Original Article

Development of applicative coordination abilities of 12 - 13 years old pupils through basketball elements

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Published online: May 31, 2017

(Accepted for publication May 25, 2017)

DOI:10.7752/jpes.2017.s2079

Abstract

Purpose: This paper analyzed one of the research tasks regarding the creation of pupils' applicative coordination abilities by special means of basketball for the purpose of rational conducting of movements in non-standard social conditions.

Material and methods: based on this research it was supposed to highlight the degree of influence that the special complex of basketball means for dribbling improvement has on the development of the applicative coordination abilities of the boys – 6th grade pupils aged 12 to 13.

Three tests were used to assess the level of development of the coordination-applicative abilities: shuttle run through the cones, the „maneuverability” test and backward (reverse) running through the cones, coming back, recovery of the ball and subsequent acceleration towards the opposite basket.

Results: the initial data of the experiment in all tests are relatively uniform (approximately identical), $P>0.05$. The control group has improved its results on all tests during this experiment. However, the comparative analysis of the data listed in Table 1 proves that they are also insignificant, $P>0.05$. At the same time, the experimental group has considerably improved its results, $P>0.01$. It should also be noted that the experimental group recorded significant results at the final test, with a larger difference than the control group, $P<0.05$.

Conclusions: It has been experimentally determined that multiple basketball elements, in contrast with other sports games, have a priority in the development of the pupils' special applicative coordination abilities that they need for their proper posture in non-standard natural and social complex conditions of the contemporary reality.

Key Words: basketball, coordinative abilities, cognitive capacities, motricity tests, non-standard situations.

Introduction

It is well known that the contemporary society of the Republic of Moldova, through the tense and unpredictable character of the social relations in all spheres, represents a relatively dangerous environment for the young generation and especially for the pupils, given their position among the peers, within the recreational and entertainment activities, as well as the travel on foot or in various means of transport to the educational institutions where they study. To all this is added also the bad weather, often unpredictable.

For these reasons, one of the major objectives of pupils' physical education is the timely development of their motor function and their ability of rational and effective guiding of their own movements in different activities and situations and to achieve their own motor potential in order to ensure their personal security in difficult living conditions [Dragnea, Bota, Stănescu, et al., 2006; Dragomir, Scarlat, 2004; Scarlat, M., Scarlat, E., 2003; Șerbănoiu, 2004]. Only the development of pupils' applicative coordination abilities will allow the achievement of this important guidance function of movements in a complex and rational assembly that would meet the requirements of the proposed motor tasks [Dragnea, Bota, 1999; Dvejrina, 2000; Tudor, 1999].

At the same time, pupils' coordinative and motor abilities also ensure more economical energy consumption in difficult motor situations. In addition, these abilities are necessary premises for the successful acquisition of new and more complex movements, suitable for various situations, the processes of movement guidance having a higher density and diversity that contribute to the growth of experience [Bernshtejn, 1966; Bernshtejn, 1991].

It is also necessary to emphasize that the development of pupils' general motor skills is an essential condition for the creation of applicative coordination abilities that allow them to conduct their own movements in contemporary society [Chicomban, 2012; Dvejrina, 2000; Thomas, 1995; Tudor, 2001].

In the opinion of many authors, opinion that we also share, a form of motor development such as basketball has the necessary technical means and procedures for the formation of applicative coordination abilities of pupils of 12-15 years old because the necessary conditions for functional improvement exist at this age [Kozhevnikova, 1971; Moanță, 2005; Pașcan, 2011; Predescu, Moanță, 2001]. It should be highlighted the importance of such technical procedure in basketball as the dribbling, in all its diversity, which allows the development of peripheral vision, space and condition sense, limbs motricity, coordinated with the developed circumstances and the intellectual competencies as a whole [Ghețu, 2010; Ghițescu, Mosnță, 2005; Krause, Meyer, D., Meyer, J. 1999; Mikes, 1986; Moanță, 2005].

