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# Analysis of shooting effectiveness and decision-making during shooting according to basket height modifications at the youth stage

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*ANALYSIS OF SHOOTING EFFECTIVENESS AND DECISION-MAKING DURING SHOOTING ACCORDING TO BASKET HEIGHT MODIFICATIONS AT THE YOUTH STAGE*
KEY WORDS: Basket, Basketball, Rules.
ABSTRACT: The aim of the present study was to identify the effect of a basketball unit of work that modifies the height of the hoop on the shooting effectiveness, the shooting decision-making process, and the ball possessions ending with a shot. The study was a cuasi-experiment with control and experimental groups measured pre and post intervention. The basketball unit of work was composed of 10 lessons that were applied to a sample of 74 students (14 years old). Control group received the lessons with the regular height of the basket (3.05m) and the experimental group received the lessons with variations in the height of the basket according to each task. The evaluation task was a 3 vs. 3 game situation. The results showed that experimental group increased the number of shots, the shooting effectiveness, as well as the decision-making process related to shooting action. The results enhance the need to modify and adapt the basketball height to the tasks and exercises specificity, and then to improve the shooting efficiency and effectiveness.

There is a wide interest in teaching methods in physical education and sports. This interest has generate large discussions in team sports. In particular, which is the most effective teaching methodologies that lead to better technical and tactical learnings in team sports.

From the 80s there are several methodological approaches of teaching team sports based on teaching games for understanding and a significant learning. These recent approaches have been developed by specific models such as the comprehensive teaching (Castejón 2010), the Sport Education (Bulger, Mohr, Rairight and Townsend, 2007; Hastie and Curtner-Smith, 2006), the Teaching Games for Understanding (Thorpe and Bunker, 1989), and the non-linear pedagogy models (Chow, Davids, Hristovski, Araújo and Passos, 2011).

These models promote the comprehensive learning of game constraints and tactics. Specifically, the models are based on active learning where the student by his/ her-self is the main actor of his/ her learning. In addition, the models have some similar characteristics: a) *Cognitive implication:* the players' cognitive implications allow to develop the technical/tactical concepts and skills that increase the game understanding; b) *Active participation:* the active learning is based on consciousness and experience. It consists on using experimental designs that make the learning easier for each student. In fact, the active learning allow the students to accept the responsibility of hi/her own learning; c) *The need to adapt the sport to the students:* it is necessary that the rules during trainings and competitions will be modified to improve the learning and then the teaching success (Garzón, Lapresa, Anguera and Arana, 2014; Ortega, 2006).

The aims of rule modifications when teaching team sports are summarised in that children may: a) play and enjoy the game according to their possibilities/ abilities, b) perform the right motor skills, c) improve the success of motor skills; and d) create positive sport habits (Beaudet and Grube, 2005).

Particularly, the height of the basket has been analysed from a biomechanical perspective during the sport initiation in basketball (Liu and Burton, 1999; Mckay, 1997). At youth stages, the players increased the shooting efficiency when the basket was lower than the regular height (Marin, Estevez, Cárdenas and Piñar, 2013). However, the available research focused on rule modifications in basketball is scarce, mainly during the primary and secondary school (Lapresa, Arana and Garzón, 2006). Therefore, the aim of the present study was to identify the effect of a basketball unit of work that modifies the height of the basket on the shooting effectiveness, the shooting decision-making process, and the ball possessions ending with a shot.

## Method

The study was a cuasi-experiment with control and experimental groups measured before (pre-test) and after (post-test) the intervention. Specifically, a basketball unit of work

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composed of 10 lessons was applied to a sample of Secondary School students (2º ESO: 14 years old). The students were randomly pooled into control (n=35) and experimental (n=37) groups. The control group received the lessons with the regular height of the basket (3.05m) and the experimental group received the lessons with variations in the height of the basket according to each task (using heights of 2.40m or 2.80m).

