

Curricular proposal through the traditional game of Mate: Tool for improving perceptual-decisional skills in Secondary school physical education students

Propuesta didáctica mediante el juego tradicional del Mate: Herramienta para la mejora de las habilidades perceptivas y decisiones en estudiantes de educación secundaria en educación física

*Daniel Ramos-Pérez, **Francisco Tomás González Fernández, ***Rafael Burgueño, *Honorato Morente-Oria
*University of Málaga (Spain), **Pontifical University of Comillas (Spain) ***University Isabel I (Spain)

Abstract. Sport represents a core content within of the Spanish Secondary Physical Education curriculum. Thus, perceptual and decisional processes should be pivotal elements to be take into consideration when successfully tackling the design and planning the sport teaching and learning process in the context of secondary school Physical Education. More particularly, the MATE game may be a suitable strategy to be implemented by physical educators in enhancing both processes and, consequently, providing students with a quality teaching for any sport. Therefore, the present study aims to show a curricular implementation proposal that, based on secondary Physical Education curriculum, helps students improve the perceptual and decisional process involved in teaching of sport through the game of MATE. To do this, a 13-lesson teaching unit is shown, considering the progression of this game as a main instructional strategy in terms of managing to increase the cognitive and decisional complexity for the student through the introduction of new rules and materials, such as mats (and their disposition) or increasing the number of balls that intervened during the game. Thus, this study aims to provide an integrated learning proposal, in which students understand the internal logic of the game and, consequently improve their participation and performance in it.

Keywords: Cognitive Processes, Teaching Unit, Physical Education.

Resumen. El deporte representa un contenido central dentro del currículum de Educación Física en Educación Secundaria Obligatoria. De esta manera, los procesos de carácter tanto perceptivo como decisional deben tenerse en cuenta elementos clave a la hora de planificar y diseñar con éxito el proceso de enseñanza y aprendizaje en educación física. Más particularmente, el juego del mate puede ser una estrategia adecuada a ser usada por el profesorado de educación física a la hora de mejorar ambos procesos y, consecuentemente, ofrecer al alumnado una enseñanza de calidad para cualquier deporte. Por tanto, el presente estudio tiene como objetivo presentar una propuesta de implementación curricular que, fundamentada en el currículum de Educación Física en Educación Secundaria Obligatoria, ayude al estudiantado a mejorar el proceso perceptivo y decisional implicado en la enseñanza del deporte mediante el juego del mate. Para ello, se presenta una unidad didáctica de 13 sesiones, teniendo en cuenta la progresión de este juego como principal estrategia didáctica en cuanto a la gestión del aumento de la complejidad cognitivo y decisional del estudiante por medio de la introducción de nuevas reglas y materiales tales como el número de casas (y su disposición) o el incremento del número de balones que intervienen en el juego. De este modo, este estudio pretende ofrecer una propuesta de aprendizaje integrada, en la cual el alumnado comprende la lógica interna del juego y, como consecuencia, mejora su participación y rendimiento en este juego.

Palabras clave: Procesos cognitivos; Unidad didáctica, Educación Física.

Introduction

A characteristic aspect of all sports games is the decision process inherent in their nature (Thorpe & Bunker, 1983). For physical educators, there is a real need to prepare to teach games or sports to students, considering the different phases that occur in any motor activity. The Marteniuk's (1976) approach has been the most significant reference of these phases for years,

synthesizing them into three clearly differentiated phases: perception, decision, and execution. However, in the last decade, it has changed the perspective regarding this process. For authors such as Poveda and Benítez (2010), the main factors in decision-making are related to attention, anticipation, and memory, which have been deeply studied (López Ros, 2010) through cognitive approaches, suggesting that the decision-making process is mainly influenced by the subjectivity and emotional factors of the athlete. This emotional association serves as a filter for certain neural networks to activate in situations that we have previously experienced, serving as a facilitating tool for decision-

making (Slovic, Finucane, Peters & MacGregor, 2005). This is what is known as an intuitive response (Perales, 2009; Punset, 2006).

At the same time, other alternative theoretical models have emerged to tackle the analysis of the decision-making process, which currently highlights the theory of dynamic-ecological systems. This theory tries to understand decision-making processes within complex and changing contexts (López Ros, 2010). Along these same lines, other authors (Araújo, Travassos, Torrents & Vives, 2011) underscore that the variability inherent in sport can not only be caused by cognitive processes that take place internally in the subject, but that the response will be a result of the interaction between the influencing factors that correspond to the player, the environment and the task.

