

## **DYNAMICS OF PHYSICAL PREPAREDNESS OF BOYS 3. GRADE PRACTICING BASKETBALL**

*(Preliminary communication)*

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### **Abstract**

*In order to achieve the aim, a complex methodology is applied, which includes the following methods of research: 1. Sports-pedagogical observation – on the organization of the lesson and modular training, general physical training and technical preparedness in basketball. 2. Sports-pedagogical experiment. To determine the effect of applying in sports-teaching practice a program has been developed for improving the technical training of students. The aim of the program is the application of specialized exercises for development of the motor skills and the improvement of technical training. Preparation of a program for development of the motor skills by means of the basketball game and improving the techniques of the game. Use of new exercises and games in the core „Sports Games“ and module „Games“. Monitoring and evaluation of the physical preparedness using specific tests. Contents of the program - 40 classes, 20 classes in core “Sports Games” and 20 in module “Games” - in which combinations of the proposed exercises and games in different parts of the lesson and the additional hour are used. The study was conducted among 108 boys in primary school (3. grade) from School “V. Drumev “- Varna, “St. Cyril and Methodius “ - Smiadovo, Primary school “Hristo Botev “- Targovishte, divided into an experimental and control group, as follows: experimental group - 52 students; control group – 56 students. This study is oriented to study some features of physical preparedness of students of primary school age - boys in 3. grade involved in lesson activities and modular basketball. It can be argued with a high guarantee probability that during the time of the pedagogical experiment with the boys from the experimental group, there occurred a significant increase in the level of all investigated signs of physical and technical preparedness*

**Keywords:** *primary school pupils, physical education, sports training, motor skills, tutorials of basketball, modules of basketball, sports-pedagogical experiment, analysis of variance, Student's t-test*

### **INTRODUCTION**

The problems of physical education and sports training for children are subject of theoretical and practical research by sports educators, psychologists and others. Issues of physical development and physical fitness are of interest lately for scientific professionals and the general public. We address attention toward the sport more and more, because we found the old adage that health is the most important thing. Participation in sport is beneficial for a good health of those involved. There are many scientific studies that have proven the positive influence of sports systematic physical, functional and psychological development of children. The possibility of handling these processes is proven through systematic and appropriate sports and educational impact. Morphological condition and motor skills are a clear indicator of the health status, functionality and performance of the body. Therefore, the

interest of theorists and practitioners to these two most objective criterion on the body is understandable.

The State's educational requirements of the cultural-educational field “Physical culture and sport” for the educational content of the subject Physical Education and Sports must meet the needs of students to be physically healthy, to have good culture of the motor skills, with established habits of systematic physical exercises, sports and tourism, to be a viable members of society, leading a healthy lifestyle (State educational requirements for learning. (ДОИ за учебно съдържание), 2000).

The compulsory training in the subject Physical Education and Sports of the cultural and educational field “Physical culture and sport” in the 1 - 4 .grade carried out on curricula approved by the Minister of Education and Science in 2000-2003. It is based on the principles for a variety of sports-technical and tactical knowledge, skills, versatility and harmony in the development of the

morpho-somatic characteristics and motor abilities of students.

Since 2004/2005 a third (optional) class in Physical education and sports for students from I to XII grade is introduced. It is implemented in the form of modules, according to the decision of the Pedagogical Council of the school, and in compliance with the school's and the provided municipal or state sports facilities, the qualifications of the teachers of physical education, and the traditions of the school and the region.

For I - IV class - the elementary stage of primary education level are offered the following modules:

The first requirement that the teacher should accomplish is for each lesson to be used for the aims and objectives of the learning process in basketball from the very first to the last second. It is wrong for the basketball lesson, it's parts or individual exercises to have a focus on track-and-field, gymnastics or even to be connected to some other sports disciplines. The lesson in basketball should be just about the basketball. This can be achieved when from the first to the last second of the class, in all parts of the lesson a basketball material is taught (Simeonova (Симеонова), 2012; Tsvetkov (Цветков), 2003).

