

Analysing tactical knowledge through team sport assessment procedure/TSAP: a case study in basketball

Análisis del conocimiento táctico a través del procedimiento de evaluación del deporte del equipo/TSAP: un estudio de caso en baloncesto

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Abstract: During the season players can be observed and evaluated in two environments: game context and training context. In basketball, the absence of a valid and reliable instrument to use in order to assess objectively the level of tactical awareness is a main problem in training processes and coaching communities. Team Sport Assessment Procedure was devised by Grehaigne, Godbout & Bouthier providing teachers with objective data on students' offensive performance. Two professional players were observed through video analysis by three observers in order to ascertain the validity of TSAP in basketball's tactical observation in game context. Cohen's k coefficient value ($k=0.88$) reveals an almost perfect inter-observer agreement meaning that observers registered the same actions and interpreted them in the same way. The results shown that TSAP is a valid and reliable tool to assess the offensive on-ball elements of the game and easy to be used by coaches and athletes.

Key-Words: Basketball; Performance Assessment; TSAP; Tactical Awareness

Resumen: Durante la temporada, los jugadores pueden ser observados y evaluados en dos ambientes: en situación de partido y en situación de entreno. En baloncesto, la falta de un instrumento válido y fiable para evaluar de forma objetiva el nivel de conocimiento táctico, es el problema principal en los procesos de formación y en las comunidades de entrenamiento. Team Sport Assessment Procedure fue ideado por Grahaigne, Godbout & Bouthier, brindando a los profesores datos objetivos sobre las actuaciones ofensivas de los estudiantes. Dos jugadores profesionales fueron observados mediante análisis de video por tres observadores, a fin de determinar la validez del TSAP en baloncesto táctico en situación de partido. El valor del coeficiente k de Cohen ($k = 0,88$) revela un acuerdo entre observadores casi perfecta lo que significa que los observadores registraron las mismas acciones y los interpretan de la misma manera. Los resultados muestran que el TSAP es una herramienta válida y fiable para evaluar elementos ofensivos en juego del partido y fácilmente utilizable por entrenadores y jugadores.

Palabras clave: Baloncesto; Evaluación de desempeño; TSAP; Conocimiento Táctico.

Introduction

Basketball is characterized by intermittent and intense effort, with short periods of action and rest (Carvalho et al. 2011), involving a complete domain of technical, tactical, physical, motivational skills. Nevertheless, tactical knowledge is not inherent to play; it must be learned, developed (González-Villora et al. 2016), and assessed.

During the season, players can be observed and evaluated in two environments: game context and training context. Therefore, the need for tools and methods that identify the individual level of tactical awareness, progresses and effects of specific tactical decision making training programs are a real concern within team contexts. This monitorization offers an effective feedback to coaches, in order to perceive the different rhythms and needs of learning, as also to assess the way the players understand the game, in order to adapt their planning.

According to William & Kendhall (2007), there is a gap between the evaluations performed by coaches and by researchers. This diversity on criteria analysis and the lack of knowledge regarding the adequacy of the instrument used, do not allow comparisons between different results (Gallati et al. 2015). From this point of view, in basketball, the absence of a valid and reliable instrument to use on game and training contexts, in order to assess objectively the level of tactical awareness, is a main problem in training processes and coaching communities.

In 1997, Grehaigne, Godbout and Bouthier devised the Team Sport Assessment Procedure. Its primary objective is to provide teachers with objective data on students' offensive performance in different invasion and net games while avoiding standardized tests which do not provide for a rapport of strength (Richard, Godbout & Gréhaigne, 2000). The use of the instrument aim to record player's specific behaviour, based on two notions: "How player gains possession of the ball" and "How a player disposes of the ball" (Grehaigne, Godbout & Bouthier, 1997). Indeed, TSAP has concentrated on assessing offensive on-ball elements of game performance,

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providing representative scores of involvement and efficiency, in order to establish an overall performance index.

From a constructivist point of view, the learner must be in the center of the teaching-learning process and according with Wiggins (1993) an authentic assessment procedure should also provide for students' active participation in assessment. TSAP is considered accessible and integrated by the authors and consulted physical education teachers, making possible the use of this tool, with a moderate to good level of precision, by 10-13 aged students (Richard, Godbout & Gréhaigne, 2000), revealing its potential on declarative knowledge development and monitorization while knowledge on action is being assessed.

Thomas et al. (1986) define sport performance as "a complex product of cognitive knowledge about the current situation and past events combined with a player's ability to produce the sport skill(s) required". For that reason, knowledge development is a key point on tactical learning and decision making processes and must be implicit on teaching-learning systems. The achievement of a common language and the implementation of a game philosophy is a need for coaches, in order to align players' representations and interpretations (Richards et al. 2009).

