimal ways of recording and processing the obtained parameters and to highlight the interaction between the moments that contribute to the optimization of the coordinating capacities. The research hypothesis itself starts from the premise that performances in the field of coordinative capacities can be improved through operational models from the age of puberty. In applying the tests, an increase of the general physical development indices was observed; In conclusion, the specific means of different sports can replace the classical means*

Keywords: *genetically determined qualities, individual coordinative abilities, physical and mental performance, training, analysis, spatial-temporal orientation*

1. Introduction - The Premises of the Preliminary Research

Approaching the current topic from the theoretical and methodological point of view had the purpose of establishing the level of knowledge and research and at the same time it allows us to set the ideas that underlie the study, as well as the premises that underlie the research hypotheses presented in the paper.

Technical training is one of the most important components of sports training

and is based on a scientific, theoretical, interdisciplinary content specific to physical effort, with reference to the movement structure based on the specific biomechanics.

"Proprioception is also defined as the ability, the ability of the human body to provide information to the nervous system by virtue of eliciting responses to the stimuli with which the body comes into constant contact. This concept can also refer to the athlete's ability to raise

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awareness of the position of the trunk and limbs at any time" [1].

The purpose followed - is to find the optimal ways of recording and processing the obtained parameters and to highlight the interaction between the moments that contribute to the improvement and optimization of the coordinative and individual capacities on the pubertal age.

The research hypothesis itself - we start from the premise that the level of performances in the field of coordinative capacities can be improved through operational models from the pubertal age in the hours of physical education and sports at the gymnasium level in accordance with the performance requirements following the evaluations made based on a comprehensive analysis of the specific parameters contributing to the improvement and optimization of the technique.

The preliminary research hypothesis - the evaluation of the technique by developing the coordinative capacities can be achieved objectively by recording, measuring and analyzing the main specific parameters at the basic moments of execution and preventing and correcting the execution errors at the physical education hours and the objective causes identified from the age of puberty.

Starting from the premises of the research underlying the working hypotheses mentioned above, presented in the paper, we consider that there is a need for an in-depth study regarding the development of the coordination capacities in the students of the secondary education.

"The characteristics of good coordination of movements consist of being as efficient as possible at the right

time, and with maximum precision" [1, p.9].

"Of all the skills on which success in sport depends, the coordination is the one that is largely related to the central nervous system, its progress being influenced by each new learned movement, by athletes for a longer period, the same being executed in an increasingly shorter time and with a higher level of mastery" [1, p.9].

Therefore, there is a very close connection between the activity of the central nervous system and its development and the physical exercise with direct application in the field of coordinative capacities.

The development of the coordinative capacities at this age level is particularly important, as it positively influences the harmonious development of the individual, both physically and mentally and even intellectually.

This development of the coordinative capacities also has a major role in the subsequent course of physical and sports activities. With their help, the individual acquires new skills and applications in the field of exercise and sports.

From the mental point of view, with the development of these coordinative capacities, the self-confidence, in the own forces, in the success of the personal executions increases, which leads to a certain mental strength - very conducive to the sport performance.

"In determining success in sport, sports performance is also conditioned by the level of development of psycho-motor skills along with other human skills. In conclusion, we can say that psychomotor activity plays a very important role in the psycho-behavioral system of the athlete because in the education of the

components of psychomotor, the training will be directed from components of kinesthetic coordination, of static and dynamic balance, on intersegment coordination as well as orientation in space and time" [1, p. 11].

The organization of preliminary research

We consider that in order to achieve the objective proposed by strategic planning, there is a need for research based on the evaluation and monitoring that has as a reference point the result, offering the possibility of comparison between the model subject and the subjects studied in the basic research. During the research, an initial evaluation was used, which establishes the level of preparation, followed by the final evaluation performed on smaller sequences that allows the knowledge and identification of the technical errors and which represents a general expression made at the end of the research period. In the present study, it was assumed that technical training in the field of coordinative capabilities can be improved through a series of mechanisms and techniques and through analytical training based on movement research.

The present analysis aims to highlight the motor baggage that differentiates the two study groups (the group of students practicing sports branches and the group of non-practicing students). Using means specific to physical education, improvements and improvements of executions can be observed in the case of the group of impractical students.