The aim of the study is to improve the effectiveness of basketball teaching in the physical education and sports classes, and the modular training by putting into practice a specialized program that includes tools and methods for improving the basketball technique. Discovery of some peculiarities of morpho-functional characteristics and development of the physical qualities of students of elementary school age, participating in the classes and extra hours in basketball (Tsvetkov (Цветков), 2009; Tsarov (Църов,) 2008).

## METHODS

According to the methodological requirements of sportology, in this research are applied the structural (studying the parts and interconnections of school physical education, the structure of the curriculum, etc.) as well as the functional approaches (for detecting connections of these systems with the external environment).

In order to achieve the aim, a complex methodology is applied, which includes the following methods of research:

1. Sports-pedagogical observation – on the organization of the lesson and modular training, general physical training and technical preparedness in basketball.

2. Sports-pedagogical experiment:

- determinative – to determine the level of the basic parameters of physical abilities and specific motor tests. For this purpose a sports and educational testing was conducted on six indicators:

- *educating pedagogical experiment* - to determine the effect of applying in sports-teaching practice a program has been developed for improving the technical training of students in 3. grade.

The aim of the program is the application of spe-

cialized exercises for development of the motor skills as well as the improvement of technical training.

To achieve the objective the following tasks are solved:

- Preparation of a program for development of the motor skills by means of the basketball game and improving the techniques of the game.
- Use of new exercises and games in the core „Sports Games“ and module „Games“.
- Monitoring and evaluation of the physical preparedness using specific tests.

The program structure: 40 classes, 20 classes in core “Sports Games” and 20 in module “Games” - in which combinations of the proposed exercises and games in different parts of the lesson and the additional hour are used.

The study was conducted among 108 boys in primary school (3. grade) from School “V. Drumev” - Varna, “St. Cyril and Methodius” - Smiadovo, Primary school “Hristo Botev” - Targovishte, divided into an experimental and control group, as follows:

- experimental group – 52 students;
- control group – 56 students.

## RESULTS AND DISCUSSION

The results went through a statistical processing with specially designed programs. The programs used for this were Microsoft Excel and statistical package SPSS 11.5. Depending on the objectives of the study the following statistical methods were applied:

1. *Analysis of variance*

2. *Student's t-test for the comparison of two means*

The analysis of the statistical parameters from the data of the described tests, taken at the beginning and the end of the pedagogical experiment, is done for the control as well as for the experimental group.

The statistical parameters of the analysis of variance of the variables that characterize the physical preparedness at the beginning of the experiment for boys are presented in Tables 2. and 3.

The diagnosis in Basketball through tests consisting of exercises similar to the elements of the basketball game lead to an increase in the effectiveness of the motor training, and the development and improvement of the motor skills, and all serve to achieve the aims of the State's educational requirements.

The test “20 meters smooth run from standing start” gives information about the motor quality speed (the speed of the simple motor response and speed of starting a separate motion). Comparing the results from Tables 2. and 3. we will notice that at the beginning of the observed period, both groups showed similar qualities ( $X = 4.62$  sec. CG for boys;  $X = 4.72$  sec. For EG guys;)

The coefficients of variation in both groups of boys are in the range of 24%, indicating an average dissipation of the shown results .

Table 1. List of indicators for detecting the state of physical preparedness of students in 3. grade

Indicator	Measure	Accuracy of measurement	Direction of increase
20 m sprint	sec	0,01	-
Shuttle run	sec	0,01	-
Throwing a ball	cm	1,0	+
High jump	Number	1,0	+
Catch and pass	Number	1,0	+
Defensive movement	sec	0,01	-

Table 2. Statistics on physical preparedness, experimental group boys - beginning of the study