Nowadays TSAP has been used extensively by students, teachers, coaches and researchers (González-Villora et al. 2016). Therefore, several content, ecological, and concurrent validity studies have been performed (Gréhaigne et al., 1997; Gréhaigne & Godbout, 1998; Richard, Godbout & Gréhaigne, 1998; Richard, Godbout & Gréhaigne, 2000). However, to our knowledge, there is no evidence on literature of any kind of TSAP's application on basketball. The present paper intends to ascertain the validity of TSAP in basketball through inter-observer reliability and test-retest method.

Methods

Participants

Two professional basketball players aged between 28 and 31 years acting on the same team of Portuguese Professional League, with basketball's experience superior to 20 years.

Measures and Instruments

Team Sport Assessment Procedure (TSAP) that focus on the offensive on-ball aspects of the game, assessing how a player

gains the balls possessions, recording the number of Conquered Balls (CB) and Received Balls (RB); and how a player disposes the ball, recording the number of: Lost Balls(LB), Neutral Balls (NB), Influent Passes (IP) and Success Shots (SS) (Table1).

Table 1. TSAP Components of Game Play.

Components	Definitions
Gaining Possession of the Ball	
Conquering the ball (CB)	Interception. Stealing the ball from the opponent, or recapturing the ball after an unsuccessful shot on goal or near loss to the other team.
Receiving the ball (RB)	Receiving the ball from a teammate and not immediately losing control of it.
Disposing of the Ball	
Playing a neutral ball (NB)	Passing the ball to a teammate, or any pass that does not put the other team in jeopardy.
Losing the ball (LB)	Losing the ball to the other team without having scored a goal.
Playing an offensive ball (OB)	Passing the ball to a partner, thus pressuring the other team, which most often leads to a shot on goal.
Executing a successful shot (SS)	Scoring or maintaining possession of the ball following the execution of a shot.

Note: Adapted from Gréhaigne, Richard and Griffin (Mitchell, Oslin & Griffin (1997)

Procedures

The process of validation of TSAP tool in basketball was divided in three phases, involving the participation of 3 observers. The observers that participated in the study had between 15 and 20 years of basketball's experience and had engaged on a 45-minute's explanation session of TSAP foundations, conducted by the author.

Design of the tool

In order to proceed to the game analysis was used a sample of a variable recording sheet was designed by Mitchell, Oslin & Griffin (1997) (Fig.1).

Figure 1. Recording Sheet.

Team Sport Assessment Procedure for Invasion Games

Name _____ Class _____

Observer _____ Date _____

Directions
Observe the student's game play and place a tally mark in the appropriate box.

Gaining Possession of the Ball

Conquered ball (CB)	Received ball (RB)

Disposing of the Ball

Lost ball (LB)	Neutral ball (NB)	Pass (P)	Successful shot (SS)

From S.A. Mitchell, J.L. Oslin, and L.L. Griffin, 2013, *Teaching sport concepts and skills: A tactical games approach for ages 7 to 18*, 3rd ed. (Champaign, IL: Human Kinetics).

Video Analysis

Two professional players (Player 1; Player 2) were observed through video analysis during the 40 minutes of the game 7 of 2007-2008's Portuguese National League Finals by the three observers (Observer 1, Observer 2, Observer 3), separately, and all the offensive actions were evaluated using the designed tool. The video was analyzed a second time by the Observer 1, in order to assess reliability through test-retest method.

Data Analysis

All the variables were computed and used to calculate the indexes of "Volume of Play", "Efficiency" and "Performance Score", using different formulas (Table 2). Cohen's k coefficient was used to measure inter-observer agreement.

Table 2. Formulas for Calculating TSAP Variables Outcomes.

Outcome variables	Calculation
Volume of play (VP)	CB + RB
Efficiency index (EI)	CB + OB + (SS / LB) + 10
Performance score (PS)	(Volume of play / 2) + (efficiency index x 10)

Note: SS = executing a successful shot; CB = conquering the ball; RB = receiving the ball; LB = losing the ball; VP = volume of play; OB = playing an offensive ball. Source: Mitchell, Oslin & Griffin (1997).

Results

“CB”, “LB” and “SS” variables have a perfect match among the recorded values, registering 1 situation in each variable for all observers, existing no variance among the observations done to Player 1. Diversity exists in other variables, namely in “RB” and “NB” with Player 1 and Player 2 respectively. Especially on Player 2, the variance is most common along the observations, existing no total coherence among any recorded variable by the three observers (Table 3 and Table 4).

The indexes of “VP”, “Efficiency” and “Performance Score” feature the participation of the players on a certain situation, using the values of the recorded variables. On Player 1 observation sheet, “VP” index presents a minimum value of 22.0 (Observer #2) and a maximum value of 26.0 (Observer #3 and RETEST- Observer #1). However, on Player 2’s “VP” does not vary, reaching 35.0 in all observations.

Table 3. TSAP output observation from Player 1.

	CB	RB	LB	NB	P	SS	VP	Efficiency	Performance Score
Observer#1	11	24	6	15	3	8	35	8,2	99,5
Observer #2	12	23	7	13	4	7	35	9,3	110,5
Observer #3	11	24	6	16	4	9	35	8,4	101,5
Retest Observer #1	11	24	6	16	4	9	35	8,4	101,5

Table 4. TSAP output observation from Player 2.

