INCREASING PRECISION AND OPTIMISING EFFICIENCY IN DISTANCE BASKETBALL SHOOTING (6.75 M)

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Abstract. *Basketball shooting is the most important element that conveys the ultimate goal of the game (point scoring). In the evolution of basketball, basketball shooting has undergone a spectacular development, both in terms of coordination ability and player precision. It is also the technical element that enjoys the utmost attention in the process of learning and training at all levels of preparation. The purpose of the paper is to develop and apply a basketball-based actuation system adapted to female students, members of the Bucharest "Politehnica" University Basketball Team, in order to increase precision and optimise the efficiency of distance basketball shooting (6.75 m). The experimental group consisted of 12 students of the "Politehnica" University of Bucharest, members of the representative basketball team. The research was conducted over two academic competitive years (2016-2017, 2017-2018). The performance of the female basketball players was recorded in both the preparatory and competitive stages, using the statistical and mathematical method, as well as the graphical representation method. The study highlights the influence of the specific training means on optimising the efficiency of distance basketball shooting by increasing precision in university female basketball. After the statistical processing of the data obtained, an increase in the percentage of distance shooting was observed, but also a decrease in the execution time of the shooting technique, the difference between the means being significant.*

Keywords: *precision, efficiency, basketball shooting*.

Introduction

The 21st century basketball is a sport in which technical executions, which show outstanding sports skills, are not enough to win. Increasing the efficiency of the basket-shooting technique is conditioned by the level of motor development.

Significant international competitions demonstrate the rapid pace of the game, the alternate dynamics of the attack and defence phases, which is largely determined by the increase in the execution speed of the station-specific technical procedures (Predescu & Ghițescu, 2001, p. 5). The quality for a player to be a good shooter is determined by several factors. The most important factors are the mechanics of shooting at the basket and the effective use of the skill to shoot at the basket (Ghițescu & Moanță, 2008, p. 67).

The correct execution of basket shooting is determined by the player's basic motor actions: leg standing, balance, movement, jump, speed, strength, resistance (Colibaba-Evuleț & Bota, 1998, pp. 89-93). If all of these are done on a unitary basis, the precision of shooting will be influenced by the correct control of the fingers on the ball. The precision of shooting will depend on ball trajectory (Moanță, 2005, p. 35).

The scientific literature and coaching claim that there is a poor correlation between fitness components (muscle strength and aerobic endurance, speed, agility, anaerobic capacity and anaerobic power) and shooting precision recorded with the photo camera. On the other hand, the results of the regression analyses showed that there were significant positive relationships between basketball shooting assessments and competitive shooting precision during the game play (Pojskić, Šeparović, & Užičanin, 2014, p. 408).

A study by Pojskić, Šeparović, Muratović, & Užičanin (2011) shows that free-shooting precision would be determined by the ball release angle, which must be close to the angle that requires the minimum release speed. The trajectory of the ball must be high and curved to allow it to hit the basket under a relatively important angle. Bosc and Gros (1985, p. 156) consider that:

- if the angle is 60^0, the shooter uses 86% of the ring surface;
- if the angle is 45^0, the shooter uses 70% of the ring surface;
- the minimum throwing angle for the ball to enter the basket is 39.9^0.

Consequently, the use of an angle between 35^0 and 45^0 for beginner players is considered in determining the shooting trajectory; for experienced players, any trajectory that is advantageous to them can be used.

Anatomical factors (position of the head and eyes looking at the target) have an important role in improving shooting precision, along with biomechanical factors. Thus, Ripoll, Bard, & Paillard (1986) investigated the role of the head position towards the target while moving. The experiment focused on the relationship between time of

eye and head stabilisation on the target and the level of skill expertise in basketball players. Experienced and beginner players significantly differed regarding the time required for the head and eye to achieve fixation on the target. Significant differences were also found for the head and eye stabilisation parameters in conditions of success and failure. The results clearly demonstrate that the efficiency of head and eye stabilisation on the target has a strong influence on the success of shooting.

Slawinski, Poli, Karganovic, Khazoom, & Dinu (2016) researched the influence of fatigue on the biomechanics of shooting from 6.75 m. The players performed four distance shots preceded by submaximal effort. The results showed that fatigue reduced the hip joint angle and increased the shoulder joint angle when the centre of mass was at its lowest point. These biomechanical changes did not alter the precision of shooting.

Another important role in optimising shooting precision is concentration. During shooting, this quality is defined as the ability to exclusively consider the elements directly involved in this action. During the individual shooting action, the essential element is setting the basket in sight.

Purpose of the study

To increase performance in university women's basketball, there is a permanent concern to develop the precision of shooting from 6.75 m. In this respect, the purpose of this paper was to develop and test methods and means aiming to optimise distance shooting precision.

Hypothesis

- Using variable intensity, work volume and differentiated technique will improve the distance basket shooting (6.75 m).
- The rationalisation of training sessions specific to distance shooting, as well as the continuous assessment of efficiency in the training process, will maximally develop the precision of shooting from 6.75 m.

