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Original Article

Complex development of physical characteristics of 11–12-year-old boys using basketball elements for physical education

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Abstract:
Up to date, the system of physical education, physical culture and sports in Ukraine is in a crisis condition and can not meet the needs of the population. This situation necessitates changes in program approaches and the definition of priority areas of physical education of the population. This article is aimed at an analysis of the developed modernized methodology for organizing physical education lessons for 11-12 year old boys when using basketball to improve the level of physical fitness. Based on the fact that 49 boys of the main medical group of 11-12 years, were divided into experimental (n = 25) and control (n = 24) groups, participated in the experiment. The tests were selected in such a way to analyze and test the level of development of all physical characteristics, particularly coordination. This is due to the fact that basketball is a coordinating sport. The selected tests to detect the dynamics of the developed modernized methodology were informative and gave a positive growth in both groups ($p < 0.05$). But the best result was shown by the experimental group, due to the fact that during the construction of the methodology, we took into account not only sensitivist development, but also those aspects that would motivate the students before classes. The obtained results testify to the effectiveness of our upgraded methodology that was used during the school year as a new tool for the formation and disclosure of the sports potential of future basketball players.
Keywords: basketball, physical qualities, physical activity, boys, method, coordinative abilities.

Introduction

The concept of the development of the socio-economic potential of our society, the reform of the general education school put forward new demands for a comprehensive improvement of the student's personality, ways and methods for solving social and pedagogical problems. Physical education programs should be based on the integrated approach to the formation of mental and physical qualities of the individual, the improvement of physical and psychological training for active life and professional activity on the principles of an individual approach, the priority of health promotion, the wide use of various means and forms of physical perfection, the continuity of this process [Gaetano, A. 2016; Ghyppo, A., Tkachov, S. & Orlenko, O. 2016].

It is common knowledge that the effectiveness of the system of physical education is determined by the level of its scientific, organizational and programmatic and regulatory support. One of the ways to increase the effectiveness of this system is to develop scientifically sound physical education programs for students in general education schools. Researchers express the idea of the inappropriateness of creating a single program on physical culture [Scarlat, M., Scarlat, E., 2003]. After all, state programs in the physical culture of schoolchildren, although aimed at the education of a perfect younger generation, are not able to take into account the diversity of conditions in different regions of the country, which determine the peculiarities of the physical condition of children.

The problem of software for physical education in a comprehensive school is devoted to numerous studies [Gaetano, A. 2016; Mahmoud, H. Mahmoud 2011]. But one of the reasons for the poor state of the younger generation's health is the limited driving regime and the fact that the physical education program is implemented only by 50 percent. In this regard, we propose to modernize the use of basketball in the system of lessons of physical culture for middle school children in secondary schools [Demcenco, P. P. 2017; Mahmoud, H. Mahmoud 2011; MoanŃă, A., GhiŃescu, I., GhiŃescu, M. 2006].

Basketball is one of the most popular sports that has many fans for the dynamism, excitement of the sporting struggle of the rival teams, the ease and unobtrusive possession of the ball by the players while playing the game techniques in challenging game situations that are constantly changing [GheŃu, R. 2010; GhiŃescu, I., MosnŃă A. 2005].

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When studying the game in basketball, a variety of ball actions are used to provide the necessary physical activity on all the muscle groups of the child; especially important muscles keep the spine in the formation of the correct posture [Chicomban, M. 2012; Krause, J., Meyer, D., Meyer, J. 1999; Santana, J.C. 2002].

In games with a ball of a collective nature, favorable conditions for the education of positive moral-volitional features of children are created [Michael, L. Hobbs 2008]. Such games teach to overcome selfish motives, bring up the endurance. In the game, the child always has the opportunity to test their strength and make sure that the action is successful. Emotionality, dynamic, variety of action and basketball game situations attract middle school children to this game [Popescu, F. 2003; Mikes, J. 1986]

Therefore, the problem of complex development of physical characteristics in the system of physical education of 11-12 year boys with the use of modernized basketball techniques is relevant and timely.

