

## Relationship between pedagogical content knowledge and coaching methods

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### *RELATIONSHIP BETWEEN PEDAGOGICAL CONTENT KNOWLEDGE AND COACHING METHODS*

**KEY WORDS:** Pedagogical Content Knowledge, Coaching Methods, Games, Coach, Basketball.

**ABSTRACT:** The aim of this study was to know the relationship between the *Pedagogical Content Knowledge* and the planned Coaching Methods in early phases of basketball learning. The participants were three coaches. Each coaches' task was analyzed: U'12 male team ( $n = 394$ ), U'12 female team ( $n = 427$ ), U'14 female team ( $n = 459$ ), as well as their own view. The variables studied were PCK's dimensions and coaching methods.

A descriptive and inferential analysis were carried out for the planned tasks (Chi-square, Contingency coefficient y Residuals adjusted standardized) and another one for content of interviews. The outcomes showed the predominance of plays over exercises. There are close ties among the knowledge of the content, curricular pedagogy, goals, players, strategies and contexts that explain the sort of coaching method chosen.

Sport training is the result of a decision-making process (Abraham, Collins and Martindale, 2006; Vergeer and Lyle, 2007) that requires that coaches acquire some basic knowledge. In order to identify what kind of knowledge the leader of the process needs, the *Pedagogical Content Knowledge* (PCK) is arisen, which joins the matter and the pedagogy (Grossman, 1990; Shulman, 1986).

There are different sort of reviews that portray and analyze coaches intervention, as well as, their knowledge. In this specific field, there are reviews that examine the features of the tasks of training (Cañadas, Parejo, Ibáñez, García and Feu, 2009; Saad and Nascimento, 2007). The analysis of the coaching methods provides information about how sport training is planned. There are some proposals that support the use of *games*, as a method, in early stages of basketball learning (Garganta, 1997; Giménez and Sáenz-López, 2007) or as a strategy subjected to the type of content to develop (ASEP, 2008; Tallir, Lenoir, Valcke and Musch, 2007).

Some reviews by Lemos (2005), Vergeer and Lyle (2007) and Park, Jang, Chen, and Jung (2011) are developed in a context that linked dimensions such as behaviour and coaches' knowledge.

PCK is considered as a "predictor" of coaches' knowledge and what they do in their training sessions (Park et al., 2011) which invites to analyze these dimensions.

Analyzing how training sessions are develop are not enough, this is why is necessary to go deeply into matter and know why a coach reach a decision or another, because it will provide information about their planning and behave (Shulman, 1986).

Therefore, the goal of this study was to determine the relationship between the PCK and the coaching methods in early stages teams of basketball.

### **Method**

The review has an eclectic design, according to the data collection method is a descriptive study, through an arbitrary code registration, and on the other hand, is an instrumental case study (Montero and León, 2007).

The participants of the research were three basketball coaches. The participants' features are shown in the table below (Table 1), as well as the tasks of the season analyzed.

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– Artículo invitado con revisión

	<b>Coach A</b> <b>Case 1</b>	<b>Coach B</b> <b>Case 2</b>	<b>Coach C</b> <b>Case 3</b>
Team's stage	U'12 male (10-11)	U'12 female (10-11)	U'14 female (12-13)
Youth basketball experience	3 years old	3 year old	5 years old
Education/ federative training	4th year degree/1st level	4th year degree/1st level	PE graduate/1st level
Tasks of training	394	427	459

Table 1. Features of the coaches of the study.

In order to know the reasons of choice each coaching method (Cañadas, 2012), *PyC Basket 2.0* and an adaptation of the *Comparative Interview* tools were used. The variables of study were: coach's pedagogical knowledge variables (knowledge of context, of content, pedagogy, goals, players, instructional strategies and curricular) (Grossman, 1990; Shulman, 1986) and the pedagogical training variable *Coaching methods* (Cañadas et al., 2009).

Firstly, a descriptive analysis of the variable *Coaching methods* was carried out. Then, was analyzed the relationship with the variable *type of content* through a non-parametric inferential analysis (*Chi-square, Contingency coefficient*). The relationship between these two variables was seen through the value of the *Residuals adjusted standardized* (RTC) (>|1.96|). Data interview were examined by *analysis of content*.

