



Science, Movement and Health, Vol. XVI, ISSUE 2 Supplement, 2016
September 2016, 16 (2, Supplement): 306-314
Original article

STUDY ON THE STREAMLINE OF THE U15 WOMENS BASKETBALL FREE THROWS

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Abstract

Aim. In high performance basketball game, the percentage of made free throws is situated near the limit of 70%, this value meaning a share from total points scored in a official game about 17%. For this reason the research aim is directed to create and implement in the sport training process a special methodology in order to develop free throws percentage in womans basketball – U15 echalon. The operational model includes exercises for basketballs free throws streamlining, influencing static and dynamic balance, visual analyser training, the precision of the free throws in conditions of sustained physical and mental effort, with phonic or visual perturbators agents, using theme games or competitions, exercises using basketballs helping materials and devices, but also using exercises in order to obtain the ideal shot trajectory.

Methods. A specific motor program has been implemented in the experimental group (CSU Braşov womans basketball team – U15 category -14 athletes) for 10 month. The verification of this methodology has been realised in two directions:

- comparing the results of initials and finals test in the experimental and control groups;
- analysing official games statistics (free throw item) at Semifinal and Final Tournaments at this echalon;

Results. The experimental group present semnificative grown indices about the obtained free throws percentage in official games and at the specific test elaborated by Romanian Basketball Federation.

Conclusions. According to the results of research, the implementation of the operational model is succesfully, that fact leading to streamlining of basketball free throws at studied echalon.

Keywords: free throws, operational model, FRB test, basketball

Introduction

Sports performance demands today a major attention about specific aspects of game / competition / discipline, small details making the difference between winning and losing. Modern basketball game require a high level of physical preparation and adequate tactical, mental and tehcnical training methods. Realising a short analyse of competitionals womans basketball games (superior league of romanian womans championship), Oancea and Ionescu (2015 pp. 23-29) concluded that free thows share fromf total scored points are situated near 17%, the percentage of this item (tried / made) beeing limited around 70%.

Throwing in the game of basketball is the most challenging of all sports skill with the ball. Disposal is the most difficult element of the game of basketball technical, requiring high accuracy precision carried muscle (Paye, Paye, 2013, p. 181).

Kozar, Vaughn, Lord, Whitfield, (1994, p. 243-248) argue that free throw in basketball game is the most important, accounting for 20% of total points

scored in N.C.A.A. Disposal economy is becoming more important in the game at the end of the that, when, in the last five minutes of the game increases its percentage share of successful points.

Krause (2002, p. 225-226) raises the question of constancy in the last 20 years in terms of the percentage of successful free throws in American Colleges reserved races, namely the barrier of 70 percent. To pass this limit, professor Kraus believes that the shorts athletes should embroidered letters K, A and P, acronyms meant to remind basketball 3 requirements for success: Knowledge, Attitude and Practice (KAP).

Free throw would be the easiest process in the basketball game, the player beeing alone at 15 feet (about 4.57 m.) away from the ring without defensive and troublemakers (Okubo, Hubbard, 2006 p. 1305) requiring good concentration, the most important element being represented by a corresponding mechanical (Kozar, Vaughn, Lord, Whitfield, 1995, p. 125).

The same aspect of free throws is supported by

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Received 11.02.2016 / Accepted 03.03.2016

* the abstract was published in the 16th I.S.C. "Perspectives in Physical Education and Sport" - Ovidius University of Constanta, May 20-21, 2016, Romania



Showalter (2012, p. 77), by calling into question the ability performer to relax and be positive thinking. Players can also turn to the motivation and relaxation techniques, thinking it is a good pitcher, while viewing the route entering through ball basketball ring.

Lam, Maxwell, Masters (2009, p. 181) states that basketball players to be effective from the free throw line because it largely determines the final outcome of the game.

In this context, a lot of researchers try to help basketball coaches making studies about ball ideal trajectory from the free shot.