Many authors such as Lago (2010) support the idea that there are three influential aspects of the decision-making process: 1) the characteristics of the individual to carry out the different processes, 2) the problem he is facing and which must be resolved, 3) the characteristics of the scenario where the entire process takes place. On the other hand, Poveda and Benítez (2010) argue that the determining factors of a decisional process in sport are: 1) the motor capacity or skill that the individual presents, 2) the number of stimuli, 3) the number of options available to solve the task, 4) the time available to carry out the resolution, 5) the risk assessment of each alternative and 6) the develop order of the different stimuli existing in that context. In this line studies as Jiménez (2007) affirm that the player or athlete choose and process the information that their perception believes most appropriate for their interests at any time. Therefore, it is no coincidence that cognitive processes progressively receive increasing importance in decision-making (Poveda & Benítez, 2010).

For these reasons, regarding sport, high physiological performance and high development of perceptual and cognitive skills are required in order to achieve good results, whether in a professional or school context. Likewise, in team games, a high volume of information can be seen that reaches the subject, who has to process it in a short period of time, under circumstances of psychological pressure, and execute a response (Scharfen & Memmert, 2019). All this perceived situational information supposes for the subject the basis of his decision, which must be taken quickly, accurately, and according to the specific requirements of the game in question (Stratton, Reilly & Richardson, 2004).

All this mental process resulting is called perceptual-

cognitive abilities, in other words, the ability to receive and perceive information related to what is happening (Roca, Ford, McRobert, & Williams, 2013). Once this information is perceived, it is integrated with what we already know about it, which allows the individual to choose and execute a response as appropriate as possible to the situation, directly influencing the result (Scharfen & Memmert, 2019). An example of this procedure is found in sport, both individually and collectively, but it is necessary to highlight the differences between both in terms of perceptual complexity and, therefore, decisional. As some authors point out (García, Ruiz & Graupera, 2009), this complexity is greater in groups than in individuals. Perhaps the rationale for this idea could be found in the collectives, the subject perceives a greater number of stimuli, on which he builds the decision-making and later the execution of the motor action. An approach to this idea can be found in the work contributed by Fink et al. (2018), where they argue that in order for athletes to carry out original and successful motor responses, they need to base their decision-making on the perceived environmental information (positions or anticipated behaviors of colleagues or rivals, players who appear unexpectedly, etc.), and in order to find the solution that best suits the requirements, attend to both the stimuli perceived and the information they already have in their memory regarding that situation or similar.

Dealing with these perceptual-cognitive processes, it is mandatory to talk about learning specific sports skills in the initial stages, attending as we have already mentioned to the information from the environment, including monitoring and movement control (Gentile, 1998). In the sports initiation phase, all these factors suppose a high attention demand, but as the number of experiences or situations increases, and with it the performance in a certain action, all this cognitive control is decreasing, since there is an automation of access to the most successful decision/response (Maldonado, 1998). That is why, once a skill is automated, attention control and cognitive performance seem to reduce its effectiveness (Castillo-Díaz et. al., 2018), and greater attention emphasis on preparation and control of motor action (Beilock, Carr, MacMahon & Starkes, 2002), which highlights the importance of working on these skills also in a school setting. Indeed, the improvement of the connection between perceptual and cognitive components and motor domain is thought to be a fundamental point in developing highly-competent students (Beni, Fletcher & Ní Chróinín, 2017; Memmert,

Hagemann, Althoetmar, Geppert & Seiler, 2009). This idea is reaffirmed by studies such as that of Scharf and Memmert (2019), who point out that high-level athletes have superior cognitive functions compared to beginning athletes.

On the other hand, the mental load that the player presents, described as controlling the amount and type of information he perceives, is another key aspect within this process since it directly influences actions where a certain precision is required. The level of mental load will be conditioned by the complexity offered by the task (Cárdenas, Conde-González & Perales, 2015). An example of this is found in the work of Castillo-Díaz et al. (2018), where it is stated that an increase in this mental load, produced by different factors, such as «cognitive demands derived from an increase in the demands for updating and maintaining information in working memory, such as demands of emotional self-regulation, caused by an increase in the level of frustration and state anxiety» (p. 161) present negative effects related to the precision of passing in athletes.