Indicator	Xmin	Xmax	Mean	S	V%	As	Ex
20 m	5,1	4,2	4,7	1,1	23,5	-0,3	-0,7
Shuttle run	51,1	35,1	41,9	12,4	29,7	0,6	0,4
Throwing a ball	3,6	5,0	4,4	1,7	37,9	0,4	0,6
High jump	18,0	31,0	24,8	3,9	15,6	0,8	-0,2
Catch and pass	17,0	38,0	23,3	3,5	14,9	-0,1	0,8
Defensive movement	14,4	10,6	12,9	2,3	18,2	0,4	0,6

Table 3. Statistics on physical and technical preparedness, control group boys – beginning of the study

Indicator	Xmin	Xmax	Mean	S	V%	As	Ex
20 m	5,37	4,11	4,62	1,12	24,24	-0,1	-0,59
Shuttle run	52,31	36,34	41,84	11,71	27,98	1,07	1,33
Throwing a ball	3,5	5,2	4,45	1,89	42,47	0,52	0,31
High jump	12	30	21,69	4,38	20,19	0,27	-0,41
Catch and pass	12	38	23,32	3,57	15,3	0,3	-0,42
Defensivemovement	15,02	11,01	12,84	2,45	19,09	0,51	-0,58

Table 4. Significance of the differences between the average levels of physical abilities before the experiment - boys

CG		EG		d	t	Pt
X	S	X	S			
4,62	1,12	4,72	1,11	-0,10	1,47	45
41,84	11,71	41,86	12,43	-0,02	-1,70	69
4,45	1,89	4,38	1,66	0,07	-1,51	65
21,69	4,38	24,78	3,87	-3,09	-1,38	44
23,32	3,57	23,26	3,46	0,06	-1,36	44
12,84	2,45	12,86	2,34	-0,02	1,33	44

Table 5. Statistics on physical preparedness, experimental group boys – end of the study

Indicator	Xmin	Xmax	Mean	S	V%	As	Ex
20 m	4,95	4,19	4,26	0,85	20,01	-0,33	-0,69
Shuttle run	50,11	29,91	40,03	7,69	19,21	1,07	1,33
Throwing a ball	3,7	5,2	4,88	1,07	22,89	0,37	-0,17
High jump	20	42	30,39	4,7	15,46	0,27	-0,41
Catch and pass	18	35	29,98	4,29	14,31	0,3	-0,42
Defensive movement	21,98	10,21	11,69	1,98	16,93	0,51	-0,58

Table 6. Statistics on the physical and technical preparedness, control group boys – end of the study

Indicator	Xmin	Xmax	Mean	S	V%	As	Ex
20 m	5,01	4,23	4,48	0,66	14,64	0,3	-0,14
Shuttle run	52,87	37,23	41,24	8,02	19,44	-0,52	-0,44
Throwing a ball	3,4	5,3	4,6	1,03	22,49	0,25	-0,33
High jump	13	31	26,12	3,51	13,44	-0,15	-0,07
Catch and pass	13	31	24,5	4,07	16,61	0,82	0,1
Defensive movement	13,09	11,54	12,68	2,02	15,93	0,25	-0,33

Table 7. Significance of the differences between the average levels for boys experimental group

Beginning		End		d	t	Pt
X	S	X	S			
4,72	1,11	4,26	0,85	-0,46	1,75	69
41,86	12,43	40,03	7,69	-1,83	-1,99	92
4,38	1,66	4,88	1,07	0,50	1,91	93
24,78	3,87	30,39	4,70	5,61	3,30	98
23,26	3,46	29,98	4,29	6,72	-4,81	96
12,86	2,34	11,69	1,98	-1,17	1,69	66

The duration of a game part or school play (10 minutes or more) requires good physical preparation. Game scenarios are not associated with long running, but with moving forward and backward on the court. The “shuttle run” - provides information on the overall (cardiorespiratory) endurance. Opposing the advancing fatigue is essential to the learning process. The measured average values at the beginning of the experiment respectively  $X = 41.84$  sec. for the control group,  $X = 41.84$  experimental group of boys suggests similar qualities of students at the beginning of the study in terms of durability and long running from line to line in the basketball court.