Teachers University of Calgary, Canada in the Human Performance Laboratory, Hamilton and Reinschmidt analysis the ideal trajectory of performed free-throw in the game of basketball, arguing that success is conditioned by launching angle, speed and spin of the ball movement (rotation back). After their view, an optimal trajectory comprises a launch angle of about 60° and a velocity of 7,3 m/s, about 2 complete revolutions backwards, but relies on the accuracy and stature depending shooter (Hamilton, 1997, p. 491-504).

Tran suggests that the ideal launch angle of the ball when the free throws are between 52° and 53° and the upper tip of the trajectory of the ball is 4 cm. below the upper edge of the panel (Tran, 2008, p. 1147-1155).

Silverberg, a mechanical engineer at the University of North Carolina, analyzing millions of successful throws from foul line players in the NBA, believes that a launch at 52° with 3 movements per second backspin of the ball in order to straighten the point represented by 7 cm. behind the basket center would be the key free-throw processed (Silverberg, 2011 p. 122-127).

In line with presenting arguments, our study is directed to improve basketball free throws percentage, creating and implementing a specific motor program. This methodology includes exercises for basketballs free throws streamlining, influencing static and dynamic balance, visual analyser training, the precision of the free throws in conditions of sustained physical and mental effort, with phonic or visual perturbators agents, using theme games or competitions, exercises using basketballs helping materials and devices, but also using exercises in order to obtain the ideal shot trajectory.

That's why, the working hypothesis is centered on development of basketball free throws thru implementing a specific operational program in training process.

Methods

Subjects of research consists in 14 sports components of the female basketball team of CSU Brasov, U14 - U15 category, athletes trained by the authors of present study. The control group is legitimate to ACS Champions Bucharest with peers and participating in the same competition with the experimental group. Reasons why the control group are that it is very close in value to the experimental one, along competitions the teams finishing in the top 6 teams of the country, squaring and the category U13 and U14 finals small National Championship Juniors.

The study takes the form of the experiment, the main reason being the low percentages of successful free throws on his own team in the games category U14 Women's Final Four in 2012, about the value of 47%.

Period of investigation is from July 2012 to May 2013. As indicators we have chosen the matches in the Semifinal Tournament Under 14, Brasov, April 2012 (out the experimental period), U14 Final Tournament, Alexandria, May 2012, U15 Semifinal Tournament, held in Dej of March 2013 and the Under 15 women's Final Tournament held in Bucharest in May 2013. Official statistics of these official games is a real indication, quantifiable and undeniable efficiency free throws, being carried out under official game, full of physical and emotional disturbance. We are going to show also the experimental and control groups performances, in the competition context, with all participation teams.

We note that these statistics are official documents of Romanian Basketball Federation, being published on its website, www.frbaschet.ro, monitoring the percentage of successful free throws at the team level.

Also, the evaluation of motor program consists in 3 tests, 2 of them own creation and the last, the third, the presented one, is being create by the Romanian Basketball Federation, consisting in 12 free throws: the player starts from the base-line running to the center line and back to the line of free throws, throwing 2 series of 3-2-1 throws; between the series the player runs to the center and back, the result of the test is represented by the number of the baskets marked/successful baskets; (the test is taken from the set of tests and rules of the Romanian Basketball Federation,

http://www.frbaschet.ro/regulamente/Probe_si_Norme_de_control_2012.pdf.) Anyway, we consider this test as irrelevant because the physical effort is not even close from modern basketball demands, but



with a large field of applicativity for all teams angrenate in competition.

The program called *Perfect Shot* is geared towards strengthening / improvement in the game of basketball free throws, consisting of the insertion in weekly training plan content of at least one training lessons specifically created to this effect. The only time when this specific training was lacking was between 14 to 23 August 2013, when the team was in training camp in Mamaia, Constanța, with no possibility of creating appropriate organizational conditions these types of drive means.

As positioning in weekly plan, Perfect Shot program was carried out usually on Saturday or Sunday, depending on the racing calendar of the federation specialty. Specific training sessions were held at the sports halls of Moisil Gregory National College and Transilvania University of Brasov.

