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OPTIMISING THE SCHEDULING OF LEARNING UNITS THROUGH ALGORITHMISATION IN SECONDARY EDUCATION

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Abstract: Over the years, new methodological trends have emerged in physical education and sport with the aim of developing and improving the instructional and educational process. These conscious actions, demonstrating their practical usefulness, have become methodological guidelines, concepts used by the majority of specialists in the field, whether teachers or coaches. They are the result of the evolution of the theory and practice of physical education and sport, but also determined by the development of science and technology in the field of physical education and sport. Algorithmisation is considered by specialists to be a non-heuristic methodological orientation, a last phase of programmed instruction. As a non-heuristic methodological orientation, algorithmisation does not give students the possibility to choose the solution, therefore, in order to contribute to the development of imagination and creativity, it should be closely linked to problematisation. Also, in physical education and sport, unforeseen situations often arise, for which the previously devised algorithms cannot be applied, a situation often encountered in sports games and situational sports. In carrying out the research we aimed at the following objectives: determination of the biomotor potential of 6th grade students through specific tests; development of the subjects motor qualities through different methods; analysis of the final results compared to the initial tests.

Introduction: The education of the modern human being is based on the multilaterality of his physical, intellectual, ethical, aesthetic development, in close connection with the requirements of contemporary society, in accordance with the real abilities necessary for the coordinates of the human personality [3] and "the vast majority of sports specialists, following the studies undertaken, have proposed various solutions to improve this process and have promoted modern methods and means" [9]. In ontogenesis, certain motor skills of the human body, called motor qualities or skills, can develop or improve. They are basic and specific motor qualities. Basic motor qualities are: speed, strength, endurance, suppleness and coordinative skills (dexterity). Specific motor skills are combinations of basic motor skills [11]. The authors believe that "regardless of age, the body must be educated in such a way that it is capable of performing the movements of the human intellect. It is the nervous system that dictates the action, and the muscular

and skeletal systems that carry it out" [1] and "in physical education and sport activities, the study of motor behaviour is very important, because the motor side predominates in bodily activities" [7]. Motor reactions are elaborated responses to certain stimuli, and "the manifestation of coordination skills is conditioned by the ability of the perceptual system to process, analyze and make decisions and to transmit nerve impulses to the effectors that actuate the motor and the ability to perform movements with more economy and harmony"[6]. The directions of improvement of the teaching process in physical education and sport are divided into two categories: heuristic and non-heuristic methodological trends and guidelines. The heuristic type calls on the cognitive capacity, imagination and creativity of the pupil or athlete. The subject is given a task to solve, to arrive at the result by himself through his own capacity of perception and analysis. Of course, the teacher directs the process until the subject has the ability to solve the task himself, to reach the result by himself. Nonsuristic methodological tendencies and guidelines stimulate less or no imagination and creativity in pupils. According to the author Cârstea G. "algorithmization is an activity or operation of elaboration of special solutions to solve standardized or typical situations, also common in physical education and sport" [2]. Algorithm is an operation or several successive logical operations that underlie the solution of a problem. According to Fiedler P. "algorithm, in the teaching process, has the following meanings: system of rules for the management of the educational process; system of learning rules; system of rules underlying the composition of the curriculum; models or schemes for the conduct of the activity; sequence of operations (exercises)" [5]. Specialists in our field of activity consider another important aspect "to improve exercise capacity without causing side effects fatigue, mental effort and confidence in performing other physical activities" [4]. In general, physical education is a fundamental type of motor activity, which involves laws, rules, methodical prescriptions, in order to achieve well-defined instructive-educational objectives, aimed at the harmonious development of the body, strengthening health and cultivating physical qualities. [10].

Material-method: In the experimental research we propose the following hypothesis: if the planning of the motor quality endurance and endurance running learning units at the beginning of the school year, and the motor quality speed and speed running learning units in the second semester, will be more effective and students will perform better on the biomotor assessment tests than when the motor quality speed and speed running learning units are planned in the first semester, and the motor quality endurance and endurance running learning units are planned in the second semester.