The various manifestations of the power are exhibited depending on the specific motor activity that should be performed. The explosive power of the upper limbs is directly related to the successful mastering of the technique of basketball - pass, shoot, etc. Its development during the learning process ensures effectiveness of the actions of the students. Through the test “Throwing a solid ball (one kilogram) above”, the development in this index in both groups is checked. The difference of 0.07 (between CG and EG) for the boys is too small to be substantial in relation to the explosive power of arms, shoulders and chest muscles in a horizontal effort at the beginning of the pedagogical experiment.

Great importance for the mastering and improvement of a large number of technical elements in basketball, such as control of the ball under the basket, jump shot, shooting in motion, has the explosive power of the lower limbs on vertical efforts. In our battery test, to obtain information on the development of this indicator in both the control and experimental groups, we have included the indicator “High jump”. The analysis of the results (Table 2., Table 3.) shows that at the beginning of the experiment, the average performance in the jump in both groups are approximately equal. The relatively

equal level in the groups in terms of the strength of the lower limbs, we will also prove with the similar maximum values of the indicator -  $X_{max} = 30$ cm for CG,  $X_{max} = 31$ cm for EG boys.

The level of the skills in catching and passing requires high dexterity from students. The test “Catch and pass the ball against the wall” provides information about the strength endurance of the arms and shoulder girdle, the technique of catching and passing. Our research shows that at the beginning of the study the observed students show the same technical abilities for this feature.

We also observe minor differences in the average levels between the two groups from the test “Defensive movement” which determines the speed endurance, agility and the quickness. Identical capabilities of boys in terms of speed of movement are also indicated by the coefficients of variation. They vary within 18-22%, and prove the approximate uniformity of the samples at the beginning of the pedagogical experiment.

The comparative analysis of the average values of the variables in the control and experimental groups of students from 3. grade using Student's t - test for the comparison of two means - Table 4. allows a confirmation of the significance of the differences at the beginning of the experiment. The values of t - from 1.23 to 1.73 are ensuring a high probability. This is an evidence of equal start in terms of motor skills and provides conditions for the correctness of the experiment.

Of exceptional interest in this study are the changes in the groups which happened during the school year in terms of physical preparedness. In Tables 5. and 6. are presented the test results at the end of the study respectively for the experimental and control groups for boys.

However, as already noted, the presence of differences between the average levels of the studied signs is

no reason for making serious conclusions without checking the reliability of those statements. For this purpose the most appropriate is Student's comparative t- test (for dependent samples). Tables 7. and 8. present the significance of differences for boys from 3. grade, respectively for the control and experimental group.

From the tables, we will recognize that the obtained differences at the end of the experiment in terms of the so-called sprinter's speed measured by the test "20 meters sprint" is not confirmed by strong probability - for CG - Pt = 45% and EG - Pt = 69%. Positive in the test is the reduction in the coefficient of variation from 24.24 to 14.64 for the CG and from 23.51 to 20.01 for EG.

According to Yordanova, Malchev, Bazelkov, & Alexiev (Йорданова, Малчев, & Базелков, Алексиев, 1997) a task of priority for physical education in school is to develop a common endurance. That is endurance in terms of prolonged activity with moderate intensity (power), which requires the functioning of a large part of the muscle apparatus. The differences obtained at the end of the experiment in both groups with respect to the indicator "shuttle run" are positive. The growth of 1.83 seconds for EG - boys, respectively 92% reliability, we attribute to the numerous exercises and learning games through which this motor quality is improved. In the control groups in terms of this indicator we see growth that is due to random factors ( $t = -1,70$  boys).

With great reliability - Pt = 98% we will confirm the change in the initial and end average values of the indicator "high jump" for the experimental group - boys. Perhaps this large increase of  $X = 24.78$  cm. to  $X = 30.39$  cm., is a proof that this feature develops by throwing in motion, throwing with rebound, and control the ball. The proposed experimental exercises for improvement of these techniques have influenced the ability to jump. We have no guaranteed probability that the growth of 4.43 cm for boys in the control group is significant. The special physical training in basketball cultivates and improves specific motor qualities in accordance with the special features of the motor habits, which are built through practising the basketball techniques (Margaritov, Boneva, Bonev (Маргаритов, Бонева, & Бонев, 2003). An essential condition for the control and improvement of a number of techniques - has explosive power of the lower limbs.