The stages and activities of the preliminary research:

Regarding the succession and the progress of the research process, the stages and activities of the research are the following:

- a) establishing the model in the specialized literature;
- b) establishing the logistics and the means of research;
- c) establishing the reference model in preliminary research;
- d) elaboration of the activity of recording and analysis in the preliminary research;
- e) comparative analysis between the reference model subject and the experimental subject;
- f) elaboration of the individualized training program for the optimization of the bio-motor parameters that contributes to the efficiency of the coordinating capacities,
- g) observation of the subject during the experiment;
- h) comparative analysis of the results obtained by the subject after completing the individualized training program.

During the physical education classes a certain cyclicity of the exercises is formed, which leads to the formation of mechanisms and automatisms that can become an impediment in the complex and multilateral development of the students of pubertal age.

Using methods and means in the field of coordinative capabilities, we can correct some mistakes acquired or inherited natively. These errors of execution are all the more evident when we use, as a reference, a "pillar" group made up of students practicing sports or sports branches.

2. Materials and methods. Results - Carrying out the Preliminary Experiment

In choosing the tests, it was intended that each of them would verify several

components of the coordinating capacity and not just one and the whole group over to provide information about as many of them as possible. Thus, within each test I measured the combination of two or more capabilities, such as: coordination - balance, precision - spatial orientation - ability to combine movements, etc. At the same time, in addition to evaluating most of the components of coordination, we also aimed to involve most of the segments or even the whole body in performing motor acts and actions for evaluation. Thus, the variety of tests determines the involvement of all body segments in the most numerous and diverse forms of movement, in continuous change from the previous and the following one (e.g. body position, direction of movement, type of detachment, support surface, etc.)

In the following, we will present the most representative tests with direct application in the field of coordinative and individual capacities.

To put into practice the experiment we selected two groups of students.

Table 1
Group A - of the students practicing extracurricular sports

Nr. Crt.	Name	Identification code (code IDEN)	Extracurricular practiced sport
1.	TR	P1	Football
2.	PR	P2	Football
3.	LH	P3	Basketball
4.	GT	P4	Basketball
5.	KR	P5	Judo
6.	BS	P6	Judo
7.	MM	P7	Swimming
8.	BD	P8	Swimming
9.	CR	P9	Athletics
10.	MA	P10	Athletics

Table 2
Group B - which contains 10 students practicing curricular sports

Crt. No.	Name	Identification code (code IDEN)	Practiced sport
1.	PA	N1	curricular
2.	BM	N2	curricular
3.	BG	N3	curricular
4.	DG	N4	curricular
5.	FR	N5	curricular
6.	MD	N6	curricular
7.	MR	N7	curricular
8.	AD	N8	curricular
9.	MM	N9	curricular
10.	DA	N10	curricular

2.1. Test 1 – The MATORIN test

Objective: to measure the general coordinative capacity and the balance.

Description: from the standing position, a jump is performed with a return around the longitudinal axis of the body to the left and to the right.

During the jump, the student must not lose his balance, he must land with his feet stuck, as in the initial position, and the return should be as many degrees.

Methodology: I drew two graduated circles on the ground with a diameter of 40 cm and a starting line for jumping.

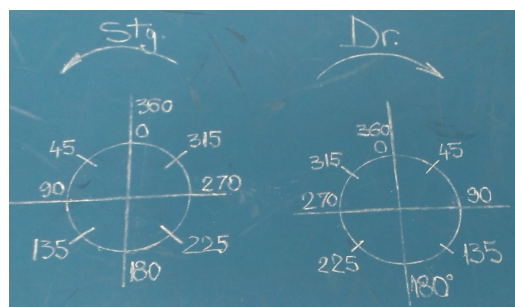


Fig. 1. *The MATORIN test*

The student, in the standing position with the legs placed on one side and the

other of the vertical line that cuts the circle, with the arms next to the body, will perform a jump with a return to the left, which is recorded in the record, and then a jump with a return to the right, which will be recorded again. After each return jump, the student will remain in the landing position (which will be the one from the start), and the teacher will measure the angle of return each time (photos 2 and 3).

Resources: gym, chalk, ruler.