Material and Methods

Subjects

The experimental group consisted of 12 female students from the "Politehnica" University of Bucharest, members of the representative basketball team. The research was conducted over two academic years (2016-2017, 2017-2018). At the time of the study, subjects did not experience any health problems. Prior to the experiment, the subjects were informed of the research data and expressed their verbal and written consent.

Methods

The experiment used the pretest-test form. The tests used to assess the precision of shooting from 6.75 m consisted of 10 basket shots from two preset positions. In the preset shooting positions, two poles were placed; the female player near a pole received the pass and shot at the basket (6.75 m), ran fast to the second pole, took the pass and shot at the basket (6.75 m). Five shots were taken from two positions. The first test was conducted during the preparatory period of the competition year 2016-2017, followed by three other tests (the 2017 competition period, the 2017-2018 preparatory and competition periods).

The magnitude of the specific training effect to increase the precision of shooting from 6.75 m was represented by the following statistical indicators: arithmetic mean, standard deviation, coefficient of variation, correlation coefficient and Student's t-test. The obtained results were presented in tabular and graphical forms.

Results

The results recorded in the initial, intermediate and final tests are shown in Table 1, Figure 1 and Figure 2.

Table 1. *Execution time(s)/precision (10 basket shots – 6.75 m)*

No.	Name initials	Initial Test	Intermediate Test	Intermediate Test	Final Test
		Preparatory period	Competition period	Preparatory Period	Competition period
		Quarterbacks			

1	B.C.	31 s	10/6 60%	30 s	10/6 60%	30 s	10/5 50%	29 s	10/6 60%
2	M.L.	35 s	10/5 50%	33 s	10/5 50%	33 s	10/5 50%	33 s	10/6 60%
3	D.D.	43 s	10/2 20%	38 s	10/3 30%	38 s	10/4 40%	38 s	10/5 50%
4	F.A.	32 s	10/5 50%	32 s	10/6 60%	32 s	10/6 60%	30 s	10/6 60%
					Forwards				
5	P.M.	40 s	10/8 80%	38 s	10/8 80%	38 s	10/7 70%	37 s	10/8 80%
6	P.M.	30 s	10/6 60%	30 s	10/7 70%	30 s	10/6 60%	28 s	10/7 70%
7	D.I.	37 s	10/6 60%	35 s	10/6 60%	35 s	10/5 50%	35 s	10/7 70%
8	G.D.	35 s	10/5 50%	34 s	10/7 70%	34 s	10/6 60%	32 s	10/7 70%
					Pivot Players				
9	R.D.	39 s	10/4 40%	37 s	10/6 60%	36 s	10/5 50%	36 s	10/6 60%
10	T.A.	38 s	10/5 50%	35 s	10/5 50%	35 s	10/5 50%	34 s	10/5 50%
11	S.L.	40 s	10/6 60%	39 s	10/7 70%	39 s	10/6 60%	38 s	10/7 70%
12	R.I.	43 s	10/4 40%	40 s	10/6 60%	40 s	10/5 50%	39 s	10/4 40%