Material and methods

The purpose of the study is to develop a modernized method of organizing physical education lessons for boys 11-12 years old when using basketball to improve their physical fitness.

Participants The experiment involved 49 boys in the main medical group of 11-12 years, divided into experimental (n = 25) and control (n = 24) groups.

Organization of research.

Our experimental technique was based on the main provisions of the physical culture program for general education institutions.

The program is aimed at: creating conditions for the development of the personality of boys 11 - 12 years old; strengthening of students' health, adherence to personal and social hygiene requirements, organization of medical control; education of moral-volitional qualities, discipline and responsibility; formation of knowledge, skills in basketball; instilling love for systematic sports activities; Achievement of an optimal level for technical and tactical training for this stage.

The method provides a strict sequence and continuity of the whole process of training of boys from 11 to 12 years, continuity in solving problems of health promotion and harmonious training, education of moral and volitional qualities and a steady interest in classes, hard work in mastering technical techniques of basketball, development of physical characteristics, creation prerequisites for achieving high sports results.

The structure of the program contains a training material on the following sections of training: theoretical training; practical training (general physical training and special physical training [Chicomban, M. 2012; Krause, J., Meyer, D., Meyer, J. 1999]); technical training [GheŃu, R. 2010; Mikes, J. 1986] tactical training.

Let’s consider the content of the method in details.

I) The theoretical training included topics that were relevant for boys 11-12 years old: "Rules of behavoir during classes", "Basketball development in Ukraine and the world", "Education of moral and volitional characteristics", "Influence of physical Exercises on the body of an athlete"," Hygienic requirements for sports"," Traumatology prevention in sports"," General characteristics of sports training"," Fundamentals of game technology and technical training, "and so on.

II) Practical training had a clear target orientation. In each lesson, as a rule, complexes of interdependent developmental, educational, recreational and educational tasks were solved. And we proposed a new approach to selecting general development exercises, games, relay and non-standard equipment at the lessons.

The preparation part, the duration of which is 7-15 percent of the total time, was aimed at organizing and motivating the students to the lesson, familiarizing them with the topic and preparing the body for the main part. It should be conducted in such a way as to: organize students and psychologically (auto-training) to direct them to conscious decision of the tasks envisaged in the lesson, to prepare them emotionally for productive labor; bring schoolchildren to mastering exercises of a certain character and complexity; functionally prepare the body of students for the implementation of intensive and complex exercises; promote the formation of correct posture, educate dexterity, speed and ability to control motor activity.

An important aspect of the technique is the preparation part, where a large number of different exercises are performed. Storm training. Actions in the system in place and in motion: construction, alignment of the system, calculation in the system, turns and hemispheres, unlocking and closing the system, rebuilding the rows and columns in the system. The original and stepping stone. Go from step to run and run to step. Changing the speed of movement. Stop while moving in step and running.

One of the very important approaches in our upgraded technique is general development exercises. Exercises without subjects are individual and in pairs. Exercises with stuffed balls - lifting, lowering, throwing from one hand to another over your head, in front of you, behind your back, throws and catching; in pairs, holding the ball - exercises in the support. Exercises with gymnastic sticks, racquets, hoops, balls of various sizes.

During the warm-up period, we drew attention to the training of those muscle groups that would be most involved in the main part of the sessions.

The main part, the duration of which is 80-85 percent of the total time of the lesson, solved the problem - the development of educational material by means of our modernized methodology.

Below are some of the exercises we used in our methodology for the development of physical characteristics of boys 11-12 years (Fig. 1).

