

Determining Efficiency Indexes for Players in the Representative University Basketball Team

Dana Lucica Ciocoiu^{a,b}, Julien Leonard Fleancu^c

^a Faculty of Physical Education and Sport, "Dunarea de Jos", University of Galati

^b Human Performance Research Center, Faculty of Physical Education and Sport, Galati

^c University of Pitești, Romania

Abstract

This work is based on a comparative study focused on the determination of efficiency index of the students in the representative basketball team of the Faculty of Physical Education and Sport of Galați, for the annual competition "Student Basketball Show". Calculating the index of efficiency is an objective indicator for assessing the quality of the game regarding acquisitions made by students in the early stages of training and competition but also their efficiency in official matches. In this respect, special record sheets for student evolution were drawn up. The objectivization of the students' performance, who are members of the researched representative teams was achieved by calculating the player's efficiency index (IEJ) and the team's efficiency index (IEE), used by Colibaba-Evuleț and Bota, (1998). The structural elements of the formulas for these two indices are the following: successful actions (number of points scored, balls won, decisive passes), unsuccessful actions (number of missed free throws, missed throws, lost balls), number of minutes played. The teacher's bonus index (which is given in special cases) and the bonus for the time played by each student are added.

Keywords: students, basketball, team efficiency index, students' efficiency index, representative team

Introduction

Promoting sports education in the University environment and cultivating the competitive spirit are some of the relevant goals that are implemented among students who love the game of basketball and during the physical education classes or in their free time (Hossu-Login, 2016). Authors Fleancu (2007), Nae (2009) and Netolitzchi (2011) appreciate the effectiveness of the basketball game, "which brings important contributions to the harmonious development of students, to the development of motor skills, qualities and abilities and to the positive education of the positive character traits." The training and preparation of the student representative team, and its management in competitions is based on a scientifically organised didactic process, specific to the training requirements. It also represents a complex management process and its development depends on the performance of the team in specific competitions (Hânsa, 2003; Ciocan, 2016). Authors such as Balaiș, Mereuță and Hânsa (2001) argued that the competition "represents the essential moment of a sportsman's activity, trying to overcome oneself or one's opponents". The preparation of the team does not focus strictly on practising the game of basketball within specific modules (Ciocoiu and Ciorbă, 2008, Badea-Miss, 2010). A number of factors are essential, such as training factors, material conditions, human resources (students) as well as scientific knowledge, ability and skill of the teacher to process data collected through investigations carried out during training sessions and competitions.

Hypothesis: given the permanent process of selection within the student representative basketball team, the calculation of efficiency index values constitutes an objective indicator for assessing the quality of the game (the acquisitions made by students in the process of training and competition) and the efficiency of players in official games.

The purpose of this work is to determine the effectiveness index of the team and of the players and former student basketball players of FEFS (Faculty of Physical Education and Sport) of Galați.

Research methods used: the study of bibliography, the observation, the statistical pedagogical observation, the statistical and mathematical method, the graphical and tabular method.

Organize and conduct the research: The study focuses on the representative basketball team of the Faculty of Physical Education and Sport of Galați at the competition held annually under the name "Student Basketball Show". The competition took place during the period December 12-16, 2016, and the representative teams from seven faculties (FSIA -Faculty of Food Science and Engineering, FAN- Faculty of Naval Architecture, FEAA- Faculty of Economy and Business Administration, FMF- Faculty of Medicine and Pharmacy, FACIEE- Faculty of Automation Computers Electrical and Electronic Engineering, FI- Faculty of Engineering) Each team was made up of 12 students with an average age of 20-27 years. The competition took place as a tournament, because this system allowed a greater number of games and the classification of participants is balanced so it's closer to the real value. Thus, the matches were held in

seven stages. The duration period of the matches was 4 quarters of 10 minutes each with a 2 minute-break between quarters 1-2 and 3-4 and 15 minutes between quarters 2 and 3.