	CB	RB	LB	NB	P	SS	VP	Efficiency	Performance Score
Observer#1	1	22	1	18	4	1	23	1,6	27,5
Observer #2	1	21	1	19	4	1	22	1,6	27
Observer #3	1	25	1	18	3	1	26	1,5	28
Retest Observer #1	1	25	1	19	4	1	26	1,6	29

Discussion

The variables with more recorded situations (“RB”; “NB”) appear to have an increased error between the observers. Contrariwise, the variables with less recorded situations (“CB”; “LB”; “SS”) show no error among the observers. This kind of information make possible to conclude that, probably the volume of observation is related to error. Nevertheless, these little variations on the values of observations may always be conditioned by the background of observers, interpretations, constraints of the game and coach’s specific instructions, conditioning its utility in very complex situations like high level game analysis.

Richard, Godbout & Gréhgaine (2000) also refer specific basketball game situations that can cause confusion on the observers. For example, when a player shoots the ball on the backboard, it is possible to be coded to “LB” without consid-

The efficiency’s minimum value is 1.5 (Observer #3) and the maximum’s one is 1.6 (Observer #1, Observer #2 and RETEST- Observer #1), representing an amplitude of 0.1. On Player 2’s Efficiency Index, the amplitude is higher reaching the value of 1.1, with the minimum value of 8.2 (Observer #1) and the maximum value is 9.3 (Observer #2).

“Performance Score” represents a final and objective evaluation of tactical and technical aspects of the game involvement. In this study, on Player 1 observations, despite the variability is small, there is no perfect precision among the values of the three observers. Player 2, reveals an increased variability; however the value is equal in “Observer #3” and “RETEST- Observer #1” observations (101,5).

Lastly, Cohen’s k coefficient value ($k=0.88$) reveals an almost perfect inter-observer agreement among all the observations.

ering who retained possession of the ball after rebound; other observers could have coded the same situations in a “SS”, revealing a big subjectivity inherent to the TSAP’s observations and the need to use it in less complex systems.

Increased amplitude on Player 2’s Efficiency Index is due to a rised mathematical importance assigned to “CB” over “LB”, once the last one is introduced on the denominator of the formula (Fig. 2), explaining the variability of values on “Efficiency” and “Performance Score”. At the same time, it is possible to see that Player 2’s “Performance Score” values are more variable than Player 1’s “Performance Score”. This can be explained by the increased “VP” and consequently increased number of situations to record rising the possibility of error, like we have wrote above.

The inter-observer agreement ($k=0.88$) reveals and “almost perfect” congruence, meaning that observers registered the same actions and interpreted them in the same way. At the

same time, the value of congruence exhibit the easy use and interpretation of the tool and respective results, by coaches and athletes. From this point of view, it is possible to engage the athletes on his own learning ensuring a best understanding of the philosophies, individual and collective roles, as also the attribution of meaning to the learnings and actions (Richards et al. 2009). For the coaches, it is also possible to assess declarative knowledge and the alignment of athletes' interpretations with his own and with the models of the team.

Declarative knowledge refers to factual information (knowing what), whereas procedural knowledge is the compilation of declarative knowledge into functional units that incorporates domain specific strategies (knowing how) (García López et al. 2010). Studying the nature and development of expertise in sports needs the analysis of knowledge and performance (García López et al. 2010) and for that reason playing well means choosing the right course of action at the right moment and performing that course of action efficiently and doing this over and over throughout the match (Greghaine, Godbout & Bouthier, 2001). Game-based approaches (GBAs) are based on a constructivist teaching-learning point of view (student-based approach) offering an opportunity to train under new prospects, needed to leading learners improve their integrated knowledge and skills in a more innovative learning context (Serra-Olivares et al. 2015). The use of tools and instruments like TSAP can help coaches to follow up the cognitive knowledge and decision making

evolution deciding and adjusting his planning according to the momentary, individual and collective, learning needs.

Future studies, should be focused on training contexts and limited periods of time, aiming the monitorization of specific aspects of game development, in order to prove its specific value on ecological assessment of players and to protect observers from monotony and multiple variables that involve two teams, time and result of the game.

Conclusion

TSAP has been widely used across many sports and academic environments and its validity has been tested in order to bridge theory-practice gap (Richard, Godbout & Grehaigne, 1998; Richard et al. 1999; Richard, Godbout & Grehaigne, 2000; Griffin & Richard, 2003). Our results support connectivity between research and training contexts, showing that TSAP is a valid and reliable tool to assess the offensive on-ball elements of basketball and easy to be used by coaches, teachers, researchers and athletes. However, its utility on high level and full game elements analysis is limited, due to the complexity of the environment and multiple situations to record.

TSAP may be an useful tool to be used in pedagogical and teaching environments, aiming the monitorization of specific tactical awareness evolution, during practice and/or competition, limiting the volume and complexity of constraints to observe in order to protect observers from monotony and error probability.

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