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Differences in basketball training loads between comprehensive and technical models of teaching/training

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DIFFERENCES IN BASKETBALL TRAINING LOADS BETWEEN COMPREHENSIVE AND TECHNICAL MODELS OF TEACHING/TRAINING
KEYWORDS: Basketball, Training load, Models of teaching, Models of training.

ABSTRACT: Researchers analyze differences between models of sport training in order to identify the most suitable one. In basketball studies are focused on finding out differences amongst the processes of sport learning and taking decisions. The basketball training load includes the total sum of stimulus to which players are subjected during the preparation process. The aim of this research was to identity differences in training loads amongst the different tasks designed by basketball coaches who used different comprehensive and technical models of teaching/training. Two expert coaches of each training model participated in the study. All tasks performed during 10 training sessions were analyzed. In each task several aspects were studied: opposition, density/intensity, number of performers, competitive load, game area, cognitive involvement, mean heart rate, total time and useful time of the task. After that, the load of the task, value of training, and utilization of the task were calculated. There are statistically significant differences ($p < .05$) between the proposed tasks under the Comprehensive and Technical Model in the level of opposition, the number of performers, the load of the task, total time, useful time and utilization of tasks. The Comprehensive Model of training increases training load compared to the Technical Model, increasing the level of opposition and the number of players participating in the tasks. It also provides better utilization of tasks. The training process is more effective in practice time under the comprehensive model.

Training team sports is a complex process where several elements interact simultaneously. The performance in basketball is the result of the interaction of different factors amongst which we can find anthropometrical characteristics of players, psychological features and psychosocial factors, physical condition, individual, group and collective technical and tactical skills, etc. All these factors are shown during training and competition.

Training is the process in which coaches prepare their players to compete. The process of training planning and control is basic in order to objectively know how training is performed in collective sports (Ibáñez, 2008). The training load and the way training is carried out have an effect on players' performance. The training load quantification plays a decisive role in sportsmen's training. Coque (2008) considers that the training load is the total sum of stimuli to which players are subjected during the whole process of training. Material resources needed to perform this function are expensive and not always available. Coque (2008) suggests a simple method to measure the training load in basketball based on a Likert scale of 5 values, including the level of opposition performed in the task, the task's density/intensity, the number of simultaneous performers of the task, the task's competitive load (emotive or psychological), the use of the area and dimensions of the place where the task is performed and the tactical load of the task (Player's cognitive involvement).

In basketball training the organization of tasks and times of performing them are important to acquire sports knowledge (Alarcón, Cárdenas and Ureña, 2008). Coaches are in charge of planning and controlling the sport training, as well as designing the tasks players would perform. The planning of the technical and tactical contents are conditioned by the characteristics of the players, their learning rate, their formative stage, and factors related to the basketball coach's professional development (Cañadas, Ibáñez and Leite, 2015). Depending on the way they are designed and performed training tasks may be transferable to the competition. According to Sánchez (2007), training tasks which are designed to resemble competitive requirement should be performed at a high heart rate, between 160 and 195 beats per minute. Research results show that it is not used the same level of intensity to train and to play. Effort levels are lower in training than in competition. In addition to the control of this variable, perfectly measurable, it is also necessary to design and control other variables within training tasks, in order to get similar stimuli so that they are transferable to competition.

Two of the major educational paradigms for teaching/training sports are the Traditional, Mechanistic, Structuralist or Technician Model, and the Alternative, Comprehensive, Constructivist or Tactical Model. Therefore, researchers are seeking scientific solutions comparing the effect of different models of teaching on learning technique, decision-making capacity or declarative knowledge either in basketball (Conte, Moreno-Murcia, Pérez and Iglesias, 2013; Tallir, Valcke and Lenoir, 2005) or football (Sánchez, Miller and Yagüe, 2012). There are no models of pure training or coaching exclusively positioned on these paradigms. Coaches take mixed profiles depending on players' characteristics, teams, competition, context, etc. (Fey, Ibáñez and Gozalo, 2007). However, coaches are closer to a model of training than another.

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There are not studies analyzing the differences in training load of basketball players undergoing training processes with different methodologies. Therefore, the objective of this research was to identify the existence of differences in training load in the tasks performed by expert basketball coaches positioned on training-learning, comprehensive and technical models.