The dependent variables analysed were: shooting efficiency (made or missed shot), the quality of decision-making during the shot (success: right or wrong), and the number of ball possessions that ended with a shot. The assessment of players was used during a 3 vs. 3 players task. The researchers distributed the students into teams of 3 people that played 5-minutes games. The games were played with the same order and opponents before and after the intervention (unit of work).

The study was based on the observational methodology (Anguera and Hernández-Mendo, 2015; Villarejo, Ortega, Gómez and Palao, 2014; Palao, Manzanares and Ortega, 2015). The research design followed the categorical procedure for each variable shooting efficiency, the quality of decision-making during the shot, and the number of ball possessions that ended with a shot. In particular, the Delphi methodology was developed using 5 experts (PhD in Sports sciences and basketball coaches with a minimum of 5 years experience). The content validity was calculated using the Aiken's V. All values were greater than 0.85.

In order to study the decision-making process, the researchers used the categories established by Alarcón, Ureña and Cárdenas (2014):

- Wrong decision: the shot was done with a close defensive pressure (the defender is placed less than 1 meter of distance), or the player does not shot without defensive pressure (the defender is placed longer than 1 meter of distance)
- Right decision: the player shots without defensive pressure close to the basket (inside the key area) or shots without defensive pressure from an intermediate range of distance.

Firstly, the tasks and exercises were video recorded. Then, the researchers designed the observers training into different stages: (i) The initial stage included the aims of the research as well as the information about variables, categories and the observation tool; (ii) in a second moment, the observers developed a training process to gather correctly the variables of the study: efficiency, decision-making and ball possessions that ended with a shot during the 3 vs. 3 tasks; (iii) lastly, the inter-observers reliability was assessed using the Kappa index. The values obtained during pre and post-test observations showed very reliable values (very good) greater than 0.80. Data analyses were done using the software SPSS v 19.0 for Windows. The *Crosstabs Command* and *Pearson's Chi Square* were used to identify the relationships between the categorical variables. The significance level was set to $p<.05$.

## Results

The table 1 showed the frequency values (control and experimental group during pre and post-test) for shooting efficiency, the decision-making percentage of success when shooting, and the percentage of ball possessions that ended with a shot.

The results (Table 1) showed non-significant differences between pre and post-test for control group students (all $p> .05$). These students obtained a reduced increment of shooting efficiency (+ 1.1%) and ball possessions ending with a shot (+ 5.3%), and lower decision-making percentage of success (- .8%). Conversely, the experimental group obtained significant relationships between pre and post-test. The results showed that these students increased significantly the shooting efficiency (+ 16%), the decision-making percentage of success (+ 13.9%), and the ball possessions ending with a shot (+ 8.6%).

## Discussion

The aim of the present study was to identify the effect of a basketball unit of work that modifies the height of the basket on the shooting effectiveness, the shooting decision-making process, and the ball possessions ending with a shot. From an overall point of view, the application of a specific unit of work about basketball was very useful for improving the players' techniques and tactics. In fact, the results showed greater improvements in the experimental group for all the variables analysed when the basket height was modified (the shooting efficiency, the quality of decision-making during the shot, and the number of ball possessions that ended with a shot) than in the control group.

According to these findings, the modification of the basket height during the exercises and tasks taught in the basketball unit of work were useful and individualised for the students' learning characteristics. In fact, this learning approach increased the shooting efficiency percentages. In particular, the basketball teaching at initial stages tries to increase the students' shooting experiences that improve the perceived self-efficacy in education (Bandura, 1986, 1997), in sport environments (Feltz, Short and Sullivan, 2008), and specifically in basketball learning (Hepler and Feltz, 2012; Ortega, 2006; Ortega, Alarcon and Piñar, 2012; Ortega., Gómez, Sainz de Baranda and Olmedilla 2009).