The aim of this work is to identify the level of development of motor skills in 6th grade students. The analysis will be carried out under the conditions of two different annual plans in terms of the phasing of learning units.
The experimental research took place in the 2021-2022 school year. Two 6th grade classes were selected: 6th grade from "Gheorghe Popadiuc" Secondary School in Rădăuți with 29 students (11 girls and 18 boys); 6th grade from "Dimitrie Cantemir" Secondary School in Rădăuți with 27 students (12 girls and 15 boys).
For the data analysis we selected 20 students from each class: 7 girls and 13 boys.
The experimental research took place at "Gheorghe Popadiuc" Secondary School (experimental group) and at "Dimitrie Cantemir" Secondary School (control group). The sports ground of the "Gheorghe Popadiuc" Gymnasium School has a 43/33m asphalted sports field and a 10/3m gymnasium. The sports ground of "Dimitrie Cantemir" Secondary School has two handball courts, one of which is asphalted and the other covered with multi-sport synthetic turf and a 10/6m gym. Both schools have similar conditions in terms of material and human resources. The independent variable consists in the fact that the "Gheorghe Popadiuc" Secondary School of Rădăuți used a periodization of the annual phasing of the learning units with the following order of the thematic units: sports game, endurance - endurance running - oar ball throwing, skill - acrobatic gymnastics, strength - apparatus jumping - sports game, speed - speed running. At the "Dimitrie Cantemir" Secondary School in Rădăuți, the physical education and sport teacher preferred a staggering of the learning units in the following order: sports game, speed - speed running - throwing the oar ball, skill - acrobatic gymnastics, strength - apparatus jumping - sports game, endurance - endurance running - long jump with elan.
The systematisation of the means used in the experimental research are grouped by learning units from the yearly learning units used in the experimental group.
Learning unit design - motor skills: endurance, speed and strength (examples of exercises):- practice of free and object exercises, under uniform effort, free exercises alternately engaging the main body segments, 2x500-600m;
- relay exercise with successive performance of various motor acts, performed at a steady pace, 3x;
- accelerated running in a straight line over a distance of 20-30m;
- accelerated running transition from ankle play/running with knees up/running with legs swinging back 3x15-50m;
- from standing forward unbalance and acceleration 20-30m;
- starts from squat and accelerates to full speed;
-exercising strength exercises to develop the main muscle groups in a 4-station "circuit";

-exercising strength exercises to develop the main muscle groups in a 6-station 'circuit'.

The author considers that „in middle school education, sports games have always been attractive activities for students"[12]. Designing the learning unit (examples)-football

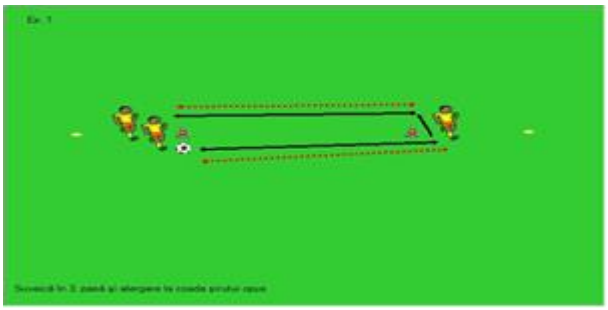

Fig 1 Suveica: pick up - pass - run to the tail of the opposite string

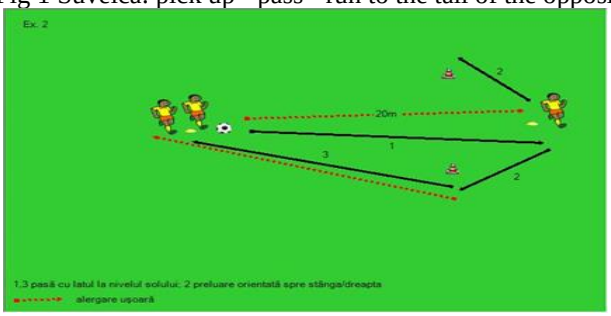

Fig 2 Suveica: pick-up oriented after the cone - pass - run to the tail of the opposite string