Method

An ex post facto prospective study, with a single independent variable, the *Model of Training*, and several dependent variables, was designed (Montero and León, 2007). For dependent variables, the variables used in studies of Coque (2008) and Alarcon, Cardenas and Ureña (2008) were used and adapted. The primary dependent variables established were the following: *Level of Opposition*, *tasks' Density/Intensity*, *Number of Players*, *Competitive Load*, *Game Area*, *Cognitive Involvement*, *Average Heart Rate* in the task, *Total Time* and training *Useful Time* of the task. From primary dependent variables three secondary variables were calculated. The *Training Load* was calculated cording to Coque (2009), the *Value of Training* (Task Loaf x Useful Tie), and the task *Utility* (Useful time/Total Time).

Two expert coaches participated in this study (more than 10 years active and experienced in high competition and training, with sports successes in training categories), who explicitly were positioned closer to each training model. In addition, in an analysis of pedagogical variables of training simultaneously carried out these differences are shown. The teams trained by these coaches are from the U13 category (12-13 years old), and they are at the same competitive level. All data were obtained after 10 sessions of training performed by each coach and all planned tasks were registered. The time used for training sessions was the same: 90 minutes.

In order to analyze these data, a descriptive analysis was carried out first (X and SD) and after that an inferential analysis was performed to identify the existence of differences between these two models of training. The exploratory analysis showed that only the variable Utilization of the task should be analyzed under parametric models of hypothesis contrast (*t for independent samples*). To analyze the rest of dependent variables, due to the fact that they do not have a normal distribution, a nonparametric test of hypothesis contrast was used (*Mann-Whitney's U)* (Cubo, Martín and Ramos, 2011).

Results

In Table 1 averages and standard deviations of the analyzed variables are shown, as well as the existence of statistically significant differences. Statistically significant differences were shown between tasks suggested by the Comprehensive and Technical Model in the *Level of Opposition* of the task, the *Number of performers* in the task, the task's Load, and the tasks' *Total Time* and *Useful Time*. There were also statistically significant differences in the *Utilization* of tasks ($t_{137} = 2.297$; $p = .023$) between the two training models. The tasks proposed under the Comprehensive or Tactical Model have a higher level of opposition and more players participating at the same time in the task. The consequence is that these tasks involve greater training load, according to Coque's suggestion (2008, 2009). The time spent on each task and the useful time is higher in the Traditional or Technical Model, as the coach positioned in the comprehensive model performs more tasks per session. On the other hand, the utilization of tasks is wider in the Comprehensive Model. There were no significant differences in the rest of variables. In spite of performing tasks with greater training load under the Comprehensive Model, there are no significant differences compared to the tasks established under the traditional model about basketball players' heart rate

Discussion

The training load in collective sports is the result of several factors' interaction. The analysis of training loads allows the complement of studies which found differences in training and learning of players subjected to different training processes (Traditional/Mechanist/Technical vs Alternative/Comprehensive/Tactical) (Conte et al., 2013; Sánchez et al., 2012; Tallir, et al., 2005).

The design of training tasks under the comprehensive model means including a greater number of formal and functional game elements (Ibáñez, 2000). Therefore, the Comprehensive Model of training involves more players as it includes players within the training tasks both in offensive and defense stages. The manipulation of these formal elements of the task (opposition and players) is reflected in an increase of the total training load (Coque, 2008). Trainings designed under the Comprehensive Model have more training load, which is understood as the interaction of stimuli (teammates and opponents, spaces, heart rate, tactical concepts, psychological load, cognitive load).

No statistically significant differences were observed in players' average heart rate during training tasks. Despite being subjected to a higher training load under the Comprehensive Model, players adapt themselves to them, improving their physical condition. The training heart rate is lower than the suggested by Sánchez (2007) in order to use this training intensity in the competition. These reference values are suggested for adults, while the population analyzed id from the U13 category (12-13 years old).

As they are expert coaches with a great training experience, no differences were found in some of the variables recorded. Therefore, it can be said that the tasks of training designed by coaches who are positioned on the Traditional and Comprehensive Model have the same intensity, competitive load and use the same game area. These data keep the debate raised between coaches and researchers on which is the best training model (Sánchez et al., 2012). The absence of differences in some of the variables recorded in the tasks reinforces the idea that claims that there is not one training model and a pure coach profile (Feu et al., 2007).

In order to achieve training objectives, the coach positioned under the Traditional/Technical Model designs tasks of a wider duration. This fact makes the useful time wider too. This difference in training times contrasts with the level of utilization of tasks. The coach positioned under the Alternative/Comprehensive Model obtains better values in the utilization of tasks, since he is more efficient in his work. Alarcón et al. (2008) demonstrate that the least directive organizations (rows, successive participation) and most participative organizations (self-regulation, simultaneous participation) improve practice times during training. As reflected in the results, the Comprehensive Model of Training requires less time for players to reach a minimum of practical experience, being more effective using the time.