Character training was primarily determined by the period of preparation, loading and training in this period of general and specific objectives of the training group. The 40 lessons of special training designed to optimize the efficiency of free throws in the game of basketball at the junior level, have a duration between 45 and 120 minutes with varied intensity and complexity, often having character comeback milestones of future performance, and predominantly physically and technically.

In determining training positions in the operational program Perfect Shot we took into

account the school program and the competition in the categories where active research subjects, Under 14, Under 15 and Under 16, convinced that athletes can increase in value if they are promoted to an upper age category.

We note that in terms of how work on experimental group sometimes applied to the principle that removing and correcting serious errors of specific technical, focusing on driving means specific content methodology Perfect Shot insisting on its stance initial free-throw convenient but appropriate requirements, focusing on indices stato-dynamic equilibrium, the equal distribution of body weight on both legs in conditions of unstable equilibrium gained or regained a result of various driving actions.

The proposed methodology comprises and drives intended exclusively work upper limb exercises for precision throwing, made in terms of effort varied in intensity, complexity, volume, terms limiting regarding the assimilation of information of the visual analyzer under conditions. The presence of various external agents disruptive drive systems for printing an optimal path to success, tactical theme, thus creating a complete consolidation / improvement of free throws.

In order to show more explicite we will present a extras from the working plan, October trainings (Table I), the legend of exercises (Table II) and the experimental calendar (Figure 1):

Table I
Working plan extras

Training no.	Date	Place	Period	Minutes	Context	Content	Dosage	Observations
15	3.11.2012	Info	precompetitive	80		42	4x3-2-1	pairs
						43	7'	visual and phonic perturbators factors
						44	7'	
						45	7'	
						15	10'	
						16	20'	
16	8.11.2012	Info	precompetitive	80	before U15 tournament	45	5'	pairs circuit
						47	4x2'	
						46	4x2'	
						35	4x2'	
						36	4x2'	
						33	4x2'	
						16	20'	
17	18.11.2012	Info	competitive	90	after U16 game	27	4x10	pairs circuit
						29		
						30		
						31		
						32		
						33		
						34		
						35		
						36		
						37		



18	25.11.2012	Info		70	before U16 game	42 17 18 38.5 38.9 16 7	5' 5' 5' 10x2 10x2 2x10' 5'	1/2 x half circle 24" low luminosity darkness
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Table II
Legend

No.	Exercises	Observations
7	free throws in conditions of low luminosity and darkness	
15	“make it or leave”	pairs
16	tactical game: first quarter team vs second quarter team (see specific regulation)	valid try if is dabled by a free throw made
17	win team who gets a x consecutive free throws made	algorithm: subjects number + 1
18	win team who gets a x free throws made	algorithm: free throw made = 2 points, unsuccessfull free throws = minus 1 point
27	free throws with Shooter bandit device	individualisation
29	free throws with palmar device	individualisation
30	free throws with wheits for arms	individualisation
31	free throws with Shotloc device	individualisation
32	free throws with correction device	individualisation
33	free throws with training / swimming glasses	individualisation
34	free throws with, on net fixing fishing bells	individualisation
35	free throws with Yellow point device	individualisation
36	free throws with Red point device	individualisation
37	free throws with Angel circle device	individualisation
38.5	free throws sets, between sets executing fundamental position movement	
38.9	free throws sets, between sets executing Jamping Jacks exercise	
42	free throws in high noise conditions	electronical scoreboard buzzer, trumpets, music, screams
43	free throws in visual perturbators factors conditions	encourage originality, the rest of the team is placed near the executant
44	free throws in visual and phonic perturbators factors conditions	encourage originality, the rest of the team is placed under the rim
45	free throws in visual and phonic perturbators factors conditions	encourage originality, the rest of the team is placed in paint zone
46	free throws with hight adjustable athletic fences	individualisation
47	free throws with hight adjustable gymnastics circles	individualisation

