TRAINING ACCURACY AND DISTANCE ANTICIPATION SKILL IN SCHOOL MOTOR ACTIVITIES

RAȚĂ BOGDAN[1], RAȚĂ MARINELA[1], RAȚĂ GLORIA[1], ENE-VOICULESCU VIRGIL[2], VASILIU ANDREEA[3]

Abstract

Problem statement. The accuracy with which any activity is carried out directly influences the result obtained. The accuracy of a physical exercise, performed at the physical education school lesson (PE) depends on the level of mastery of the technique of execution of movements, and the level of development of motor skills, the ability to mentally perceive actions, attention to which each exercise is performed. Movement accuracy is assessed by the way in which the one who perform it comply with the sequence of motor acts, movement direction and pace, according to amplitude, according to the score, according to ranking, according to the results achieved etc. After practicing physical exercises, perception and accuracy are trained, distance anticipation is formed, speed of movement, throwing force are improved and therefore, motor activity, which ensures a good adaptation of the students to perform various daily activities.

The aim. The paper aims to highlight the possibility of training accuracy and speed, but also the possibility of distance anticipation skill during the PE class for secondary school students.

Conclusions. The processed and analyzed data show that both the ability to anticipate distance, accuracy, time in the 50 m sprint and the performance of throwing the oina ball, are improved by a directed work performed after the carrying out targeted and time-structured exercises. The use in physical education classes of some exercises that aim at certain technical acquisitions in athletics, gymnastics and sports games lead to the improvement of the ability to anticipate distance and precision of movement, the speed of performance in high school students and implicitly the improvement of motor behavior, all these improvements occurring as a result of carrying out a large number of exercises for the peripheral (muscle) and central (nerves) motor control components of movement.

Key words: accuracy, distance, physical exercise, practice.

Introduction

There are multiple and diverse influences related to the practice of physical exercises. Besides the effects on the harmonious physical development, on the general and specific motor capacity, physical exercise helps to improve memory, perception, will, attention and life skills such as the ability to anticipate distances and accuracy in conducting motor actions. This paper, besides underlining the interest in highlighting the efficiency of exercising in improving behavior, aims at obtaining information on the possibility to form the ability to anticipate distance and get accuracy of movement during the Physical Education classes at school. In the Encyclopedia of Physical Education and Sports , 2002, "accuracy is a phase of an event" (Nicu, 2002), and in the 1996 DEX, accuracy is the fact of being precise, the quality of measuring, of determining or indicating precisely; precision" (DEX, 1996). It is undeniable that sports performance as well as performance in all types of activities has progressed due to the value of experimental research and "mostly due to people's work" (Dragu and Cristea, p. 46), to the effort structured and analyzed by people from different fields of activity. Training accuracy in physical education and sports is an indisputable goal, and "object-oriented accuracy assessment plays a vital role in ensuring its quality" (Li Ping et al. 2018). Cunha et al. (1995) showed that "accuracy assessment by dynamic measurements on long distances is unfailing for the excellent level of accuracy offered by the VPI laser sensor and on short distance measurements, they used tests to obtain sensitivity related to the influence of observation distance as well as of the type and characteristics of the surface observed."

Reaching the distance anticipation and accuracy is a complex process, which is based on multiple repetitions, permanently assessed and corrected by the teacher during the educational process.

[1]"Vasile Alecsandri" University of Bacău, Faculty of Movement, Sport and Health Sciences, 157 Calea Mărășești, Bacău, România.
[2]Mircea cel Bătrân Naval Academy, Constanța, Romania
[3]Ion Creangă "Technological High School Pipirig / Pluto High School, Neamț County, Romania
Correspondence address: rață_gloria50@yahoo.com

The level of knowledge and involvement of the teacher in the act of training students is the one that determines the achievement of cognitive and practical performances. In the field of physical education and sport, a teacher must master information on psychology, biochemistry, physiology, anatomy, pedagogy, management, etc., an aspect also emphasized by Burns (2011), who considers that teachers' level of knowledge must include "multiple domains, knowledge of their content, i.e. deep knowledge of the subject they teach".

How a lesson is conducted, how a teacher seeks to train students' skills depends on the students' learning styles. In physical education, skills relate equally to the level of theoretical knowledge and practical application, since both directions include psychic processes, procedures and strategies that help teachers meet the objectives and tasks set. The approach of teaching a new practical content requires the ability to choose the most appropriate exercises according to the particularities of students that depend on the cognitive, motor, mental, motivational, volitional, etc. and especially their individual level. For example, in physical education, knowing how to achieve the objectives and tasks of a content by using certain exercises depends on the teacher's ability to organize a group of students, to make them collaborate and work together, on his/her ability to describe the exercises clearly, on his/her ability to create a pleasant atmosphere. The value of these skills depends on the "procedural knowledge" accumulated in the process of training and especially on the teaching experience gained in time. The practical learning of movements represented by "training and self-training, as well as their components or forms (such as adjustment, adaptation, memorization, attention and creativity) are natural phenomena" (Gagea, 2010) that occur in the physical education classes.