Focusing on the pillar on which our proposal is built, the game, Parlebas (2001), creator of the term motor praxeology, affirms that a participant in a game or sport is an actor whose role is to interpret game logic of individualized motor responses (Lavega, Planas & Ruiz, 2012). But there is a question we must ask ourselves: are these interpretations of the game always, correct? Do we execute what the situation really requires? In response to these questions, authors such as Alarcón and Cárdenas (2010) introduce the concept of 'playing smart', making reference to this by the need to know the concepts of the game that respond to logic and its needs, among which there are relationships with colleagues and with adversaries, interactions with the environment and compliance with the rules that govern it.

The games represent, also within the educational context, exceptional pedagogical resources that help improve the interpersonal relationships of the students because many of them allow each participant to be a partner and rival at the same time (Pic, Lavega-Burgués & March-Llanes, 2018), as is the case of the one we include in our proposal, MATE. In them, the subjects have high autonomy making decisions, for which they are based on perceiving the intentions and trying to anticipate the behaviors and decisions of other players (Pic et al., 2018), thus as other factors such as the emotional experience related to that game or the personal way of establishing relationships with classmates

(Durán, Lavega, Salas, Tamarit & Invernó, 2014).

Overall, the level of complexity of the motor actions involved in a game like MATE is not low, since, although it may be easy to execute a pass with a certain elevation or throw trying to contact an opponent, high performance by the participants seems complicated. It is a game that involves great complexity, both cognitive-decisional and motor if we pursue fluidity in the development of the game and that the objectives are met. In addition, if we analyze the game space (not very large) and the number of participants in it (it will depend on each group in particular, but at least there must be about four per team for the game to have some fluidity) we realize. It becomes a propitious setting to work on perceptual, decisional and execution mechanisms in short periods of time. Actions such as perceiving where and at what speed the ball (or balls) comes towards us, locating rivals in space, evaluating favorable or unfavorable options, being aware of being in a risky position and long etcetera make us consider MATE as an interesting proposal to put into practice in Physical Education.

Therefore, this article aims, through the well-known game of MATE and with a set of variables and factors that progressively grow in complexity with the passage of sessions, to present a Teaching Unit (TU) proposal focused on improving perceptual skills and decisional in Physical Education secondary school students

Methods

This article includes, as we have already mentioned, a curricular proposal that, relied on secondary Physical Education curriculum, attempts to improve skills related to perception and decision-making carried out with students.

Sample

This proposal would be developed between 24 and 32 students per classroom from the first cycle of the Spanish secondary level (12-14 years). 200 students would correspond to both levels ($n = 90$ of the first level and $n = 110$ of the second). Of the first group ($n = 90$), 58 would be boys and 32 would be girls; of the second ($n = 110$), 62 would be boys and 48 girls. All the students would belong to the same secondary school.

Contextual Analysis

The proposal is aimed at the middle secondary schools, where most students have an acceptable level

of motor development. In addition, it is with schoolchildren from this cycle where the previous TU based on alternative sports was carried out and where the described errors related to perception and decision-making were observed.

Curricular Analysis

Table 1.

Curricular performance map

T.U.	Block of curricular content	Assessment criteria	Learning Standard	PE Goals	Goals of Stage
Law	O. July 14 2016	RD 1105/2014, December 26	O. July 14 2016	O. July 14 2016	D. 111/2016, June 14
MATE	Block 3	3. CMCT, CAA, CSC, SIEP.	3.1., 3.2., 3.3., 3.4., 7.1., 7.2. & 7.3.	2, 7, 11 & 12	a), c), d), g) & k)

O.: Orden (Andalusia Law of Education); RD: Real Decreto (Spanish Law of Education); D: Decreto (Spanish Law of Education); CMCT: Mathematical competence and basic competences in science and technology; CAA: Learn to Learn; CSC: Social and civic competence; SIEP: Sense of initiative and entrepreneurial spirit.

Practical proposal

Teaching Unit Model

As we have previously indicated this TU would be framed, within the programming, in the Block 3. Games and Sports, and the structure that this TU would follow would be two sessions for each type of MATE. With 12 variants of the 'classic' MATE, and taking into account that we are only going to dedicate the first session to this (introductory, since in general they have all played at some time), we had a total of 13 sessions.

That is why the proposal is based on a progression of the traditional MATE, managing to increase the cognitive and decisional complexity for the student through the introduction of new rules and materials, such as mats (and their disposition), increasing the number of balls that intervened during the game, etc.