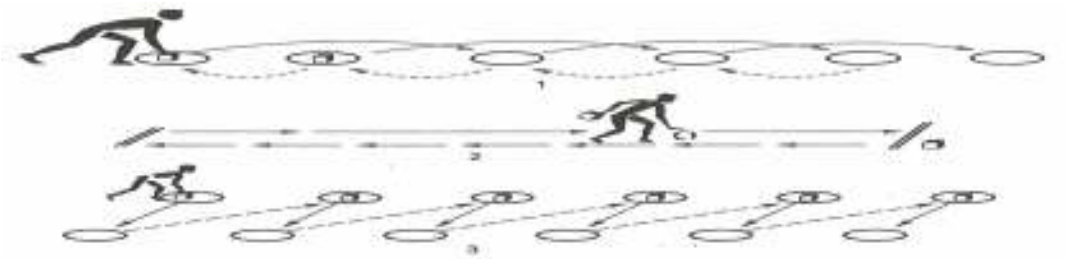

Fig.1 Options for shuttle running

1) Shuttle run with the transfer of cubes by a spiral (Fig. 1, 1). On command "March!" the participant of the exercise takes the first cube and transfers it to the third circle. Returns for the second cube, which moves in the fourth circle, etc. After touching the cube of the sixth circle, a member of the exercise performs a rearrangement of the cubes in the opposite direction. It is forbidden to throw a cube in a circle; exercise can be complicated by repeating it twice in a row; floor surface or floor in the hall should not be slippery; It is desirable to have shoes that have good adhesion to the floor.

2) Shuttle run 4*9,14 m with the conduct of basketball (Figure 1, 2). A participant after the command "March!" begins to conduct a basketball ball with a maximum speed. Runs to the cubes and, while continuing to lead the ball, takes one of them. Then he takes it over the starting line. Similarly performs the same actions with the second cube. During the run, the ball can not be taken with two hands; The ball is carried by the leading hand; If the ball is lost, the attempt is repeated.

3) Shuttle run with the transfer of cubes from one row to the other (Fig. 1, 3). On command "March!" participant takes the first cube and transfers it to the parallel circle on the right. Then runs to the second cube and again takes it to a parallel empty circle. So consistently transferred all the cubes on the left side of the shuttle distance to the right. Only one attempt is available for the exercise; Cubes need to be put into a circle; If the cube flies outside the circle, the attempt is repeated.

In the implementation of all these guidelines, the bulk will be more diverse and effective. This is due to the fact that in this part we are stabilizing the functional state of the child.

The final part, which is 5-6 percent of the total time of the lesson.

III) Technical training included assault techniques and protection techniques.

IV) Tactical training included attack tactics and defense tactics.

Given that our studies were conducted with children of adolescence, we have definitely paid attention to fatigue.

It is necessary to take into account the load and overload during physical exercises. Because the load is the cause of those adaptive changes in the body, the nature and magnitude of which depends on the outcome of the exercise. To change the size and nature of the load, we used the following techniques: increase and decrease the number of repetitions; Amplitude of exercise; Change of conditions, time, rate of execution; starting position; Duration of rest intervals; Variety of mobile games; general-development exercises with objects and without objects.

At the beginning and at the end of the study, all students performed the control standards, which allowed to determine the level of growth of physical skills and the level of physical fitness.

I. A complex test, designed to control the development of motor abilities, consists of 6 tests:

1. Running at 20 m - to determine the speed abilities. At the signal, the students start running from a high start one by one. Trying to overcome the distance as soon as possible. Time to overcome the distance, determined with an accuracy of 0,1 s.

2. The tennis ball's throwing at the target is to determine the coordination abilities, namely target accuracy. The competitor becomes a throwing line. Takes a tennis ball with the usual hand and tries to aim the target as accurately as possible. There are two series for five throws. Hit the small square - 3 points, in the middle - 2 in the big one - 1. The amount of points from 10 throws is calculated.

3. The throw of a rubber ball between the legs in the wall and his knowing - to control the development of coordination abilities. The competitor becomes on the line of throws back to the target. Having placed his legs, leans forward and throws the ball between his legs in the target. Then straightens and quickly turns face to the wall (180 °). If possible, without leaving the place, he tries both hands to catch the ball that jumped out of the wall, or at least touch it. The participant is given two series for five throws. A student does not receive points if the movements from the very beginning are incorrect and the ball does not fall into the wall; 1 point -

movements are wrong (untimely turn), but the ball falls into the wall, but the student did not catch him or touch; 2 points - movements in the rough form are correct, the ball falls into the target, but after turning the pupil does not catch and not even touched; 3 points - the movements are correct, the student touched the ball or after one contact with the floor caught him; 4 points - movements are confident, the ball is caught immediately, but the student descended; 5 points - the movements are well coordinated, the ball is caught, without leaving the place. The amount of points from 10 throws is calculated.