Methods

Research hypothesis. In carrying out this research, we considered necessary to check the following assumptions:

- *the introduction of a distance anticipation exercise program in each physical education lesson will help to improve the level of distance anticipation skill*;
- *the use of exercises with precise tasks leads to improved accuracy in the execution of movements during the class;*
- *the use of an exercise program with precise tasks contributes to the improvement of the speed of movement and to the improvement of the performance for the oina bal throwl.*

Research objectives. The objectives were to teach and improve the ability to anticipate distance and accuracy of movement, to improve the time achieved in the 50m sprint and the performance in throwing the oina ball at a distance at the secondary school.

Research subjects. In the research, there were included 38 students aged 12-13, in the 6th grade from two secondary schools divided into two groups (an experiment group with the 6th-grade pupils from Stânca Secondary School, Neamt County and a control group with the 5th - grade pupils from Pluton Secondary School, Neamţ County).

Research instruments. Mastering well the didactic process both theoretically and practically, but also taking into account the specifications found in the national and international literature, we decided to evaluate the development of accuracy and distance anticipation in a group of students at the secondary school level, as essential aspects of the evolution of the motor behavior and the training for the social life. Since we are dealing with physical education in schools, in order *to assess accuracy of movement and hand-eye coordination,* we developed a test that consisted in the execution of a volleyball dig with two hands. A subject standing behind the starting line (the line behind the volleyball court) makes a move to a ball thrown by a partner and / or teacher, from the opposing court, and takes over the ball with both hands from below. The ball taken over by the subject must be oriented towards a square with a side of 2.5 m located near the net in zone 2. 5 repetitions are performed and the efficiency is calculated in percentage, according to the number of successful exercises. Location: a gym, necessary materials: mattress, volleyballs, teammate, 2.5 m volleyball court mark drawn on the net.

For distance anticipation, we used *the Test for distance anticipation, a test represented by a path,* which was carried out in two rounds with a 6-minute break. The subjects covered the distance on a 12m straight line, drawn on the ground, with their eyes closed and stopped when they considered that they had covered the 12 m. The starting signal is given from a standing position, after the subject was blindfolded. In their movement, the subjects are not allowed to be helped by different landmarks (number of steps, voices, etc.). After stopping, they must tell the distance traveled in meters and wait motionless to be able to check the actual distance traveled. We performed 2 assessments, the initial evaluation between 20th - 30th September 2019 and the final one in February 2020.

We used as research methods the following: bibliographic study, testing, experiment,

statistic-mathematical method and graphical method.

In the experiment group during the educational instructional process, in order to improve the distance anticipation, the students covered different distances, first with their eyes open and then with their eyes closed. The distances were increased every 2 weeks. In order to train accuracy, we used exercises with volleyballs that had to be aimed at certain landmarks. Both types of exercises were performed by the control group only one previous class before the final assessment. Beside the two tests, we also had two assessment events i.e. 50m sprint with standing position at the start and oina ball throw with 5-step momentum. These 2 tests were performed by each student twice, the recorded result being the best.

Research results

The research results can be found in the summary table no. 1.

Table no.1 The values of the indicators for distance anticipation, accuracy, 50 m sprint timing and oina ball throw for the 6th-grade pupils at Stânca și Pluton Secondary Schools, Neamț County.

A.I.	Gr.	Distance anticipation (m)		Movement accuracy (%)		50m sprint (s)		Oina ball throw (m)	
		I	F	I	F	I	F	I	F
M.	Ex.	8.83	9.82	56.67	73.33	9,17	8,56	17,00	19,22
	Prog.	**0.99**		**6.66**		**0.63**		**2.22**	
	Con.	8.90	9.25	72.63	76.95	8,83	8,68	17,84	18,84
	Prog.	**0.35**		**4.32**		**0.15**		**0.94**	
Max.	Ex	9.3	10.15	100	100	9,86	9,19	21	25
	Prog.	**0.95**		**00.00**		**0.67**		**4.00**	
	Con.	9.8	9.9	100	100	9,57	9,34	23	25
	Prog.	**0.01**		**0**		**0.23**		**2.00**	
Min.	Ex.	8.00	9.15	40	40	8,69	8,13	12	13
	Prog.	**1.15**		**0**		**0.56**		**1.00**	
	Con.	8.00	8.45	40	60	7,69	7,48	12	13
	Prog.	**0.45**		**20**		**0.21**		**1.00**	
Ab.	Ex.	0.33	0.20	10.18	17.32	0,37	0,39	2,92	3,63
	Prog.	**0.13**		**7.14**		**0.02**		**0.71**	
	Con.	0.48	0.38	15.22	12.43	0,42	0,47	2,65	3,00
	Prog.	**0.13**		**2.79**		**0.05**		**0.35**	