The first session corresponding to each type of MATE would be used to familiarize the students with the innovations introduced, achieving at the end of it in almost all the variants that the participants achieved a fairly adequate interpretation of the rules and the operation of the game. After each session, the last 5 minutes of calm would be used to deal with questions about the key points of each MATE, serving to consolidate what would be interpreted correctly and to clarify the aspects not understood or not put into practice. In this way, the second session of each MATE would be thought to be much more fluid and actions would begin to be observed in reference to a high degree of understanding of the game and great perceptive and decisional work.

Conclusions

The objective of this proposal is to improve students'

Table 2.

Session example

TEACHING UNIT / TITLE: SPORT & GAMES - "PLAYING MATE"		STAGE: PRIMER CICLO SECUNDARIA	
		LEVEL: 2º ESO (SECONDARY)	
		QUARTER: SECOND	
		SESION: 12	
BLOCK OF CURRICULAR CONTENT	DIDACTICS GOALS	COMPETENCE	
Block 3. Games and sports. Perceptual, decisional and motor skills specific to MATE's activity. Existence of rules and game rules. 'Attack' and 'Defense' phases. Popular and traditional game practice. Team play and promotion of respect among colleagues.	-Know and implement technical and tactical foundations of the game of the MATE, as well as specific perceptual and decisional skills. -Promote teamwork skills and respect for peers in the context of a collaboration-opposition game, as well as implement the concepts of sportsmanship and respect for the rules.	-Specific situations of MATE's resolution based on perceptual processes and related to decision making, trying to execute the best strategy for each scenario. -Recognize the game of MATE as a setting where values such as integration, tolerance or respect are implemented.	
INSTRUCTION			
<ul style="list-style-type: none"> SESSION INTRODUCCION. 2'. Once everyone is sitting on the floor, we use the blackboard to remember the dynamics and key points of the MATE variant carried out in the previous class and which will be very similar to this one. A brief explanation, using the blackboard, of the new MATE. WARM UP. 3'. Through continuous running and joint mobility, introduce the group to the session "getting warm" and trying to avoid injuries during it. By using different variants of MATE for each day, what interests us is optimizing time and trying to get the student to play MATE as soon as possible. Therefore, in these sessions, we do not introduce games during the warm-up that complement the same. MAIN PART. 45'. Implementation of the 'Six balls' MATE'. <div style="text-align: center;"> </div> 			
<ul style="list-style-type: none"> CALM DOWN - REFLEXION. 5'. In addition to collecting the Material used, the students sit down again to jointly remember the conclusions that this MATE leaves us (strengths and weaknesses). 			
ACTIVITIES			
ORGANIZATION	MATERIALS	TIME	SESSION ASSESSMENT
This variant is played with six balls that will be placed three in one field and three in another at the start of the game. The fields are divided by wooden benches, and the limits will be established by large mats placed horizontally forming walls. On the side of the mats, the eliminated players will be placed.	6 foam rubber balls, 8 benches to delimit areas and separate fields	45' of motor commitment. 5' of introduction and warm-up, and the last 5' for a brief reflection as a calm down.	First Contact with new attack and defense strategies. Experiment new attack behaviors (watch for opposing shots and the availability of balls). Experiencing changes in attack decision making (launching the distracted, trying new strategies of distraction, surprise, etc.).

perceptual-cognitive and decisional skills through MATE. To achieve this objective, the aspects that will be worked on the game follow the line marked by both the dynamic-ecological systems model and determining factors in decision-making such as attention, anticipation and memory. In each of the MATE variants, the action to be carried out by each participant will not simply be the result of the player's cognitive work, but also aspects related to the context influence: rivals who throw balls with the intention of eliminating ourselves and controlling the location of rivals and eliminated area (attention); the strategies that opponents try to follow (anticipation); the experience in this type of situations that is acquired with the passage of the sessions (memory), the number of balls that intervene in the development of the game, etc.