The dribbling in basketball is a complex coordinative action. It is one of the main technical procedures that allow the athlete to move in a certain space, in different directions with different speed and often without visual control of the ball. At the same time, it is necessary for the pupils to execute the dribbling using the forearm, hand and, especially, the phalanges of the fingers, without touching with the palm and with the force that would allow the ball to bounce up to the waist level. The "Sense of the Ball" in spatial parameters, during dribbling, is reached by performing this procedure with closed eyes or peripheral vision as well as under difficult conditions [Foster, 1983; Moanță, Ghițescu I., Ghițescu M., 2006].

In basketball, the dribbling is done in the following way:

- High dribbling (high impact of the ball from the ground, knee bending angle of 140 - 160°);
- Lower dribbling, with ball protection (low impact of the ball from the ground, knee bending angle 90-120°).

The basic position in the dribbling is the following: legs are flexed at the knee joint; body slightly bent forward, straight shoulders, head up. During the dribbling, the ball is passed from one hand to another by three methods: by impulse to the front, impulse of the legs (returning to 270-360° in contact with the opponent). During dribbling, the pupil must be ready at any time to change his movement direction, to take stops, passes or throws to the basket. The ball can be protected by the opponent with the body, with the shoulder, with the free hand. The palm of the hand with which the dribbling is executed adjusts the power of the impulse, the height of the ricochet and the direction of ball movement. Thus, the ball is only reached with the phalanges of the hand; the player does not have to look at the ball, but only control it with the peripheral vision. Static objects and dynamic subjects (teammates, opponents and various groups of people) can be found simultaneously near the field of "dribbling" [Gomel'skij, 1964; 9. Ghețu, 2010; Moanță, 2005; Predescu, Moanță, 2001].

Material & methods

Experimental pedagogical research

On the basis of research, it was highlighted the degree of influence of the special complex of means from basketball intended to improve the dribbling on the development of the applicative coordination abilities of the 6th grade boys of 12-13 years old.

The complex of special means developed by us contained the following basic exercises:

1. *By-passing the cones while running backwards*. Execution: in the middle of the distance between the two basketball hoops, plastic cones are arranged at an identical distance to each other; the number of cones is 8. The initial position: the pupil is under the basketball hoop with his back towards the center circle; at the signal, he bypasses all the cones by running backwards, finishing on the bottom line of the field.

Note: the performer may look back over any of shoulders. It is forbidden to move with added step. The first cone can be by-passed either on the right or on the left.

2. *By-passing the cones with a ball in one hand without touching the ball with the body*. Execution: four plastic cones are equally spaced from each other along the distance between the basketball hoop and the middle line. Initial position: the pupil is under the basketball hoop, holding the basket ball in the right or left hand. At the signal, he bypasses the cones without touching his body with the ball or the hand that holds ball.

Note: it is forbidden to hold the ball with both hands. Exercise is repeated with the right or left hand.

3. *Moving with added steps on the line of free throwing (shuttle movements), grasping the ball with one hand, pushing the ball to the ground and dropping the ball on the ground*. Execution: the partner stands under the basket holding the ball, the performer lies on the free throwing line. The player carries out a direct pass to the edge of the free throwing line. The subject catches the ball with a hand, executes an immediate impulse to the ground and puts the ball on the edge of the free throwing line. He executes the movement with added steps to the line opposite to the free throwing line, reaches the place of intersection with the circle and modifying his direction, moves with added steps back to the ball on the ground. He raises the ball with one hand and passes it to the partner under the basket. Next, the passing is executed in another direction, also the catching and pushing of the ball is executed with one hand.

Note: it is necessary to execute movements with added steps strictly. Catching the ball in both directions is executed with one hand.

4. *Meandering movement with steps added laterally to the right/left side*. Execution: there are 5 cones located on a line in the gym at a distance of 1.5 m from each other. Initial position: the subject is sitting with a part of the body towards the direction of movement. At signal, he must avoid with added steps all the cones, without turning, by-pass all cones laterally in the opposite direction.

Note: the first cone must be avoided frontally. All movements and maneuvers are carried out in the basic position.

5. *Meandering movement with steps added with the right / left side, juggling the ball around the trunk*. Execution: there are 5 cones in the gym at a distance of 1.5 m from each other on the same line. Initial position: the pupil stands laterally towards the direction of movement and holds the ball in front of him. At signal, he bypasses all of the cones with added steps and, without making the turn, moves laterally, bypassing the cones in the opposite direction, executing rotations of the ball around the trunk.