Legendă: A.I. = assessment indices, Gr= grade, Ex. = Stânca Secondary School, Con. = Pluton Secondary School, M = mean, Max. = maximum value, Min.= minimum value, Std. = standard deviation , Prog.=Progress

Table no. 1 presents the statistical indicators calculated for the four events, namely, distance anticipation, movement accuracy, 50m sprint and oina ball throw in the students from the two grades.

For *distance anticipation*, an initial average value of 8.83m and a final one of 9.82m can be observed in the experiment group (Stânca Secondary School), therefore, a progress of 0.99 m, and at Pluton Secondary School, an initial average value of 8.90m and the final of 9.25 m, thus, a progress of 0.35 m. Regarding the maximum value, a higher progress can be observed for the experiment group of 0.95 m compared to the control group of 0.01m, which was also recorded at the minimum value where the students from the experiment group recorded a progress of 1.15 m and those in the control group of 0.45 m. The values of the standard deviation show an improvement of the homogeneity of the two grades with a value of 0.13. As it can be seen from the evolution of these values and from the graphical representation in fig. 1, the students from Stânca Secondary School had a better evolution, as a result of the application of the specific program which consisted in moving with their eyes closed over increasing distances.
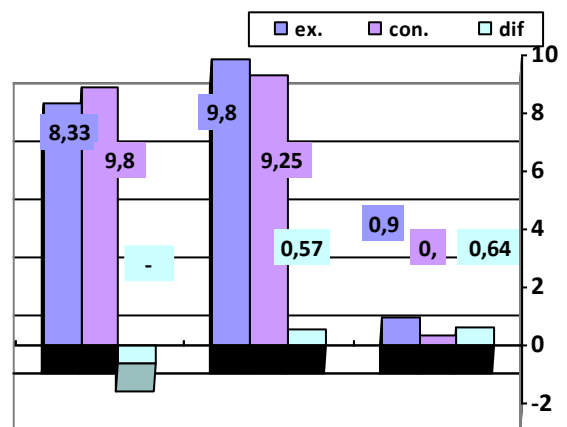

Fig. no. 1. Graphical representation of the evolution of the average value for distance anticipation

The *movement accuracy* is observed in the experiment group (Stânca Secondary School) with an initial average value of 66.567% and a final one of 73.33% , thus a progress of 6.66% , and at Pluton Secondary School with an initial average value of 72.63 % and a final of 76.95%, therefore a progress of 4.32% . Regarding the maximum value, no progress is observed as some students, in both assessments, from both grades scored all 5 points and accumulated a percentage of 100%. For the minimum value, the students of the experiment group did not record a progress, registering a percentage of 40% of successes, in the two assessments, while the students of the control group recorded a progress of 20%. The standard deviation values show a decrease of the homogeneity of the

experiment group with a value of 7.14 and an improvement of the homogeneity of the control group with a value of 2.79. As it can be seen from the evolution of these values and from the graphical representation in fig. 2, the students from Stânca Secondary School improved their accuracy skill more, as this group worked on a set of exercises that aimed at sending the volleyball from a dig in a certain area.
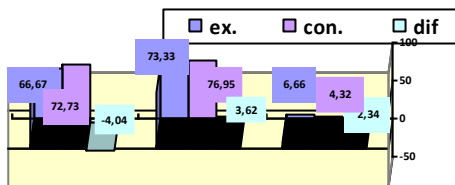

Fig. no. 2 Graphical representation of the evolution of the average value of the motion accuracy capability

For the *50m sprint,* an initial average value of 9.17s and a final one of 8.56s are observed in the experiment group (Stânca Secondary School), so a progress of 0.63s and an initial average value of 8.83s and a final one of 8.68s, therefore a progress of 0.15s. Regarding the maximum value, a higher progress is observed in the students of the experiment group by 0.67s compared to those in the control group who did not record a progress of 0.23 s. For the minimum value, the students from the experiment group recorded a progress of 0.56s and those from the control group, a progress of less than 0.21s. The standard deviation values show a decrease of the homogeneity of the experiment group with a value of 0.02 and a decrease of the homogeneity of the control group with a value of 0.05. As it can be seen from the evolution of these values and from the graphical representation in fig. 3, the students from Stânca Secondary School improved their time for the 50m sprint, since in this group they worked especially with specific exercises that involved nervous processes such as attention and will.
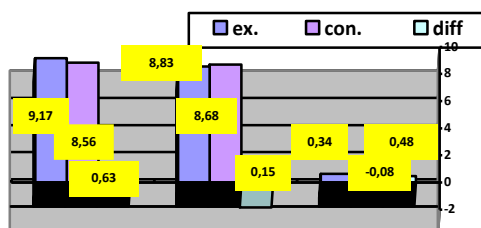