## Results

The analysis outcomes of training tasks show that the use of games is higher than exercises (72.6% case 1; 66.5% case 2; 60.1% case 3).

There is a statistically relationship between *coaching methods* and *type of content* [ $\chi^2(24, N = 394) = 162.45, p < .01; C = .54, p$

< .001] case 1; ( $\chi^2(9, N = 427) = 85.99, p < .001; C = .382, p < .001$ ) case 2; ( $\chi^2(15, N = 459) = 215.71, p < .01; C = .544, p < .01$ ) case 3], the *RTC* analysis shows, in the three different cases that exercises are used more frequently, in order to practice individual gestures of attack (*RTC* = 8.4; 9.1; 14.3) and games in order to put in practise individual behaviours of attack (*RTC* = 6.5; 7.1), in cases 2 and 3, and for group behaviours of attack (*RTC* = 3.3) and for individual behaviours of defense (*RTC* = 3.7) in case 1.

The interviews' analysis show a series of relationship between the elections of both types of means of training linked with the different dimensions of PCK (Figure 1).

In these early stages of basketball training, games are considered the best methods "In this phase U'12, games are really important for me." (Coach B)

An entertaining training approach that ensures the continuity of players, is one of the aspect that determined the use of amusing practises. "This is not a sport talent school, I just prefer that they enjoy themselves. If I prepare another kind of sessions, above all, exercises, I am sure that next day I will be alone." (Coach B). Game is identified as a type of strategy that contributes to players' motivation "Normally, I try to use games in order to motivate players" (Coach A)

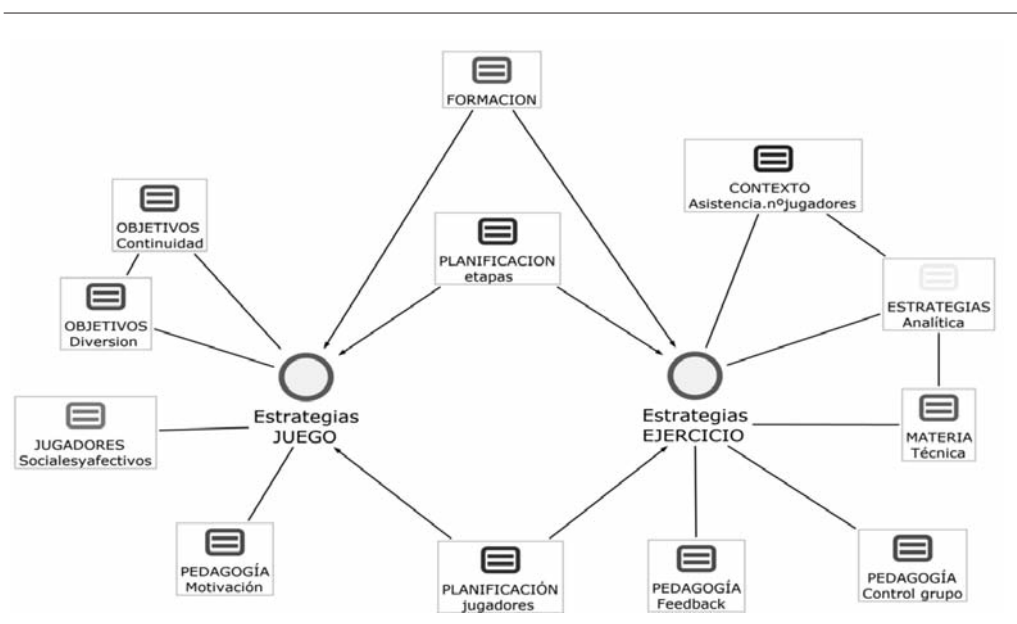


Figure 1. Relationship between dimensions of pedagogical knowledge of coaches.