Note: the first pole shall be bypassed from the front. All movements and maneuvers must be executed from the basic position in basketball. The juggling of the ball around the trunk will be performed in medium tempo.

6. *Catching the ball from behind after high passing with ricochet from the wall or the panel.* Execution: initial position - the player is sitting 3 - 4 meters away from the panel or wall. He throws the ball against the panel or wall, taking into account that, after ricocheting, the ball must be caught with both hands from behind.

Note: when catching the ball, the trunk must not be bent forward.

7. *Dribbling in place with the impulse of the ball with the right hand to the left side behind the back.* Execution: the initial position - the basic position, the ball is held in front. The pupil drives the ball, executing its impulse in place with the right hand from the direction of the left leg, behind the back and between legs. After some repetitions, the hand that drives the ball is changed.

Note: the ball must be dribbled without visual control.

8. *Dribbling in movement without simple impulsions of the ball to the ground (repeated impulsions with a hand, with passing the ball through the front).* Execution: The ball is dribbled on the ground in the free direction.

Note: During the dribbling, it is avoided to hit the ball twice with a hand or to pass the ball through the front.

9. *Dribbling with a hand from behind between the legs and the back, with the change of hands.* Execution: initial position - basic position in basketball, ball in front. The ball impulses must be executed from the front, laterally and from behind with one hand only. After many repetitions, it is necessary to change the hand.

Note: dribbling must be executed without visual control.

10. *Catching the ball between the legs from behind after the passing and behind the head.* Execution: initial position - basic position, ball in front. It is executed by tossing up and back the ball, it is necessary to catch the ball bending forward, the trunk flexed and hands stretched backwards between the legs.

Note: the passing can also be carried by a partner, which makes it difficult to catch the ball.

Organization and methodology of research.

Two groups of boys from the 6th grade have participated in this annual experiment which lasted 60 academic hours and was carried out three times a week - 2 academic hours (out of the program hours): the experimental group and the control group, each one formed of 15 subjects. The control group practiced only the forms of basketball, but the experimental group - on the basis of our methodology, which contains a complex of 10 specialized exercises for the improvement of the "dribbling" technique, had a basketball game at the end of each week.

In order to evaluate the level of development of the coordination applicative abilities, three tests were used, which are well known in the sports practice [Dvejrina, 2000; Gomel'skij, 1964; Paşcan, 2011; Tudor, 2001]:

1. *Shuttle run with by-passing of the cones.* Execution: running from the bottom line to free throwing line, changing running direction back to bottom line, running to free throwing line, running to the opposite line of free throws, running to center line, running to the bottom line, running to the far line of free throws, finish line.

Note: a mandatory condition is to reach the lines with one hand and only after this to change the direction of movement.

2. *"Maneuverability" test.* On a 10m distance, 4 plastic cones are equidistantly spaced. The first cone is placed at a distance of 2 m from the starting line. The pupil lies face-down after the starting line. At the signal, he jumps, executing an acceleration towards the last obstacle, runs meanderingly, by-passing the cones in one direction and in the second direction and accelerates towards the starting line; thus the exercise is completed. Evaluation: the time is recorded with the stopwatch from the starting signal till the moment of passing over the finish line.

3. *Running (backward running by-passing the cones, turning back, recovering the ball and accelerating afterwards to the opposite basketball hoop.*

The pupil with the ball is positioned under the basketball hoop with his back turned to the center of the field; at the signal he accelerates backwards diagonally, by-passing the cone placed in the corner of the penalty line, further by-passing in backward run one more cone placed on the three-point line. Then he accelerates with the back turned to the center of the field; once arrived in the center circle he performs a 180° turning back, raises the ball situated on the center line and executes the final acceleration up to the opposite basketball hoop. Evaluation: the time is recorded with the stopwatch from the starting signal till the moment of passing over the finish line.

Results

Table 1 presents the initial and final results of the experimental group testing (6th grade pupils), and their comparative statistical analysis [Demicenco, 2009].