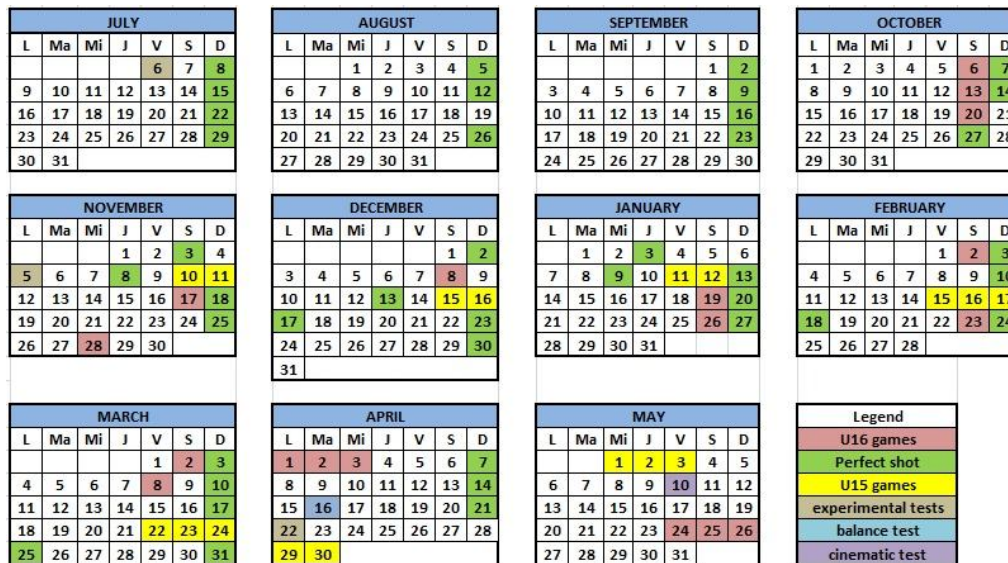


Figure 1
Experimental calendar

The analyse of experimental calendar (Figure 1) shows that motor program named *Perfect Shot* has 40 specific training lessons, most of them situated on Sundays or after officials games of experimental group. Sometimes, the lessons are helping us to manage useful competition stress level, in the content finding different methods in order to streamlining free throw percentage getting in the same time neuro-muscular remake.

Results

We are going to present the results of the experiment in two directions: the results of the FRB test and the percentage of free throws from official games during the experiment time.

The FRB test is aplyed on experimental and control groups, at the begining and at the end of experiment, the results beeing presented in the following table (Table III).

Table III
The results of FRB test

		Totals	Average	Percentage
Experimental group	Initial test	102/210	7,28	48,57%
	Final test	129/210	9,21	61,42%
	Progress	27	1,93	12,85%
Control group	Initial test	94/210	6,71	44,76%
	Final test	99,5/210	7,10	47,38%
	Progress	5,5	0,39	2,62%

The analyse of FRB test results shows that, in experimental group case, between initial and final tests there are a progress of 27 made free throws, conducting to a average of 9,21 made shots, increasing the percentage from 48,57% to 61,42%, with a 12,85 value. In the case of the control group, its been registered also a small growing with 5,5 made free throws, leading to a percentage of 47,38%.

In conclusion, we could affirm that the differences are evident, those beeing the way to determine the efficiency of *Perfect Shot* program.

Statistacaly speaking, in the following we are going to present some important items which confirm one more time the efficiency of the operational program (Table IV).

Table IV
Statistical items

Tests	Athlets number	Average	Standad error	Standard deviation	Simmetry	Vaulting	Statistic	Sig.
Initial test	14	6.89	0.11	0.44	-0.27	-0.32	0.238	0.031
Final test	14	8.42	0.23	0.87	1.06	0.86	0.260	0.011

The interpretation of statistical items (Table IV) confirm one more time the hypothetis of the present study, maybe, the most important item being the semnification limit (Sig.) who is less than 0.05, conferring real meaning of the study.