The evidence related to games in TU tries to reflect playful (Baena & Ruiz, 2016; Fernández-Gavira, Prieto, Alcaraz-Rodríguez, Sánchez-Oliver & Grimaldi, 2018) and socio-emotional aspects (Lavega, Saez de Ocáriz,

Lagardera, March-Llanes & Puig, 2017; Lavega, Filella, Lagardera, Mateu & Ochoa, 2013), even being studied in games very similar to MATE from the sociomotricity perspective (Pic, Lavega-Burgués & March-Llanes, 2019), all of them being present in the development of our TU. Likewise, there are not many proposals in the Physical Education field using the game in TU as a tool to develop decisional aspects in the school environment and know that it is essential for the early physical and cognitive development of the students. Among them, we highlight the study by Calderón and Martínez de Ojeda (2014) around precisely the same game of MATE, where they argue about benefits of this game similar to those of this work, bringing students closer to other types of typical situations of others sports or disciplines where perceptual capacity, problem solving and decision making are fundamental elements. However, if we differ in any way from the aforementioned study, it is that in our proposal the improvement of these three fundamental aspects is established as a priority objective, using a progression of the game in complexity with the passing of the sessions. However, where we have found numerous references regarding work aimed at improving these perceptual-decisional skills is in sports settings, where the importance of this type of work for improving performance is evident (Conejero, Fernández, González, Claver & Moreno, 2018; Suárez-Cadenas, Courel-Ibáñez & Cárdenas-Vélez, 2017) and, in our case, for better cognitive development of the students.

Another benefit that our proposal presents is that the students, without a high command of MATE, face a high attention load during their participation, keeping them with a high degree of concentration, which causes errors in precision actions, such as it shows in some studies such as that of Alarcón et. al (2018) where footballers under great mental or attention load lose precision in the pass. Likewise, and in relation to this aspect, we find another beneficial situation along the TU, the students automate responses, adding actions and decisions in their motor memory, improving the understanding of the logic of the game (perception and decision-making) and therefore reducing their attention control and cognitive performance. Despite the belief that for many years an increase in practice was the main cause of the improvement in the learning process (Ericsson, Krampe & Tesch-Römer, 1993), in our proposal we follow the established line by more recent studies (Hambrick et al. 2014), which consider that, despite being configured as a fundamental pillar of the

learning process, it is not a factor that ensures improvement in a certain action or set of actions; This is as a result of a complex and dynamic combination of increased experience with the action or situation, practice (training), knowledge about the internal logic of the game or sport, degree of effectiveness and success, and the desire to excel trying to give the best possible performance (Sánchez, 2002), yielding a result of an interaction process between its biological, psychological and sociological characteristics (Baker, Horton, Robertson-Wilson & Wall, 2003).

For decades we have perceived the teaching of sport from the purely technical and mechanical level of determining motor action (Castejón, Díaz, Giménez, Jiménez, López & Vizcana, 2010). On the educational level, Physical Education has also followed this paradigm, receiving the name 'teaching by objectives' (Kirk, 1990), reflected in the well-known technical model (Blázquez and Amador, 1995). As Wein (1991) points out, the axis of interest for teachers or coaches in this type of teaching-learning process is a correct execution of the technical gesture, putting into practice on many occasions exercises not close from the reality of the game, where the transfer is not what the participant actually experiences. In this way, it is possible to 'deny' the person the possibility of asking questions, interpreting the situation and, ultimately, understanding and acting according to the internal logic of the game or sport in question, behaving autonomously and thoughtfully for it, which are the main purposes that we try to fulfill with our proposal, following another more recent paradigm, which emerged a few decades ago, and which is called the constructivist model for sports initiation (Contreras, De La Torre and Velázquez, 2001; González-Víllora, Evangelio, Guijarro & Rocamora, 2020). In it, and as in the MATE, the student is part of the learning process itself (González-Víllora, García-López, Gutiérrez-Díaz & Pastor-Vicedo, 2013), with the mediation of the teacher, so that they no longer are only limited to being a passive recipient of a large amount of information, but now it also autonomously uses cognitive thinking and abilities to develop the corresponding game or sport (Guijarro, Rocamora, González-Víllora & Arias-Palencia, 2019).

Considering all the evidence argued during this work, we can say that the MATE game can be configured as a very interesting tool to be developed in Physical Education sessions when we try to develop perceptual-decisional skills that help students in their physical and cognitive development either in school context or in sports initiation. Despite this, we are aware that more

works are necessary for this line to verify if really through the MATE or another type of similar game those perceptive and decisional skills are developed that in the course of the sessions it has been possible to experience pragmatically.

In summary and consistent with previous research (Beni et al., 2017; Memmert et al., 2009), it is expected to accomplish with this integrated learning proposal that the student, in general, understands the internal logic of the game that he begins to learn and, more specifically, makes contact with certain aspects of the game that help you improve your participation and performance in it.