Table 1. Comparative analysis of experimental results of testing the 6th grade pupils (C: n = 15, E: n = 15)

No.	Tests	Groups and statistical feature	Initial indices	Final indices	t	P
			$\bar{X} \pm m$	$\bar{X} \pm m$		

1	Shuttle running through the cones (sec)	C	15.90±0.42	15.58±0.40	0.82	0.05
		E	15.75±0.43	14.41±0.38	3.53	0.01
		t	0.25	2.13	-	-
		P	0.05	< 0.05	-	-
2	Maneuverability test (sec)	C	11.83±0.45	11.51±0.42	0.78	0.05
		E	11.58±0.44	10.30±0.40	3.45	< 0.01
		t	0.24	2.09	-	-
		P	0.05	< 0.05	-	-
3	Running backwards among cones, recovery of the ball and acceleration (sec)	C	16.70±0.50	16.28±0.48	0.91	0.05
		E	16.50±0.47	14.91±0.42	3.78	0.01
		t	0.29	2.14	-	-
		P	0.05	< 0.05	-	-

Note: n=15; P - 0.05; 0.01; 0.001 r – 0.553 C – control group; E – experimental group
 f = 14 t = 2.145 2.977 4.140
 f = 28 t = 2.049 2.763 3.674

Discussion

In accordance with Table 1, the initial data of the experiment in all tests are relatively uniform (approximately identical), $P > 0.05$. During the experiment, the control group improved its results in all tests. However, the comparative analysis of the data presented in Table 1 shows that they are also insignificant, $P > 0.05$.

At the same time, the experimental group has considerably improved its results, $P > 0.01$. It should also be noted that the experimental group recorded significant results in the final test, with a greater difference than the control group, $P < 0.05$.

The applicative character of motor activities forms during the dribbling

In various forms of dribbling in basketball, a difficult complex of pupils' motor actions can also have an important applicative character for an individual manifestation in the unforeseen circumstances of contemporary society. Such a complex of motor actions is formed if the following conditions are met:

- A coordinated motion (synchronous) of the arms, legs, head and trunk;
- the peripheral vision, which instantly appreciates the created circumstances and those under modification and determines the choice of the safe (optimal) means of overcoming the "obstacles" in the created situation;
- the motor memory, which, together with other factors, including affinity, ensures the automation or lack of visual control of dribbling in difficult circumstances, changing quickly;

- the complex interconditionality of the intellectual and cognitive abilities (attention, memory, imagination, thinking, creativity) in the created condition, with unpredictable character and the selection of optimal means to solve the motor task.

In our opinion, these factors are very important for the correct assessment of the created situation from the point of view of their own abilities and for the correct prognosis of further reactive actions with less physical reluctances, including traumatic unpredictability.

For this reason we consider that the technical procedure of "dribbling" in basketball and its varieties is also an important means of applicative improvement, which develops the pupils' effective coordinative abilities that are so necessary in their everyday life for their own positioning.

Conclusions

1. The practice of basketball by pupils, in the context of some common lessons (the control group) did not lead to a sufficient development of their coordination abilities of a relatively big complexity.

2. The training and improvement of dribbling in basketball and the variants of this method according to the methodology that provides the application of the specialized means (experimental group) contributes to the significant development of some quite complex coordinative capacities, which can become applicative to a considerable extent.

3. The quite difficult development of the coordinative abilities of pupils is determined by the continuous improvement of the following capacities:

- The coordinated motion of the hands, legs, head and trunk for achieving the motor task;
- the peripheral vision which instantly assesses the created circumstances and those manifested themselves and which determines the choice of a safe (optimal) way of overcoming the "obstacles" in the created situation;
- the motor memory, which, together with other factors including the tactical affinity, ensures the automation or lack of visual control while dribbling in difficult circumstances, with quick changing;
- the complex interconditionality of the intellectual and cognitive abilities and the motor potential, created and realized in unpredictable circumstances, as well as the selection of optimal means for solving the task.

4. A series of basketball technical actions and elements (for example, various forms of dribbling) under the guided instruction can serve as important means of forming the coordinative and applicative abilities of pupils in terms of rational conducting of movements under non-standard conditions of the contemporary society.

Conflicts of interest

The author declares that there is no conflict of interests.

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