As we are saying before, we are presenting now the specific competitive yield (free throw item) from experimental and control groups, in the context of other competitive teams (Table V).

Table V
Experimental group free throws percentage

Date	Competition	Made	Tried	Percentage
06-08.04.2012	Semifinal Turnament (SFT) – U14	45	96	46,87%
02-06.05.2012	Final Turnament (FT) – U14	56	98	57,14%
22-24.03.2013	Semifinal Turnament – U15	66	108	61,11%
29.04-03.05.2013	Final Turnament – U15	78	122	63,93%

As a side note ascertaining the indicators relating to free throws in official games experience, we can say that during the experimental period, the percentages relating to the topic addressed in research at major tournaments played in the National

Championship Junior echelon U14 and U15 Women, they are increasing dramatically.

As regards the comparison of the performances of the experimental group and the control, we are able to present the following table (Table VI):

Table VI

Experimental / control group free throws percentage, source
http://www.frbaschet.ro/campionat-feminin/u15/statistici-echipe/?season_id=76653
http://www.frbaschet.ro/campionat-feminin/u14/statistici-echipe/?season_id=17253

	SFT U14 2012	FT U14 2012	SFT U15 2013	FT U15 2013
CSU Braşov	46,87%	57,14%	61,11%	63,93%
ACS Champions Bucureşti	52,63%	51,96%	53,03%	45,45%

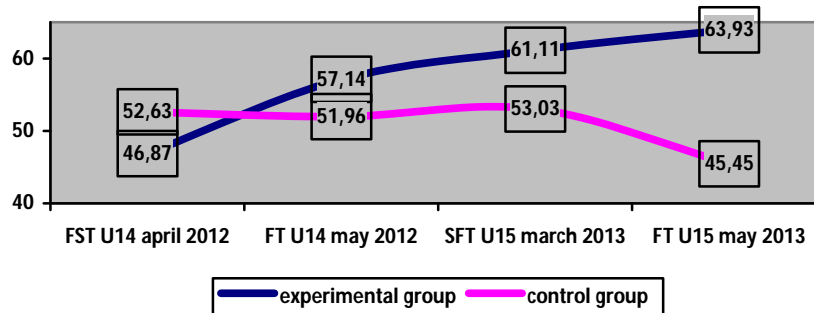


Figure 2
Graphic interpretation of specific competitive yield



Analysis performances of groups contained in this study, shown in Table VI and Figure 2 highlights the effectiveness of the methodology for strengthening / improvement of free throws. The results of this study indicate a competitive yield on free throws percentage of 46.87% in April 2012, representing the starting point for experimental approach (U14 Semifinal Tournament games) in May of the same year – 57,14% (Tournament Final U14) 61,11% in the U15 Final Four games in March 2013 and performance to reach 63,93% (U15 Final Tournament), a percentage approaching and even large teams is superior high performance level. This increase of over 17 percent is largely due process of preparing the experimental methodology was implemented.

The value of 63,93% is all the more valuable as it is understood that the performance of sport means sport performance requirements, but also the sacrifices made to get it at an early age, small

performance girls being born in 1998, 1999 and 2000, while the percentage analysis is limited to the top teams of seniors around 70%.

Interim figures if we can call it that, obtained in May 2012 and in March 2013 confirmed the upward trend of the percentage values pursued, representing real indicators confirming the effectiveness of the training.

As a final note following the data on competitive return on free throws, we can say with certainty that the proposed operational program has proven successful free-throw percentage by developments in the period considered.

We believe that this progress, to provide certainty must present it in the context of competition. Thus, in what follows we will give data that will present the achievements of the experimental group compared to the other teams participating in the Final Tournaments competition (Table VII).