Fig. no. 3. Graphical representation of the evolution of the average value of the time recorded in the 50m sprint

For the ***oina ball throw,*** an initial average value of 17.00m and a final one of 19.22m are observed in the experiment group (Stânca Secondary School), thus a progress of 2.22 m, and at Pluton Secondary School School, an initial average value of 17.84m and a final one of 18.84 m, therefore a progress of 0.94 m. Regarding the maximum value, a progress of 4.00 m is observed in the experiment group and one of 2.00 m in the control group. For the minimum value, the students from the experiment and control groups achieved a progress of 1m between the two assessments. The standard deviation values show a decrease in the homogeneity of the experiment group with a value of 0.71 and in the control group with a value of 20.35. As it can be seen from the evolution of these values and from the graphical representation in fig. 4, the students of Stânca Secondary School improved their performance when throwing the oina ball at a distance, as this group worked on a set of exercises aimed at sending the volleyball from a dig in a certain area
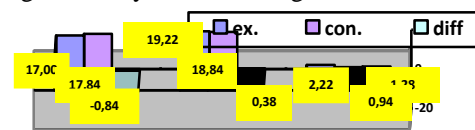

Fig. no. 4 Graphical representation of the evolution of the average value for the oina ball throw

Table no.2 Results for the Student's dependent t-test for the *experiment group*

Indicator	AD		PM		AV		AMO	
	I	F	I	F	I	F	I	F
Number of subjects	19	19	19	19	19	19	19	19
Mean	8.76	9.63	69.47	74.73	9.15	8.71	17.31	19.21
Standard deviation	0.42	0.57	13.93	18.66	0.36	0.41	2.45	2.91
Student's test	-8.12		-1.56		5.15		-9.43	
P* value	**< .001**		< .135		**< .001**		**< .001**	

* Results in the initial and final testing by applying the Student's dependent t-test to each of the two groups. A significant difference between the two tests if p < 0.05.

Table no.3. Results for the Student's dependent t-test for the *control group*

Indicators	AD		PM		AV		AMO	
	I	F	I	F	I	F	I	F
Number of subjects	19	19	19	19	19	19	19	19

Mean	8.89	9.24	72.63	78.94	8.83	8.67	17.84	18.84	
Standar deviation	0.48	0.37	15.21	12.42	0.42	0.46	2.65	3	
Student's test	-3.90		-1.67		5.97		-5.33		
P* value	**< .001**		< .111		**< .001**		**< .001**		

*Results in the initial and final testing by applying the Student's dependent t-test to each of the two groups. A significant difference between the two tests if p < 0.05.

Conclusions

According to the data analysis, we can emphasize the importance of the Physical Education classes and the efficiency of physical exercises in the formation of important motor skills and abilities in life. From the data obtained, processed and analyzed, we can highlight that distance anticipation, accuracy, travel speed and throwing force have improved in both grades, but in different proportions, which emphasizes the efficiency of directed work done during the PE class. The use in the PE lessons of some exercises that follow certain acquisitions lead to the improvement of the distance anticipation and movement accuracy skills, of the execution speed in the secondary school students. The statistical processing and analysis of the data presented allows us to draw the following conclusions:

- the hypothesis according to which the *introduction of a distance anticipation exercise program in each Physical Education lesson, in the experiment group, will contribute to the improvement of the level of distance anticipation skill* has been confirmed. The statement is supported by the higher progress (0.99m) recorded by the students of the experiment group compared to the one recorded by the control group (0.35m);

- the *hypothesis* according to which *the use of exercises with precise tasks leads to improved accuracy in the execution of movements during the lesson* was confirmed, as the progress in the experiment group was 0.66 m, higher than that in the control group of 0.35 m;

The hypothesis according to which the *use of an exercise program with precise tasks contributes to the improvement of the speed of movement and performance for the oina ball throw* has been confirmed. The evidence is supported by the progress made by the students of the experiment group who made a higher progress than the students of the control group by 0.48 s in the 50 m sprint and by 1.28 m in the oina ball throw. The results achieved by the students of the two different grades as values emphasize the possibility of developing the students' capacity for distance anticipation and accuracy, as necessary aspects of their daily life.

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