Exercise is seen as a tool that provides feedback “With exercises I can correct them better than with games.” (Coach C). Moreover, with exercises coaches can have a higher control of the group “I would have liked to use more games but I have had some control group troubles, and I have had to make more exercises.” (Coach A)

Exercises are seen as a kind of analytic strategy that is really suitable for putting into practise technical contents. The three coaches state that point, “I see that with exercises I can practice more specifically contents that I want them to acquire” (Coach C) “When I wanted to practise some technical contents I did that with exercises...” (Coach A). Players’ features determined the kind of content as well as the coaching methods “I remember a phase in which I had less players than I used to, I had, above all, players that were in a higher stage, that situation let me focus on more specific staff and I tried to use more exercises.” (Coach B). In this specific situation, it involves motor, technical and tactical dimension of players, however, the affective dimension is also include in coaching methods election, moving that choice towards games. “This also depends on your players, this year, I had some players that have some personal problems and I saw that they needed an extra affective point... then I prioritized, I preferred then that they had a good and enjoyable time with their friends...” (Coach B).

Coaches’ training, experience and knowledge are points that could influence in the use of games or exercise. “I like to use many games because this is the way that I have been trained...” (Coach A)

## Discussion

The way of planning training depends on some inner coaches’ characteristics such as their knowledge, beliefs, targets, training,

as well as, some outside characteristics such as their training stage and players’ features (Abraham et al., 2006; Meinberg, 2002).

The tendency of using games in early stages of basketball training is not really common, exercises are the preferable one (Saad and Nascimento, 2007). However, the coaches’ opinion of this review support the idea of using games in early stages of basketball learning (Giménez and Sáenz-López, 2007). Games are identified as a method that encourages motivation (Garganta, 1997), so this is one of the main reasons that justify their use in these stages.

Exercises are a kind of strategy that because of their closed and analytical structure improve the control of groups, the way of passing on information to players and it is also the ideal way to practice technical skills (ASEP, 2008). The relationship between technical-exercise and tactical-game is stated in this research. Although, new sport learning methodologies support the practise of technique and tactic with both methods, games and exercises (Tallir et al., 2007), these ties are still rooted in coaches’ philosophies.

Sport training goals have been linked with the type of content (Lemos, 2005), and with the specific method to get that aim, as well.

Abraham et al. (2006) established that decision-making process in training takes into account different dimensions of players, what is another all-important that coaches have to be in mind to enhancing their commitment.

Inside the “mess” in which sport training is developed, there are some patterns that take part in the process (Vergeer and Lyle, 2007). Sport training involves an interdisciplinary process of making-decision and requires some knowledge from different dimensions that determines each decision (Abraham et al., 2006). Some effects of training programmes in the coach, from the frame of PCK, need a multidimensional approach that enable information to be passing on and whose aim is mainly encourages practise.

## Agradecimientos

Este estudio se ha realizado gracias a la aportación de la Unión Europea a través de los fondos europeos de Desarrollo Regional. Gobierno de Extremadura. Consejería de Empleo, Empresa e Innovación.

### RELACIÓN ENTRE EL CONOCIMIENTO PEDAGÓGICO DEL CONTENIDO Y LOS MEDIOS DE ENTRENAMIENTO

**PALABRAS CLAVE:** Conocimiento Pedagógico del Contenido, Medios de entrenamiento, Juego, Entrenador, Baloncesto.

**RESUMEN:** El objeto de este estudio fue conocer las relaciones que se establecen entre el *Pedagogical Content Knowledge* y los medios de entrenamiento planificados para categorías de iniciación al Baloncesto. Los participantes fueron tres entrenadores. Se analizaron las tareas de entrenamiento diseñadas por estos entrenadores para un equipo alevín masculino ( $n = 394$ ), alevín femenino ( $n = 427$ ) e infantil femenino ( $n = 459$ ), así como la opinión de los entrenadores. Las variables de estudio son las dimensiones del PCK y los Medios de entrenamiento. Se realizó un análisis descriptivo y un análisis inferencial para los datos de las tareas planificadas (Chi-cuadrado, Coeficiente de contingencia y Residuos Tipificados Corregidos) y, un análisis del contenido para los datos de la entrevista. Los resultados muestran que existe un predominio del juego por encima del ejercicio. Se encuentran relaciones entre dimensiones del conocimiento de la materia, de la pedagogía, curricular, de los objetivos, de los jugadores, de las estrategias y del contexto que explican la elección por un tipo de medio de entrenamiento u otro.