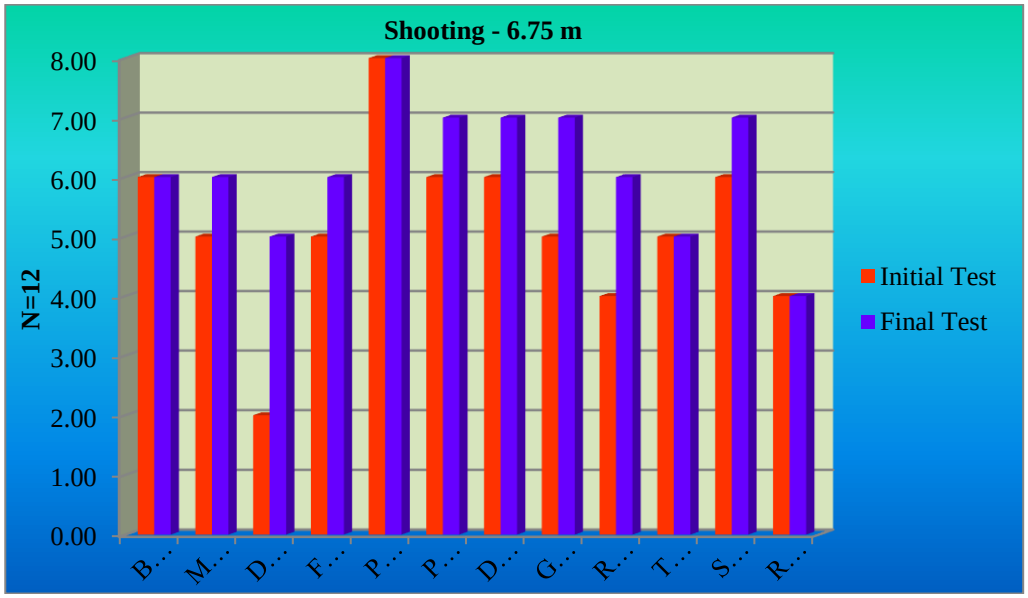

Figure 1. Distance shooting (6.75 m) from 10 attempts

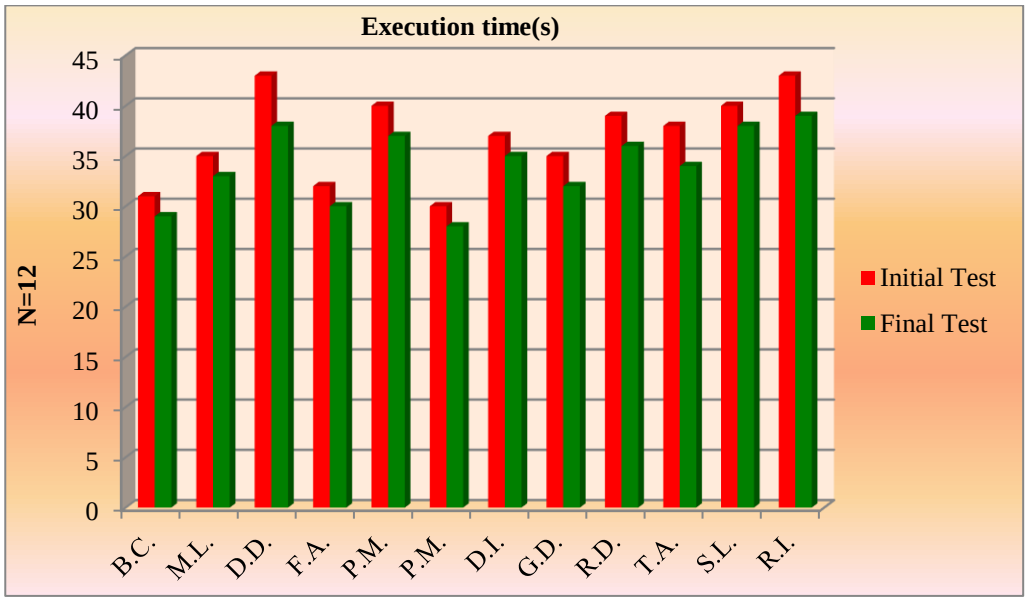

Figure 2. Execution time of shooting from 6.75 m

We can see from Table 1 and Figure 1 that some female athletes have improved their execution time in the final test, and others have the same percentage. The best result was obtained by P.M., with a percentage of 80%, and the worst result was 40%.

Table 2. *Execution time (initial test / final test)*

Arithmetic mean		Standard deviation		Coefficient of variation		Student's t-test	Coefficient of correlation
Initial test	Final test	Initial test	Final test	Initial test	Final test	9.53 p = 0.0073	0.98
36.92 s	34.08 s	4.4 s	3.6 s	11.8 s	10.7 s		

Table 3. *The precision of distance shooting (6.75 m)*

Arithmetic mean		Standard deviation		Coefficient of variation		Student's t-test	Coefficient of correlation
Initial test	Final test	Initial test	Final test	Initial test	Final test	3.63 p = 0.0028	0.77
0.52	0.62	0.2	0.1	35.8	17.6		

The statistical data show that there are significant differences between the initial and final tests (Tables 2 and 3) in the sense that the precision of distance shooting (6.75 m) has increased ($t = 3.63$; $p = 0.0028$).

Also, the time required to execute the shots has improved by recording a statistically significant decrease ($t = 9.53$, $p = 0.0073$).

The assessment of the precision of shooting from 6.75 during the preparatory period of the academic competition year 2016-2017, correlated with the same assessment tests applied during the competition period of the academic year 2017-2018, points out the following data:

- The arithmetic means for the percentage of shots is 52% and 0.3 for the standard deviation in the initial test, while and in the final test, the arithmetic mean has grown by 10 percent (62%), and the standard deviation is 0.1.
- The coefficient of variation (shooting precision) describes the lack of homogeneity in the initial test (variation higher than 20%), and in the final test, the team has become relatively homogeneous, according to the data (Cv = 17.6%).
- The significant differences determined by the Student's t-test for both the precision of distance shooting (6.75 m) and the execution time confirm the research hypotheses according to which "Using variable intensity, work volume and differentiated technique will lead to improving the distance basket shooting (6.75 m). The rationalisation of training sessions specific to distance shooting, as well as the continuous assessment of efficiency in the training process, will maximally develop the precision of shooting from 6.75 m".

Conclusion

The research results highlight that, through systematic training based on variations and a high level of performance, most female players have improved their precision of shooting from 6.75 m.

By applying methods and means specific to basketball, in accordance with the individual particularities of the female players, the optimisation of efficiency and the increase in the precision of distance shooting have been achieved.

In this way, the competitive game will exploit the training model efficiency, also creating and obtaining numerical and percentage values for the game model parameters that ensure the performances achievement in the university competition activity.

Authors' Contributions

All authors contributed equally to this study and should be considered as main authors.

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