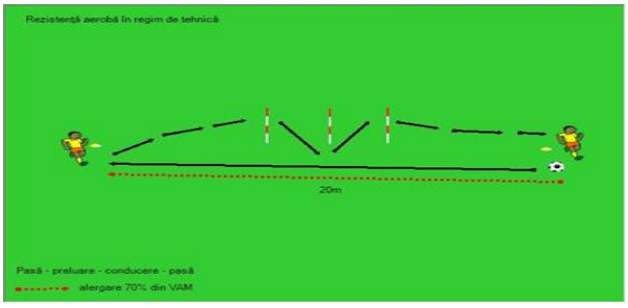

Fig. 3 Suveica: pick-up - driving the ball between the hoops - pass - running to the opposite end of the line

For a better intensity of the exercise play with 2 balls. The exercise is performed one set on the left and one set on the right.

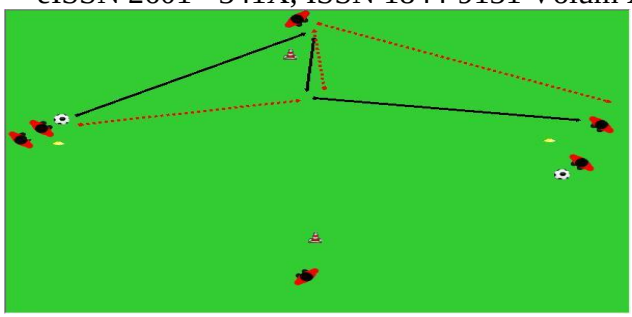

Fig.4 Swish: pick-up - pass left/right - one-two for third

Results

Table 1. Differences in the assessment indicators between the experimental and control groups in the initial and final tests of the long jump

Indicators	Long jump (cm)					
	Initial testing			Final testing		
	Experimental group	Group control	The difference	Experimental group	Group control	The difference
Vmax	188	173	15	202	180	22
Vmin	140	155	15	148	161	13
X	163.5	162.25	1.25	175.35	168.45	6.9
α	16.26	5.25	11.01	19.27	4.72	14.54
CV%	0.09	0.03	0.06	0.10	0.02	0.08

Table 2. Differences in the assessment indicators between the experimental and control groups in the initial and final push-up tests

Indicators	Push-up (rep)					
	Initial testing			Final testing		
	Experimental group	Group control	The difference	Experimental group	Group control	The difference
Vmax	13	16	3	17	22	5
Vmin	2	4	2	5	6	1
X	6.55	9.3	2.75	10.2	13	2.8
α	3.13	3.55	0.41	3.99	4.63	0.63
CV%	0.47	0.38	0.09	0.39	0.35	0.03

Table 3. Differences in the assessment indicators between the experimental and control groups in the initial and final small ball throwing tests

Indicators	Small ball throwing (m)					
	Initial testing			Final testing		
	Experimental group	Group control	The difference	Experimental group	Group control	The difference
Vmax	27	23	4	35	29	6
Vmin	13	12	1	16	14	2
X	20	18.35	1.65	25.7	22.6	3.1
α	4.49	3.96	0.53	6.00	4.91	1.09
CV%	0.22	0.21	0.001	0.23	0.21	0.01

Table 4. Differences in assessment indicators between the experimental and control groups in the initial and final sprint tests

Indicators	Speed run (sec)					
	Initial testing			Final testing		
	Experimental group	Group control	The difference	Experimental group	Group control	The difference
Vmax	9.6	9.5	0.1	9.2	9.2	0
Vmin	7.5	7.8	0.3	7.0	7.5	0.5
X	8.51	8.5	0.01	8.06	8.18	0.12
α	0.64	0.56	0.08	0.65	0.52	0.12
CV%	0.07	0.06	0.009	0.08	0.06	0.01

Table 5. Differences in assessment indicators between experimental and control groups in initial and final endurance running tests

Indicators	Endurance running (m)					
	Testare inițială			Testare finală		
	Experimental group	Group control	The difference	Experimental group	Group control	The difference
Vmax	800	800	0	980	820	160
Vmin	500	520	20	540	550	10
X	665	689	24	720	717	3
α	112.36	103.71	8.65	127.07	103.67	23.39
CV%	0.16	0.15	0.01	0.17	0.14	0.03