In order for the student to be able to shoot, pass, or dribble, first he has to receive the ball. Proper receiving of the ball is a prerequisite for the effectiveness of the following actions. The opinion of Vl. Tsvetkov (Цветков) (2003) is that catching the ball is one of the most often neglected techniques of the game. The passing is a key technique in basketball because thanks to it the ball moves quickly in all directions of the court. According to him, special attention should be paid to these technical elements in all stages of the long-period sports training.

The analysis of Table 5. and Table 6. shows that during the experiment it comes to some stabilization of the indicator "Catch and pass in a wall" in both groups of the boys. A guarantee for the improvement of the tech-

nical skills of students to pass accurately and quickly is the growth from 23 to 30 times for the experimental group. Reason to believe that the impact on the tested groups with respect to the accuracy of the pass was effective enough we seek in the changed means and methods of the experimental program. The exercises that we apply to the throwing and certain game situations result in improvement of the agility, strength endurance of the arms and shoulder girdle and technique of catching and passing. This conclusion is confirmed by the argument of Yordanova (Йорданова) (2008) that the mobility and dynamics of nerve processes in the cerebral cortex is the physiological basis of skill, but psychologically it is closely related to the completeness of the perceptions, speed and accuracy of complex reactions. The increase in speed and accuracy of the passing during the time of the study is significant and confirmed with a high probability Pt = 96%.

The ability to move on the court without the ball is important in modern basketball. Defensive movement is an indicator that provides information on the individual technique of defence. Although there is not enough time spent on learning the technique of defence in school, it is an essential element in modern basketball.

Here we observe a positive change in boys of both groups. In the experimental group we have a change from 12.86 sec. to 11.69 sec., and in the control group from 12.84 sec. to 12.68 sec. The relatively low rate we can confirm by the fact, in terms of speed, boys in this age period do not fall in the sensitive phase. The improving in the average achievements in both groups at the end of the period is not essential (Pt = 66% for EG and Pt = 64% for CG). This is evident from tables 7. and 8., where the significance of differences between the two groups at the end of the study is presented. Important for the study is also to be traced the changes which have taken place in the diffusion of signs of physical preparedness at the end of the observed period. From the coefficients of variation of the indicators, we notice that both groups remained within the zone of stability, which means that they are relatively similar on this indicator and retain its homogeneity at the end of the study.

Given the importance of the quality Speed and its great application in the basketball game, it gives us reason to believe that the comprehensive program, which is used for improvement of the various physical qualities and is applied in the educational games of basketball, leads to development of the quality Speed.

Basketball is a complex game, and we can not determine with certainty which of the physical qualities has a dominant character. For better mastering and practising of this emotional game in its essence, it is necessary to work on the development of all physical qualities.

## CONCLUSION

It can be argued with a high guarantee probability that during the time of the pedagogical experiment with the boys from the experimental group, there occurred a significant increase in the level of all investigated signs

of physical and technical preparedness. Most significant are the changes in the level of endurance, agility and jump. Our opinion in that relation is due not only to the physical development of students, but also to the pedagogical process of teaching with the implemented basketball program for lesson and modular teaching.

For the same period of time, growth is also observed in the control group, especially in terms of strength of the upper limbs. The changes which have occurred in terms of endurance, agility and jump are insignificant.

After the completion of the study, some stabilization of the signs is observed for both groups of boys. They retain homogeneity in terms of physical properties, as well as in technical preparedness.

The distribution of the signs in the observed samples remains unchanged - symmetrical and normal.

Unambiguous is the evidence that at the end of the observed period, the experimental group is significantly superior over the control group in the level of development of all signs. This is proof of the successful selection of tools, methods and their combination reflected in the proposed new curriculum.

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