	Coach	n	X	SD	P
Level of Opposition	Comprehensive	78	4.28	1.38	.013 *
	Technical	61	3.41	1.91	
Density/Intensity	Comprehensive	78	3.56	.69	.087
	Technical	61	3.43	.59	
Number of Simultaneous Players	Comprehensive	78	4.99	.11	.000 *
	Technical	61	3.54	1.38	
Competitive Load	Comprehensive	78	1.90	.41	.390
	Technical	61	1.84	.58	
Game Area	Comprehensive	78	2.92	.73	.119
	Technical	61	3.08	.86	
Cognitive Involvement	Comprehensive	78	2.83	1.33	.089
	Technical	61	2.49	1.47	
Task Load	Comprehensive	78	20.49	2.58	.001 *
	Technical	61	17.79	4.69	
Training Value	Comprehensive	78	10207.12	6437.32	.907
	Technical	61	10600.21	7083.93	
Average Heart Rato of the task	Comprehensive	78	150.03	11.19	159
	Technical	56	148.44	10.09	
Task’s Total Time (Seconds)	Comprehensive	78	632.21	316.41	.002 *
	Technical	61	808.43	418.41	
Task’s Useful Time (Seconds)	Comprehensive	78	478.40	254.52	.017 *
	Technical	61	572.80	295.65	
% Utilization	Comprehensive	78	.76	.11	.023 *
	Technical	61	.71	.13	

*p < .05

Table 1. Descriptive results and differences in training tasks between technical and comprehensive model

Conclusions

The results of this research points out that tasks designed under a Comprehensive Model of training increases training load compared to the Technical Model by increasing the level of opposition and the number of players participating in the tasks. In order to achieve a higher level of learning and practicing by basketball players, less time is needed for training tasks under the Comprehensive Model. In addition, the utilization of tasks is higher with alternative or comprehensive methodologies that with traditional or technical methodologies. The training process is more efficient under the Comprehensive Model.

The use of the comprehensive methodology in basketball training collaborates on the full training of basketball players, improving both their physical condition and sports learning.

DIFERENCIAS EN LAS CARGAS DE ENTRENAMIENTO EN BALONCESTO ENTRE LOS MODELOS DE ENSEÑANZA/ENTRENAMIENTO COMPRENSIVO Y TÉCNICO

PALABRAS CLAVES: Baloncesto, Carga de entrenamiento, Modelos de enseñanza, Modelos de entrenamiento.

RESUMEN: Los investigadores analizan las diferencias entre los modelos de entrenamiento deportivo para identificar cual es el más idóneo. En baloncesto los estudios se orientan a descubrir las diferencias en el aprendizaje deportivo y en la toma de decisiones. La carga de entrenamiento en baloncesto se considera como la suma total de estímulos a los que el jugador se ve sometido durante el proceso de preparación. El objetivo de esta investigación fue identificar la existencia de diferencias en la carga de entrenamiento en las tareas diseñadas por entrenadores de baloncesto posicionados en modelos de entrenamiento-aprendizaje comprensivo y técnico. Participaron en el estudio dos entrenadores expertos posicionados en cada uno de los modelos de entrenamiento. Se examinaron las tareas realizadas durante 10 sesiones de entrenamiento. En cada tarea se analizó el grado oposición, densidad/intensidad, número de ejecutantes, carga competitiva, espacio de juego, implicación cognitiva, frecuencia cardíaca media, tiempo total y tiempo útil de la tarea. Posteriormente se calculó la carga de la tarea, valor del entrenamiento, y el aprovechamiento de la tarea. Existen diferencias estadísticamente significativas (p < .05), entre las tareas propuestas bajo el Modelo Comprensivo y Técnico en el grado de oposición, el número de ejecutantes, la carga de la tarea, tiempo total, tiempo útil y el aprovechamiento de las tareas. El Modelo Comprensivo de entrenamiento incrementa la carga de entrenamiento frente al Modelo Técnico, al aumentar el grado de oposición y el número de jugadores que participan en las tareas. Además, ofrece un mayor aprovechamiento de las tareas. El proceso de entrenamiento es más eficaz en el tiempo de práctica bajo el modelo comprensivo.

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