The objectivization of the athletes' performance in the researched representative teams was achieved by calculating the player index of efficiency (IEJ) and team index of efficiency (IEE) used by Colibaba-Evuleț and Bota (1998), as follows :

$$IEE = \frac{(\text{no. of success. actions}) + (\text{no. of unsuccess. actions})}{200 \text{ minutes (5 players x 40 minutes)}} \times IBA$$

where:

- *number of successful actions* = number of scored points + number of won balls + number of decisive passes
- *number of unsuccessful actions* = number of misses + number of lost balls+ number of points received
- IBA = coach advantage index.

Player efficiency index

Calculated using a formula similar to the previous one (but using the advantage index for the given time, according to the minutes played (Colibaba-Evuleț and Bota, 1998):

$$IEJ = \frac{(\text{p.m.} + \text{m.c.} + \text{p.d.}) - (\text{a.l.n.} + \text{a.n.} + \text{n.m.p})}{\text{n.m.j.}} \times IBT \times IBA$$

where:

- (p.m.) – scored points
- (m.c.) – won balls
- (p.d.) – decisive passes
- (a.l.n.) – unsuccessful free throws
- (a.n.) – unsuccessful throws
- (n.m.p.) – number of lost balls
- (n.m.j.) – number of minutes played by the athlete
- IBT – time advantage index
- IBA – coach advantage index

The scale of assessment and rating is shown in Table 1.1, according to Colibaba-Evuleț and Bota (1998).

Table 1 - Scale of assessment and rating according to Colibaba-Evuleț and Bota (1998:175)

Efficiency index of the player (IE)		
$IE = \frac{(\text{No. of scored points} + \text{No. of won balls} + \text{No. of decisive passes}) - (\text{No. of missed free throws} + \text{No. of throws for missed actions} + \text{No. lost balls})}{\text{No. minutes played by athlete}} \times IBT \times IBA$		
IBT=Time Advantage Index	IBA=Advantage Index given by coach	
Limits: 1.1 – 1.8; given according to the no. of minutes played, as follows: <ul style="list-style-type: none"> - 6-9 min.= x 1.1 - 10-15 min.= x 1.2 - 16-20 min.= x 1.3 - 21-25 min.= x 1.4 - 26-30 min.= x 1.5 - 31-36 min.= x 1.6 - 36-40 min.= x 1.7 - 6-9 min.= x 1.8 overtime	Limits: 1.1 – 1.6; given in exceptional cases for: <ul style="list-style-type: none"> - neutralize a dangerous opponent; - win a great no. of balls; - decisive actions in difficult moments of the game; - extraordinary efforts to win; - exemplary achievement of special given tasks; - etc. 	
Assessment and Rating Scale		
IE Assessment Value Ranges	Rating	% efficiency
0.00 – 0.19	Wery low (FS)	0
0.20 – 0.40	Low (S)	40
0.41 – 0.60	Satisfactory (Sf)	50
0.61 – 0.80	Good (B)	80
0.81 – 1.00	Very Good (FB ₁)	100

1.01 – 1.20	Very Good (FB _{II})	120
1.21 – 1.40	Excellent (E _I)	140
1.41 – 1.60	Excellent (E _{II})	160

Results of the research:

In order to determine the efficiency of FEFS (Faculty of Physical Education and Sport) Galați basketball team players in the stages of the competition, we monitored their evolution by recording on special sheets their performance during the seven matches played and the efficiency index of players (IEJ) was calculated on a scale between 0.07-1.51 (Table 2).