4. Race overcoming obstacles - to determine the coordination abilities during the run. A high-kick participant starts the running; encircles the riser and continues to run right to the gate 1; Crawls under them on mat; returns; Flip through the gate and run to the center. Then the riser runs to the right and runs to the gate 2, repeating the same thing at the gate 1, and through the center, bending the riser to the right, goes to gate 3, where all movements repeat, and through the center runs to the finish. Time to overcome the interference band is recorded to within 0.1 s.

5. Pushing the ball in two hands from the chest - to determine the speed-strength abilities. The competitor gets behind the line to the wall, bends his hands in his elbows and squeezes the ball into his chest. After that, he pushes him forward as far as possible. The distance of the flying ball is measured up to 10 cm.

6. 6-minute run - to control the growth of overall endurance. Participants in a group of up to 10 people rally around the volleyball court. Running can alternate with walking. To get the right pace of running, the first three laps with pupils run a teacher. The pace of the race is recommended as follows: 6-7 year old children run every 22-23 s, and 8-12-year-olds - for 20-21 s. Every minute the teacher reports the time remaining until the end of the task. After 6 minutes at the signal the participants stop. It is determined for each participant the number of complete circles it ran, plus the distance of the start of the last circle. The length of the distance traveled by the student for 6 minutes is determined with an accuracy of 1 m [Thomas, R. 1995; Winnick, J., Short, X. 2014].

Testing is best organized in a gym.

II. Ten "eights" (Kopylov test) - for the assessment of coordination abilities. The test participant acquires the starting position of the body tilt forward, holding the ball in one hand. With the command "GO!" as quickly as possible, the ball makes an imaginary eight between legs at the knee level. At the same time the ball is transferred from hand to hand. Time of execution of ten "eight", registered up to 0,1 s.

Results

Table 1 shows the results of testing the level of development of physical characteristics of boys 11-12 years before and after the experiment.

Table 1. Statistical values of indicators of growth of motor characteristics of boys 11-12 years old before and after the experiment

Tests	Stats	Boys CG n – 24 Experiment		Boys EG n – 25 Experiment	
		Before	After	Before	After
20m Running , sec	$\bar{x}$	3,66	3,34	3,63	3,03
	σ	0,65	0,89	0,81	1,13
	V	5,32	6,98	5,34	5,88
	m	0,19	0,17	0,15	0,16
The tennis ball's throwing at the target, points	$\bar{x}$	21	23	21	28
	σ	0,81	1,13	0,79	1,09
	V	7,42	8,90	7,54	8,16
	m	0,09	0,14	0,09	0,10
The throw of a rubber ball between the legs in the wall, points	$\bar{x}$	46	49	47	55
	σ	1,11	1,19	1,01	1,10
	V	7,34	7,44	7,16	7,12
	m	0,26	0,56	0,22	0,42
Race overcoming obstacles, sec	$\bar{x}$	13,72	10,30	13,74	9,81
	σ	1,52	1,09	1,58	1,41
	V	6,23	8,18	6,56	7,55
	m	0,12	0,16	0,19	0,18
Pushing the ball in two hands from the chest, cm	$\bar{x}$	6,24	6,79	6,29	7,31
	σ	0,82	0,66	0,96	0,79
	V	4,79	7,09	4,71	6,51
	m	0,60	0,75	0,63	0,77
6-minute run, m	$\bar{x}$	1187	1258	1189	1341
	σ	6,37	5,90	6,12	6,05
	V	7,89	9,44	7,91	9,18
	m	1,23	1,52	1,54	1,83
Ten "eights", sec	$\bar{x}$	11,67	10,12	11,82	8,51
	σ	0,69	0,91	0,71	0,88
	V	3,77	3,12	3,91	3,56
	m	0,76	0,41	0,75	0,67

Discussion

Listed in the table. 1 data before and after the experiment indicate that all the groups are more homogeneous in the test results to (V to 9.44%) and after (V to 9.18%) of the experiment.