Discussions: Table 1 lists the values of the assessment indicators of the two groups, experiment and control, in the standing long jump test, the differences between them highlight the following aspects: in the initial test, the difference between the maximum values is 15cm, between the minimum values is 15cm, between the mean values is 1.25cm, between the standard deviations is 11.01 and between the coefficient of variability is 0.06. In terms of the difference between the mean values we can say that the results of the experimental group are better than the control group, but there is no significant difference between the two groups of students. Regarding the differences in the values of the indicators in the final test between the two groups, we can see that at the maximum values it is 22cm, at the minimum values it is 13cm, at the mean values it increased to 6.9cm, the standard deviation is 14.54, and at the coefficients of variability it is 0.08. The difference in mean values increased from 1.25cm at the initial test to 6.9cm at the final test. This demonstrates a better improvement in the performance of the students in the experimental group in the long jump from the standing.

In Table 2, the values of the assessment indicators of the two groups, experiment and control, in the push-up test, the differences between them highlight the following aspects: in the initial test, the difference between the maximum values is 3 repetitions, between the minimum values is 2 repetitions, between the mean values is 2.75 repetitions, between the standard deviations is 0.41 and between the coefficients of variability is 0.09. In terms of the difference between the mean

values we can say that the results of the control group are better than the experimental group, but there is not a very big difference between the two groups of students.

Regarding the differences in the values of the indicators in the final test between the two groups, we can see that at the maximum values it is 5 repetitions, at the minimum values it is 1 repetition, at the mean values it increased to 2.8cm, the standard deviation is 0.63, and at the coefficients of variability it is 0.03. The difference in mean values increased slightly in favour of the control group pupils from 2.75cm at the initial test to 2.8cm at the final test. This shows a better improvement in the performance of the control group students in the push-up test.

In Table 3, in the initial test, for the oar ball throw, the difference between the maximum values is 4m, between the minimum values is 1m, between the mean values is 1.65m, between the standard deviations is 0.53 and between the coefficients of variability is 0.08. In terms of the difference between the mean values we can say that the results of the experimental group are better than the control group, but there is no significant difference between the two classes of students. Regarding the differences in the values of the indicators in the final test between the two groups, we can see that at the maximum values it is 6m, at the minimum values it is 2m, at the mean values it increased to 3.1m, the standard deviation is 1.09, and at the coefficients of variability it is 0.01. The difference in mean values increased from 1.65m at the initial test to 3.1m at the final test. This demonstrates a better improvement in the performance of the students in the experimental group in the oar ball throwing event.

In Table 4, in the speed running test, at the initial test, the difference between the maximum values is 0.1 seconds, between the minimum values is 0.3 seconds, between the mean values is 0.01 seconds, between the standard deviations is 0.08 and between the variability coefficients is 0.009. In terms of the difference between the mean values we can say that there is no significant difference between the two groups of students. Regarding the differences in the values of the indicators in the final test between the two groups, we can see that for the maximum values it is 0 seconds, for the minimum values it is 0.5 seconds, for the mean values it increased to 0.5 seconds, the standard deviation is 0.12 and for the coefficients of variability it is 0.01. The difference in mean values increased from 0.01 seconds at the initial test to 0.12 seconds at the final test. This demonstrates a better improvement in the performance of the students in the experimental group in the sprint test.

In Table 5, in the endurance running test, at the initial test, the difference between the maximum values is 0m, between the minimum values is 20m, between the mean values is 24m, between the standard deviations is 8.65 and between the variability coefficients is 0.01.

Regarding the differences in the values of the indicators of the final test between the two groups, we can see that for the maximum values it is 160m, for the minimum values it is 10m, for the mean values it reached up to 3m in favour of the experiment group, the standard deviation is 23.398 and for the coefficients of variability it is 0.032. The difference in mean values increased from 24m in the initial test to 3m in the final test. This demonstrates a better improvement in the performance of the students from the experimental group in the endurance running event.