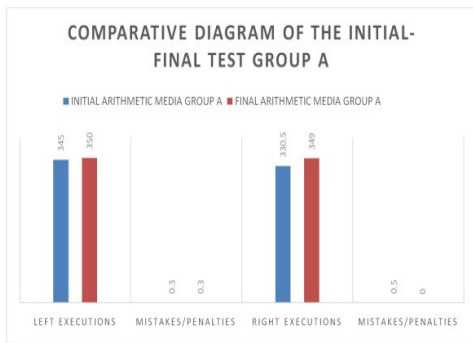


Fig.2. Comparative diagram initial-final test group A

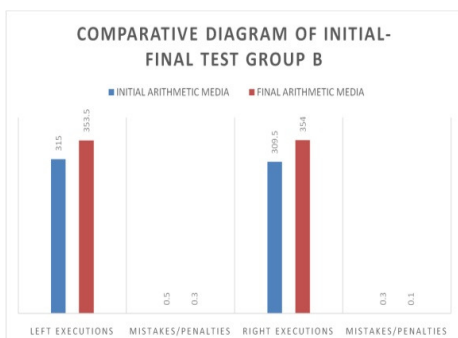


Fig. 3. Comparative diagram initial-final test group B

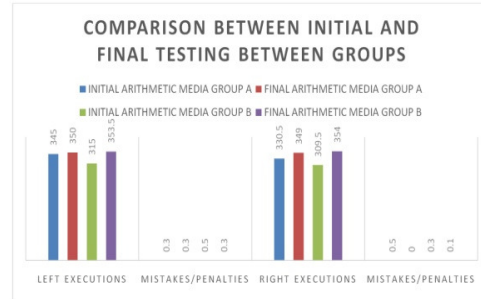


Fig. 4. Comparison between initial and final testing between groups

Following the experiment carried out in Group A, between the two tests (initial and final testing), a slight progress is observed, while maintaining the number of execution errors. This can be put on account of age and times of growth and development. In the investigated subjects, they occur naturally between the two tests performed, natural somatic and functional improvements, and even motor skills.

In Group B, on the other hand, there is an increase in the efficiency of executions, reducing the number of errors that are most likely due to the stereotype of executions, while keeping the gap from Group A.

2.2. Test 2 -The utility-application route

Objectives: evaluation of general coordination, balance, ability of spatial and temporal orientation, ability to combine movements.

Description: Start:

- jump on two legs over four chests with a height of 20 cm arranged at a distance of 70 cm between them;
- run with changes of direction, bypassing 5 milestones with a distance of 1.5 m between them;

- run on the inclined gym bench, with the distal end fixed on the longitudinally arranged gym box;
- step on the gym crate and jump straight;
- land (on the gym mattress) and roll before grouping;
- jump on two legs inside 6 circles, with a diameter of 1 m, arranged in zigzag;
- cross the finish line, running 3 m from the last circle.

Methodology: I placed all the necessary materials in the order and distance presented in the paragraph Description and I ensured their stability and security. I randomly selected a student from the group and set him to travel the entire route at slow speed while accompanying him with explanations and giving directions on how to run the route with the highest efficiency, in the shortest time. After this demonstration, we tested each student by timing the entire route, from the starting whistle to the finish line, recording it in the individual records. The route extends over 35 meters. Only one test is given for each subject. Each error in the course (dropping or failing a chute, milestone or circle, stepping near or falling off the bench or gymnasium, falling on landing on the gymnasium, stepping outside or missing a circle, etc.) will attract penalties of two seconds / mistake for each student.

Resources: milestones, gym sticks, the gym bench, the gym box, gym mattress, gymnastic circles, espalier, whistle, roulette, chalk, stopwatch, notebook and pencil.