### RELAÇÃO ENTRE O CONHECIMENTO PEDAGÓGICO DO CONTEÚDOS E OS TIPOS DE TREINO

**PALAVRAS-CHAVE:** Conhecimento pedagógico do conteúdo, Tipo de treino, Jogo, Treinador, Basquetebol.

**RESUMO:** O objetivo deste estudo foi conhecer as relações que se estabelecem entre *Pedagogical Content Knowledge* os tipos de treino planificados para o escalão de iniciação ao Basquetebol. Os participantes foram três treinadores. Foram analisadas as tarefas de treino delineadas por estes treinadores para uma equipa de iniciados masculinos ( $n = 394$ ), iniciados feminino ( $n = 427$ ) e infantil feminino ( $n = 459$ ), bem como a opinião dos treinadores. As variáveis estudadas são as dimensões do PCK e os tipos de treino. Foi realizada uma análise descritiva e uma análise inferencial para os dados das tarefas planificadas (Qui-quadrado, Coeficiente de contingência e Residuos Tipificados Corregidos) e uma análise de conteúdo dos dados das entrevistas. Os resultados mostram que há uma predominância do jogo relativamente ao exercício. Verificam-se relações entre as dimensões de conhecimento da matéria, da pedagogia, curricular, dos objetivos, dos jogadores, das estratégias e do contexto que explicam a escolha de um determinado tipo de treino.

## References

- Abraham, A., Collins, D. and Martindale, R. (2006). The coaching schematic: Validation through expert coach consensus. *Journal of Sports Sciences*, 24(6), 549-564.
- American Sport Education Program (ASEP) (2008). *Manual de Baloncesto. Para entrenar a niños de 6 a 14 años*. Madrid: Human Kinetics.
- Cañadas, M. (2012). *El conocimiento pedagógico en un entrenador de baloncesto en período de formación*. Tesis doctoral no publicada, Universidad de Extremadura, Cáceres.
- Cañadas, M., Parejo, I., Ibáñez, S. J., García, J. and Feu, S. (2009). Relationship between the pedagogical variables of coaching a mini-basketball team. *Revista de Psicología del Deporte*, 18(Supl.), 319-323.
- Garganta, J. (1997). Para una teoría de los juegos deportivos colectivos. En A. Graça y J. Oliveira (Coords.), *La enseñanza de los juegos deportivos* (pp. 9-24). Barcelona: Paidotribo.
- Giménez, F. J. and Sáenz-López, P. (2007). Estrategias lúdicas para mejorar la percepción y decisión de los jugadores y jugadoras. En G. Ortega and A. C. Jiménez (Coord.), *Baloncesto en la Iniciación* (pp. 123-138). Sevilla: Wanceulen.
- Grossman, P. (1990). *The Making of a Teacher: Teacher Knowledge and Teacher Education*. Nueva York: Teachers College Press.
- Lemos, I. (2005). *O treinador. Conhecimento, Concepções e Prática. Estudo de Caso em Cinco Treinadores de Formação em Basquetebol*. Dissertação no publicada, Universidade do Porto, Oporto.
- Meinberg, E. (2002). Training: a special form of teaching. *Revista Portuguesa de Ciências do Desporto*, 2(4), 115-123.
- Montero, I. and León, O. (2007). A guide for naming research studies in Psychology. *International Journal of Clinical and Health Psychology*, 7(3), 847-862.
- Park, S., Jang, J.-Y., Chen, Y.-C. and Jung, J. (2011). Is Pedagogical Content Knowledge (PCK) Necessary for Reformed Science Teaching?: Evidence from an Empirical Study. *Research in Science Education*, 41, 245-260.
- Saad, M. A. and Nascimento, J. V. (2007). Estruturação das sessões de treinamento técnico-tático nos escalões de formação do futsal. *Revista Portuguesa de Ciências do Desporto*, 7(Supl. 1), 21-84.
- Shulman, L. S. (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher*, 15(2), 4-14.
- Tallir, I. B., Lenoir, M., Valcke, M. and Musch, E. (2007). Do alternative instructional approaches result in different game performance learning outcomes? Authentic assessment in varying game conditions. *International Journal of Sport Psychology*, 38(3), 263-282.
- Vergeer, I. and Lyle, J. (2007). Mixing Methods in Assessing Coaches' Decision Making. *Research Quarterly for Exercise and Sport*, 78(3), 225-235.