Consequently, at the beginning of the experiment, the quantitative indicator of the rate of development of the results of the "Run 20 m" test indicated that the initial level of development of the frequency of lower limb movements in boys 11-12 years of age, both control and experimental groups: KG - 3.66 ± 0.19 s .; EG - 3.63 ± 0.15 s. At the end of the experiment, the results of the test "Run 20 m" significantly increased in the experimental group, but the increase was also in the control group: KG - 3,34 ± 0,17 s .; EG is 3.03 ± 0.16 sec ($p < 0.05$).

The test "Tennis Ball Target to the Goal" was the following figures for the experiment: KG - 21 ± 0.09 (scores); EG - 21 ± 0.09 (scores). After the experiment: KG - 23 ± 0.14 (scores); EG is 28 ± 0.10 (scores) ($p < 0.05$). Analyzing the parameters of this test, we draw attention to the fact that the development of coordination abilities, namely, the precision accuracy, is a smaller increment in the experimental group due to the use of modernized basketball techniques.

"Throwing a rubber ball between legs in the wall" in boys 11-12 years at the beginning of the experiment, this test exercise came with a slight deviation in accuracy, but after the experiment and the use of special exercises in the process of physical education classes in the experimental group level The performance of this exercise has increased significantly. So at the beginning of the experiment, the following indicators: KG - 46 ± 0.26 (scores); EG - 47 ± 0.22 (scores). After the experiment: KG - 49 ± 0.56 (scores); EG - 55 ± 0.42 (scores) ($p < 0.05$).

High results were obtained when running the Race overcoming obstacles test, both before and after the experiment. Before the experiment: KG - 13.72 ± 0.12 s .; YE - 13.74 ± 0.19 sec. After the experiment: KG - 10,30 ± 0,16 s .; EG is 9.81 ± 0.18 s ($p < 0.05$).

The analysis of the results of the test aimed at the development of speed-strength abilities, "Push the packing ball with two hands from the chest", we note that in boys 11-12 years the figures were as follows: before the KG experiment - 6.24 ± 0.60 cm, EG - 6 , 29 ± 0.63 cm; After the KG experiment - 6.79 ± 0.75 cm, EG is 7.31 ą 0.77 cm ($p < 0.05$).

The test for control of overall endurance "6-minute run" revealed the following indicators: before the experiment, the COG - 1187 ± 1.23 m, EG - 1189 ± 1.54 m; after the KG experiment - 1258 ± 1.52 cm; EG - 1341 ± 1.83 m ($p < 0.05$).

The "Ten Eights" test is very important in basketball. Because, due to this test, we are able to assess the coordination of hand movements, manifestation in the specific conditions of the motor task, as well as to determine the level of training of motor memory. Thus, the indicators for the experiment: KG - 11,67 ± 0,76 s; YE - 11.82 ± 0.75 sec. After the experiment: KG - 10.12 ± 0.41 s; EG is 8.51 ± 0.67 s ($p < 0.05$).

On the basis of the performed experiment it has been shown that the extension of physical characteristics with the help of the developed modernized experimental technique has a positive effect and has the right to exist.

Conclusions

The established problem of the investigated issue allowed to identify and develop an experimental upgraded methodology aimed at organizing physical education lessons for boys 11-12 years old, using basketball to improve the level of physical fitness.

In developing our upgraded methodology, important aspects were taken into account, such as the level of physical fitness of boys, and the peculiarities of the study.

Qualitative characteristic of the level of physical preparedness showed that the use of experimental techniques in almost all indicators ensured the achievement of the highest values of the standards of physical fitness.

The perspective of the directed use of basketball elements for the formation of motor skills and skills of high school students based on the level of their physical development and the state of physical preparedness is substantiated. It is based on an experimental upgraded technique and the results of our experimental study.

Conflicts of interest

The authors declare that there is no conflict of interest.

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