After analysing the differences in the assessment indicators obtained by the two groups at the final test, we found that the results of the experimental group were better than those of the control group in the following events: long jump from a standing position, oar ball throw, speed run and endurance run. The control group performed better in push-ups, a test that assesses the strength of the arm muscles. We also noticed that the differences in these indicators were greater at the final test than they were at baseline.

Conclusions: With regard to this hypothesis it was found that: the use of the second variant of annual learning unit phasing produced a greater improvement in the results obtained in the biomotor tests by the subjects of the experimental group than in the control group where the first variant of annual learning unit phasing was used; the results recorded in the final tests of the long jump, oar ball throw, speed run and endurance run showed that the differences in mean values between the experimental group and the control group underline that the experimental group performed better than the control group; only in the push-up test did the control group perform better than the experimental group. In conclusion, I consider that the use of algorithmization, by each teacher individually, for the elaboration of the annual phasing of learning units based on successive logical operations and according to the material resources, human resources of the educational unit he/she represents, would make the instructional-educational process more efficient and, implicitly, would lead to the achievement, by the pupils, of superior results in the biomotor tests and to the achievement of the general and specific objectives of physical education and sport, and that "the systematic practice and good organization of sports activities during physical education classes, contribute to achievement of active functioning of all body systems in childhood, adolescence and youth" [8].

References

[1] A. Petrea, E. Rață (2015). Suppleness optimization in children aged 10-11 years by dance specific elements, The Annals of the "Stefan cel Mare" University ISSN – 1844 – 9131, Volum VIII issue 1, p. 77-84

[2] Cârstea, Gh. (2000). Theory and Methodology of Physical Education and Sport. For the final exams and teaching grade II. Bucharest: Editura AN-DA, p.33-45

[3] D. Pasăre, E. Raţă (2014). The developmentof young school children through the psychomotor activity, The Annals of the "Stefan cel Mare" University, ISSN – 1844 – 9131, Volum VII issue 1, pag.90
[4] E. Raţă, D. Havriş (2012). Alternative exercise in fighting obesity, annals of “Dunarea de Jos” University of Galati Fascicle XV ISSN – 1454 – 9832, p.167-171
[5] Fidler, P. (1998) Methodology of physical education and sport. Iași: Editura Fundației "Chemarea", p.23-28
[6] Ghe. Agache, E. Vizitiu (2020). Study on the practice of chess by children aged between 8 and 10 years old online through contents specific to physical education, ASMU.PESS.SAM Volume XIII issue 2, DOI:10.4316/SAM, p.64-71
[7] Grosu, B.M. (2012). Methodical aspects for development of coordination abilities in children 8 – 10 years, through specific training means of the soccer game, Annals of “Dunarea de Jos” University of Galati, Fascicle XV ISSN – 1454 – 9832, pag. 68
[8] Grosu, B.M. (2013). The development of the moving-speed quality at the primary school through movement and preparatory games specific to football, The Annals of the "Stefan cel Mare" University, ISSN – 1844 – 9131, Volum VI issue 2, pag.22
[9] L. D, Milici, E. Raţă, M. R, (2007) Milici, Study of New Graphical Method for Sportman Evaluation, International Journal of Computers and Communications Issue 4, Volume 1, pag.99
[10] L. E, Avram, E. Vizitiu (2020). Study on the importance of physical education and sport classes in current society investigative approach, The annals of the "Stefan cel Mare" University ISSN – 1844 – 9131, eISSN 2601 – 341X Volum XIII issue 2, DOI:10.4316/SAM.2020.0204, pag.28
[11] Raţă, G. (2012). Physical education methodology for tenure and teaching degrees. Bacău: Editura Egal, p.34
[12] Tănasă, B. I., Vizitiu E. (2020). Study on the technique of the game ofbadminton by using information technology during the pandemic covid -19 in students aged 10-12 years, The Annals of the "Stefan cel Mare" University, ISSN – 1844 – 9131, eISSN 2601 – 341X Volum XIII issue 2, DOI:10.4316/SAM.2020.0215, p. 112-120