Table 2 - Efficiency index of the players in the FEFS (Faculty of Physical Education and Sport) Galați representative basketball team

Match against:		FSIA	FAN	FEAA	FMF	FACIEE	FI
Players		Efficiency indices of players					
1.	P.R	0.47	0.67	1.06	0.49	0.46	0.91
2.	G.G	0.28	0.65	0.40	0.33	0.72	0.71
3.	D.B	1.41	0.94	0.56	0.10	0.91	0.80
4.	M.P	0.95	1.42	1.51	1.09	1.70	1.64
5.	B.R	0.70	0.88	0.86	0.82	0.67	1.08
6.	P.A	0.63	0.81	0.83	0.42	0.88	0.64
7.	O.G	-	-	0.47	0.07	0.44	1.14
8.	V.C	-	-	0.11	0.29	0.76	-
9.	T.M	0.69	-	-	-	0.84	0.28
10.	B.A	-	0.79	-	-	0.49	0.47
11.	S.N	-	-	-	-	-	0.48
12.	D.A	-	-	-	-	-	-

The ratings for each player vary from very low (FS) to excellent (E) (see Table 3).

Table 3 - Ratings of the players of FEFS (Faculty of Physical Education and Sport) Galați basketball representative team

Match against:		FSIA	FAN	FEAA	FMF	FACIEE	FI
Players		Ratings of players					
1.	P.R	Sf	B	FB 2	Sf	Sf	FS
2.	G.G	S	B	S	S	B	B
3.	D.B	E 1	FB 1	Sf	FS	FB 1	B
4.	M.P	FB 1	E 1	E 2	FB 2	E 2	E 2
5.	B.R	B	FB 1	FB 1	FB 1	B	FB 2
6.	P.A	B	FB 1	FB 1	Sf	FB 1	B
7.	O.G	-	-	Sf	FS	Sf	FS
8.	V.C	-	-	FS	S	B	-
9.	T.M	B	-	-	-	FB 1	S
10.	B.A	-	B	-	-	Sf	Sf
11.	S.N	-	-	-	-	-	Sf
12.	D.A	-	-	-	-	-	-

The efficiency of the players varies in the interval 0% - 160%, the data being expressed in percents in Table 4:

Table 4- The efficiency of the players

Match against:		FSIA	FAN	FEAA	FMF	FACIEE	FI
Players		Efficiency of players					
1.	P.R	50%	80%	120%	50%	50%	0%
2.	G.G	40%	80%	40%	40%	80%	80%
3.	D.B	40%	100%	50%	0%	100%	80%
4.	M.P	100%	140%	160%	120%	160%	160%
5.	B.R	80%	100%	100%	100%	80%	120%
6.	P.A	80%	100%	100%	50%	100%	80%
7.	O.G	-	-	50%	0%	80%	50%
8.	V.C	-	-	0%	40%	100%	-
9.	T.M	80%	-	-	-	100%	40%
10.	B.A	-	80%	-	-	50%	50%
11.	S. N	-	-	-	-	-	50%
12.	D.A	-	-	-	-	-	-

The systematization of the matches played pointed out that the team had the following general statistic situation: 5 wins and 2 defeats; goal average 325-288; so, number of scored points 325; number of won balls 437; number of decisive passes 281; number of misses 345; number of lost balls 211; number of received points 288.

The data resulting from the calculation of the efficiency index of the ratings and the efficiency of the team during the played matches is shown in Table 5.

Table 5 - Efficiency index, rating and team efficiency FEFS Galați

Stage	Match against:	Score	IEE	Rating	(Efficiency %)
I	FSIA	49 – 26	0.26	S	40%
II	FAN	38 – 31	0.30	S	40%
III	FEAA	44 – 41	0.91	FB1	100%
IV	FMF	51 – 78	0.18	FS	0%
V	FACIEE	60 – 22	0.54	Sf	50%
VI	FI	37 – 19	0.35	Sf	50%

The improvement in the performance of the FEFS (Faculty of Physical Education and Sport) Galați representative student basketball team (efficiency of the team and players) is the result of the objectivization of human resources (selection-preselection), of teaching resources (improving methodological preparation), of preparation and presentation material resources, etc.

The calculation of the index of efficiency will objectify the assessment of game quality and of student efficiency in official matches.