Table VII
Free throws (FT) share and percentage – Final Tournament, U14 Female, 2012, source
http://www.frbaschet.ro/campionat-feminin/u14/statistici-echipe/?season_id=17253

No.	Team	FT made	FT tried	Total points	Percentage	Share
1	MC Sport Cluj Napoca	59	92	282	64,13%	20,92%
2	CSU Braşov	56	98	248	57,14%	22,58%
3	CSS Alexandria	53	102	380	51,96%	13,94%
4	CSS Bega Timişoara	52	106	254	49,05%	20,47%
5	BC Valbon Arad	49	108	262	45,37%	18,70%
6	ACS Champions Bucureşti	35	80	235	43,75%	14,89%
7	U 4 You Cluj Napoca	24	68	193	35,29%	12,43%
8	CSS Sibiu	41	123	183	33,33%	22,40%
Average		46,12	97,12	254,62	47,48%	18,11%
Total		369	777	2037		

Analyzing the datas presented in the table above (Table VII) we can say that the differences between the values obtained from the teams participating in the competition in Alexandria (2012) are significant, preparedness influencing directly from our point of view the performance achieved in this index.

Regarding the share of the points scored from free throws, we can say that it is influenced on the one hand and the style, approach or philosophy / concept of the game each team, but also on the surface of

game player waisted, who are often put in a position to execute the free throws, because age-specific defense system.

However, we can say that the value share of successful transformation points is an important free throws in the game's economy, a figure which is very close to the performance of the teams above.

The final race of this age-game statistics indicates a percentage of successes from the free-throw line of 47,48% with a share of 18,11%.



Table VIII
Free throws (FT) share and percentage – Final Tournament, U15 Female, 2013, source
http://www.frbaschet.ro/campionat-feminin/u15/statistici-echipe/?season_id=76653

No.	Team	FT made	FT tried	Total points	Percentage	Share
1	CSU Braşov	78	122	329	63,93%	23,70%
2	LPS Galaţi	74	137	308	54,01%	24,02%
3	U 4 You Cluj Napoca	59	120	208	49,16%	28,36%
4	CSŞ Bega Timișoara	75	164	266	45,73%	28,19%
5	ACS Champions Bucureşti	65	143	256	45,45%	25,39%
6	LAPI Dej	105	240	291	43,75%	36,08%
7	CSŞ Alexandria	60	142	317	42,25%	18,92%
8	CSŞ Sibiu	73	185	239	39,45%	33,33%
Average		73,62	156,62	276,75	47,00%	27,24%
Total		589	1253	2214		

Analysis of the data presented in the table above (Table VIII) entitles us to say first that the effects are positive experimental implementation of the operational model, the experimental group leader at the final competition of the Junior National Championship Edition 2012-2013 on chapter regarding the percentage of successful free throws with a digit approaching and even exceeding the performance of big teams involved in competitions reserved to senior women.

Regarding the share of points in realizing successful free throws over the total number of points we can say after examining the data presented in the Table VIII that is above average statistical analysis teams from various echelons value. This value can be justified by the increase in intensity and aggressiveness in the defense phase of the game.

Subject research team concluded 2012-2013 competitive year with participation in the final of the Junior National Championship U15 Women booked echelon, where recorded a share of free throws converted by 23,70% of the total points scored, and the percentage of successes free throw line to 63,93%, there by positioning the first team this parameter's basketball game at this category, giving us this certainty the proposed operational program effectiveness.

Discussion

Analysing the results we could affirm that:

1. The chosen test shows that the experimental group has develop free throw efficiency in a solid mode;
2. Index competitive return on free throws converted the experimental group is growing in preparing athletes during the implementation of the operational program;

3. The operational program influences recording the best percentage of successful free throws from all teams participating in the women U15 Final Tournament;

That's why, we propose:

1. Implementation of the proposed operational program to the juniors national teams of Romania.
2. The introduction of the methodology in preparing athletes in *Perform Basketball Program. A step forward!*

Conclusions

According to the results of research, the implementation of the operational model is succesfully, that fact leading to streamlining of basketball free throws at studied echalon.

Acknowledgments

Thank you to all of subjects who participated in this study.

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