| Variable | Group | Test | | P Value |
|---|---|---|---|---|
| | | *Pre-test* | *Post-Test* | |
| Efficiency | Control | 22 (21,6%) | 22 (22,7%) | .492 |
| | Experimental | 14 (15,4%) | 30 (25%) | .042 |
| Decision-Making | Control | 87 (85,3%) | 82 (84,5%) | .519 |
| | Experimental | 67 (73,6%) | 105 (87,5%) | .009 |
| Ball possessions ending with a shot | Control | 102 (35,8%) | 97 (41,1%) | .125 |
| | Experimental | 90 (29,4%) | 120 (38%) | .014 |

*Table 1. Frequency and percentage of efficiency, decision-making and ball possessions ending with a shot.*

The shots in basketball are the most important actions during the game. Then, when a player improves his/ her shooting efficiency he/ she also increases the self-confidence and the self-efficacy. Regarding this issue, the players that have high levels of positive self-efficacy are able to: (i) establish new challenges that optimise their learning (Bund, 2001), (ii) feel the need of new activities (Pastorelli, et al., 2001), (iii) relate the failure to low efforts and abilities (Chase, 2001), (iv) face the complex tasks without stress (Rodríguez, López, Gómez and Rodríguez, 2015), (v) exert their-self when facing new learnings (Trevelyan, 2011), and (vi) increase the physical activity adherence reducing the dropout and non-practice physical activity (Fronso, Nakamura, Bortoli, Robazza and Bertollo, 2013; Koring, Richert, Lippke, Parschau, Reuter and Schwarzer, 2012). Finally, the increments in students' self-efficacy levels is associated with better complex decision-making processes (Bandura and Bund, 1989) but particularly in basketball (Hepler and Feltz, 2012; Meseguer and Ortega, 2009; Ortega and Meseguer, 2009).

On the other hand, Ortega et al., (2012) found that the increments in shooting efficiency were related to increments in perceived team self-efficacy in basketball. This finding reflected that the student perceived his/ her classmates as more self-confident and effective increasing the students' psychological skills and then the positive teaching-learning environments in team sports (Leo, González-Ponce, and Sánchez, 2015).

The specific design of units of work focused on deliberated practice allow to obtain greater values of self-efficacy. However, these improvements would be greater if the equipment, facilities and rules are modified according to the students' characteristics as well as using complementary resources (i.e., video) (Ortega, Giménez and Olmedilla, 2008; Shearer, Mellalieu, Shearer and Roderique-Davies, 2009).

The present findings allow coaches, teachers and sport analysts to use the results as reference values when planning tasks and exercises at youth stages. The use of the basket rule modification may improve the young players' learning and an effective design of teaching-learning processes in basketball.

*INCIDENCIA DEL USO DE UN PROTOTIPO DE CANASTA CON MODIFICACIÓN DE LA ALTURA DEL CESTO SOBRE LA EFICACIA Y LA TOMA DE DECISIÓN DEL LANZAMIENTO EN EL ÁMBITO ESCOLAR*

PALABRAS CLAVE: Canasta, Baloncesto, Reglas.

RESUMEN: El objetivo del presente estudio fue identificar el efecto de una unidad didáctica de baloncesto en la que se modifica la altura del aro sobre la efectividad de tiro, el proceso de toma de toma de decisiones, y el número de fases de ataque que finalizan en lanzamiento. El estudio fue estudio cuasi-experimental con grupo control y experimental medidos antes y después de la intervención. La unidad didáctica de baloncesto se compone de 10 sesiones que se aplicaron a una muestra de 74 estudiantes (14 años). El grupo control recibió las sesiones con la canasta a una altura normal de (3.05m) y el grupo experimental recibió las sesiones con variaciones en la altura de la canasta de acuerdo a cada tarea. La tarea de evaluación era una situación de juego 3 vs 3. Los resultados mostraron que el grupo experimental aumentó el número de lanzamientos, el número de fases de ataque que finalizan en lanzamiento, así como el proceso de toma de decisiones relacionadas con el lanzamiento. Los resultados señalan la necesidad de modificar y adaptar la altura de baloncesto a las tareas y ejercicios, para mejorar la eficiencia y eficacia del lanzamiento en baloncesto.

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