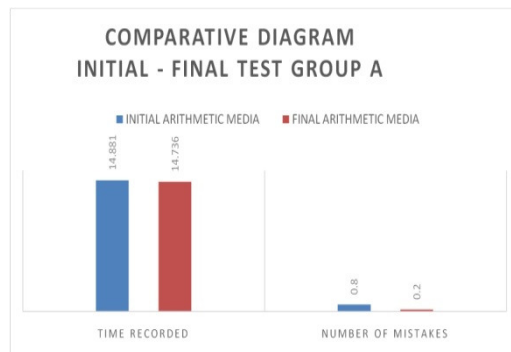


Fig.5. Comparative diagram initial-final test group A

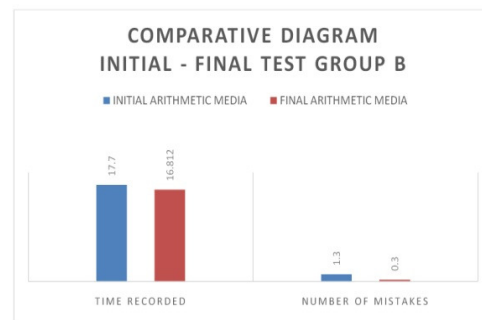


Fig. 6. Comparative diagram initial-final test group B

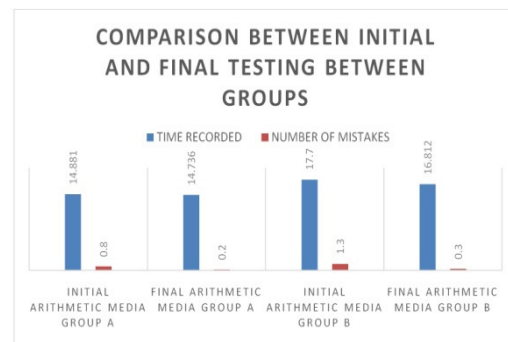


Fig. 7. Comparison between initial and final testing between groups

Within Group A, between the two tests, there is an improvement of the execution time, as well as a decrease of the individual errors. These can be attributed to a more pronounced adaptability, due to

the fact that the subjects practice sport in an organized extracurricular way.

Compared with Group A, within Group B there is a certain difference, the subjects failing to reach the level of the subjects of Group A, in either test. On the other hand, there is also a slight progress, both in execution time and in the number of individual errors.

The average values indicate an improvement in the values recorded between tests in both groups.

2.3. Test 3 - the test with the ball (ball with bells)

Objectives: assessment of general coordination, spatial and temporal orientation ability, intuition and ability to combine movements.

Description: The ball (the ball with the bells) is placed on the handball field at the point of 7 m. The tested subject will try to defend (catch the ball) based only on the auditory sense, when it is connected to the eye.

Methodology: I placed the golf ball at the point of 7 m and sent it to the gate, by rolling, in random corners, with a moderate speed of movement, so that the "goalkeeper" bound to the eye will have some reaction time. Each subject received 10 such "shots" quantifying the number of successful and failed parades.

Resources: handball field, handball gate, golf ball, whistle, black ribbon for eye closure.

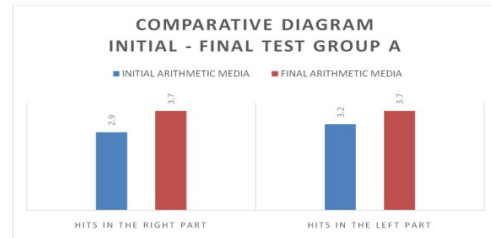


Fig. 8. Comparative diagram initial-final test group A

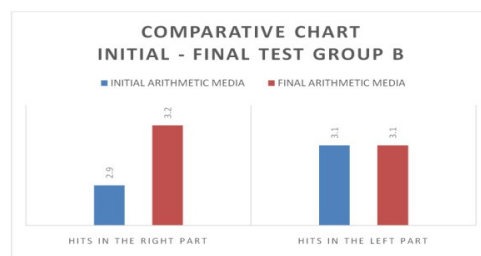


Fig. 9. Comparative diagram initial-final test group B

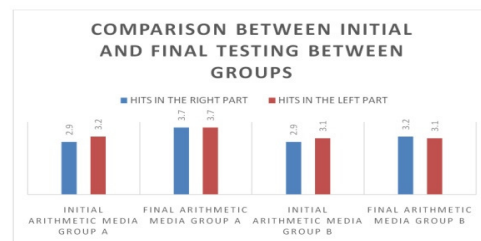


Fig. 10. Comparison between initial and final testing between groups

In this less conventional test, which emphasizes the training of auditory stimuli, in the absence of visual ones, it can be observed that due to the practice of extracurricular sport on a regular basis, the coordinative and individual capacities are better highlighted in comparison with subjects who do not practice extracurricular sports. The difference between the two groups is obvious, and this is due to better spatial-temporal coordination at the level of group A.

Within Group B there is a very slight improvement in the case of the right-handed parade.

2.4. Test 4 - Browse the circles by jumping on both legs

Objectives: verification of coordination, spatial orientation capacity, balance and execution speed.