Conclusions:

- The calculation of the index of efficiency represents an objective indicator for the assessment of the quality of the game by students in the early stages of training and their efficiency in official matches.
- The efficiency of the players' performance and of the FEFS (Faculty of Physical Education and Sport) Galați basketball representative team was achieved by calculating the index of efficiency which constituted an objective indicator for assessing the quality of the game (acquisitions made by students in the process of training and competition) and thus the research hypothesis was confirmed.
- The centralization and interpretation of data in detecting the efficiency of the players and of the FEFS (Faculty of Physical Education and Sport) Galați basketball team for the "Basketball student show" competition was achieved by recording on special sheets their performance throughout the games played as follows:
 - The calculation of the players' index of efficiency (IEJ) is made on a scale between 0.07-1.51, the scores ranging from very low (FS) to excellent (E) and the between 0%-160%.
 - The calculation of the index of efficiency of the team (IEE) obtained in the seven matches are situated in the following range 0.15-0.9, the ratings (low and very good) and the team efficiency between 40%-100%.
- The centralization of the results after the disputed matches demonstrated that the team had the following overall situation: 5 wins and 2 defeats; goal average 325-288; so number of points scored 325; number of balls won 437; number of decisive passes 281; number of misses 345; number of lost balls 211; number of points 288.

Practical and methodical recommendations

- The objective assessment of the players performance and student representative team must become a constant in the work of the teacher.
- The results obtained from the calculations of the index of efficiency contribute to raise students awareness during matches, to reduce the number of unsuccessful actions and to increase the number of successful ones.
- Correlation of the indices aimed at players and team efficiency with parameters of statistical-mathematical calculation used in sport and physical education can represent an important feedback about the actions teacher training the university basketball team.

References

- Badea-Miss G., (2010)-*Possibility of applying the new technologies of information and communication starting in basketball's initiation*, Annals of the „Constantin Brâncuși” University of Târgu Jiu, Mens Sana Series, Issue 2/2010, P 27- 33.
http://www.utgjiu.ro/revista/sport/pdf/2010-02/4_BADEA_MISS_GEORGIAN.pdf
- Balaiș, F.; Mereuta, C; Hânsa, C. (2001). *Managementul sportului*, Galați, Ed. Academica.
- Colibaba-Evuleț D., (1998). *Jocuri sportive, teorie și metodică*, Ed. Universitaria Aldin, București., P 173-176.
- Ciocan V., C. (2016)-*Teoria și practica baschetului* :Curs studii de licență, Bacau, Alma Mater,2016, P.2
- Ciocoiu D.L., Ciorbă C., 2008, *Analiza relației componentelor tactice individuale în condițiile jocului bilateral la disciplina "Baschet" curs de bază*, Strategii de dezvoltare a sportului pentru toți și bazele legislative ale domeniului Culturii Fizice și Sportului în țările CSI, Chișinău, p. 3-6
- Fleancu, L. (2007). *Concepte de dezvoltare a calităților motrice și evaluare tehnico-tactică în baschet*, Ed. Universitaria, Craiova.
- Hânsa C (2003). *Învățarea jocului de baschet – Galați: Fundației Universitare "Dunărea de Jos"*
- Hossu Longin L.,G. (2016).*Efectele conținutului specific jocului de baschet asupra capacității psihomotrice a studenților din învățământul vocațional de arhitectură*, Rezumatul tezei de doctorat, Bucuresti, p., 5, 12.
- Nae, I., C., (2009). *Baschetul în lecția de educație fizică din învățământul superior de neprofil*, Marathon, Vol I, Nr.2, 2009, p 207,
[7.http://www.marathon.ase.ro/pdf/vol1/2/14%20Nae.pdf](http://www.marathon.ase.ro/pdf/vol1/2/14%20Nae.pdf)
- Netolitzchi, M., (2011). *Obiectivele și conținutul pregătirii baschetului în lecțiile de educație fizică cu studenți*, Marathon, Vol III, Nr. 1 2011, P
<http://www.marathon.ase.ro/pdf/vol3/1/MihaelaNetolitzchi.pdf>