Description: - jumps on two legs, from the place, passing from one circle to another.

Methodology: I placed 9 circles, on lines of 3 and numbered them randomly. The subject will travel, by jumping from both legs, from the place, in the order of the numbering of the circles. Each subject runs this counter-timer route 10 times. Each time the arrangement of the figures in circles will be different. The subject has a limited time (2 seconds) to view and save the route.

The travel times, as well as the execution errors, will be quantified. Every mistake leads to a penalty.

Resources: fluorescent fabrics, circles, whistle, chronometer, notebook, pencil.

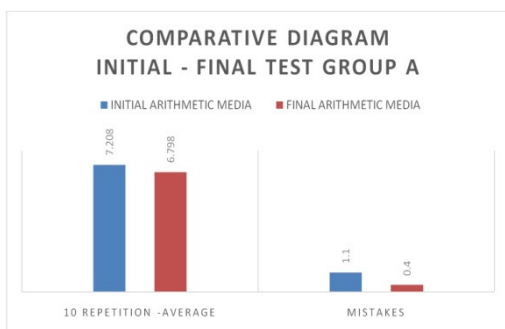


Fig. 11. Comparative diagram initial-final test group A

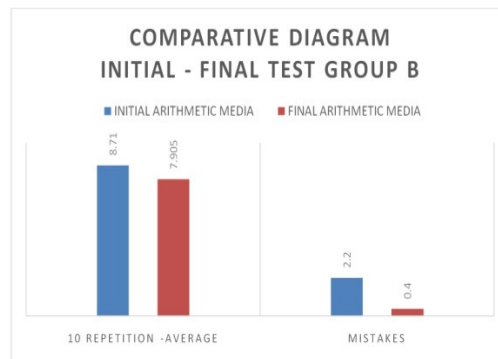


Fig. 12. Comparative diagram initial-final test group B

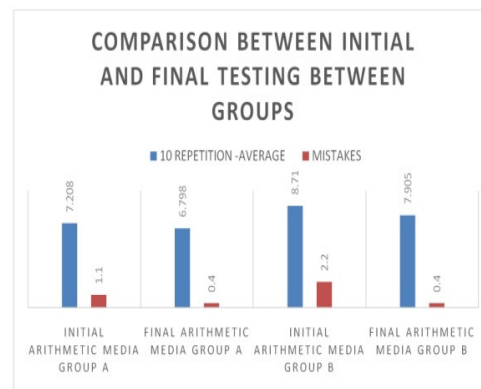


Fig. 13. Comparison between initial and final testing between groups

Within Group A, progress can be observed between the two tests, initial and final. To this also contributed to the fact that, in sports such as: football, basketball in particular (changes of direction), athletics, judo (specific motility), the subjects have a much better motor memory.

The successful execution lies motor memory and speed of execution, specific sport practitioners.

In Group B there is an improvement in terms of performance errors due to stereotypes year.

3. Conclusions and Suggestions

Following the elaboration and systematization of the materials presented in the present paper, we reached the following conclusions:

- ❖ The coordination capacities are developed throughout the training;
- ❖ Starting from the fact that sport in general is a means of physical education, I believe that during the physical education hours exercise structures of the most varied sports (age-appropriate) can be used to meet the objectives regarding the development of coordinative skills, individual of the students of the secondary school cycle;
- ❖ By applying the tests, we noticed an increase of the general physical development indices;
- ❖ The level of development determines the duration of the learning period of the technical procedures;
- ❖ Following the visualization of the tables and graphs in the framework of the experiment, an increase of the values is observed in all the 7 tests, both of the Experiment Group (Group A - group of students practicing extracurricular sports) and of the Control Group (Group B - group of practicing students of curricular sports);
- ❖ What was the object of the research was the difference between the results of the two groups after the final test if there is and to what extent. The progress of the Experiment Group is significant compared to that of the Control Group, which gives us the right to state that in order to optimize the

individual coordinative capacities, the specific means of the different sports can successfully replace the use of the classical ones;

- ❖ The results of the Experiment Group (Group A) are superior, with some minor exceptions, to the results of Group B. These differences are given by the specific physical training and the additional training of the individual coordinating capacities of the students of the Group A components, remaining a way of development and study improvement of individual coordination capabilities.

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