Referencias

- Alarcón, F., & Cárdenas, D. (2010). Conocer el juego en baloncesto para jugar de forma inteligente. *Revista Wanceulen EF Digital*, 6, 52-72.
- Araújo, D., Travassos, B., Torrents, C., & Vives, M. (2011). La toma de decisiones en el deporte escolar. Un ejemplo aplicado al fútbol. *Innovació en Educació Física (INyEF)*, 3, 1-7.
- Baena, A., & Ruiz, P. J. (2016). El juego motor como actividad física organizada en la enseñanza y la recreación. *EmásF: revista digital de educación física*, (38), 73-86.
- Baker, J., Horton, S., Robertson-Wilson, J. y Wall, M. (2003). Nurturing sport expertise: Factors influencing the development of elite athletes. *Journal of Sports Science and Medicine*, 2, 1-9.
- Beilock, S. L., Carr, T. H., MacMahon, C. & Starkes, J. L. (2002). When paying attention becomes counterproductive: impact of divided versus skill-focused attention on novice and experienced performance of sensorimotor skills. *Journal of Experimental Psychology: Applied*, 8, 6-16. <https://doi.org/10.1037/1076-898X.8.1.6>
- Beni, S., Fletcher, T., & Ní Chróinín, D. (2017) Meaningful experiences in physical education and youth Sport: A review of the literature. *Quest*, 69(3), 291-312. <https://doi.org/10.1080/00336297.2016.1224192>
- Blázquez, D & Amador, F. (1995). *La Iniciación deportiva y el deporte escolar*. Barcelona: Inde.
- Calderón, A., & Martínez de Ojeda, D. (2014). Unidad didáctica de balón-tiro en una temporada de Educación Deportiva. Modelos de enseñanza en educación física: *Unidades didácticas de juegos deportivos de diana móvil, golpeo y fildeo y pared*, 115-150.
- Cárdenas, D., Conde-González, J. & Perales, J. C. (2015). El papel de la carga mental en la planificación del entrenamiento deportivo. *Revista de Psicología Del Deporte*, 24(1), 91-100. Disponible en <https://www.rpd-online.com/article/view/1365>
- Castejón, F. J., Díaz, M., Giménez, F. J., Jiménez, F., López, V., & Vizcana, M. T. (2010). *Deporte y enseñanza comprensiva*. Sevilla: Wanceulen.
- Castillo-Díaz, A., Castillo-Rodríguez, A., Cárdenas, D., Madinabeitia, I. & Alarcón, F. (2018). La carga mental deteriora la precisión del pase en jugadores de fútbol. *Revista de Psicología del Deporte*, 27, 155-164. Disponible en <http://www.rpd-online.com/article/view/v27-n2-alarcon-castillo-diaz-et-al>
- Conejero, M., Fernández, C., González, J., Claver, F., & Moreno, M. P. (2018). Asociación entre la función en juego, toma de decisiones y rendimiento en voleibol. *Revista de psicología del deporte*, 27(2), 0173-180.
- Contreras, O., De la Torre, E. & Velázquez, R. (2001). *Iniciación deportiva*. Madrid: Síntesis.
- Duran, C., Lavega, P., Salas, C., Tamarit, M., & Invernó, J. (2015). Educación Física emocional en adolescentes. Identificación de variables predictivas de la vivencia emocional. (Emotional Physical Education in adolescents. Identifying predictors of emotional experience). *Cultura, Ciencia y Deporte*, 10(28), 5-18. <http://dx.doi.org/10.12800/ccd.v10i28.511>
- Ericsson, K. A., Krampe, R. y Tesch-Romer, C. (1993). The role of deliberate practice in the acquisition of expert performance. *Psychological Review*, 100(3), 363-406. <https://doi.org/10.1037/0033-295X.100.3.363>
- Fernández-Gavira, J., Prieto-Gallego, E., Alcaraz-Rodríguez, V., Sánchez-Oliver, A. J., y Grimaldi, M. (2018). Aprendizajes significativos mediante la Gamificación a partir del Juego de Rol: «Las Aldeas de la Historia». *Espiral. Cuadernos del Profesorado*, 11(22), 69-78.
- Fink, A., Rominger, C., Benedek, M., Perchtold, C. M., Papousek, I., Weiss, E. M. & Memmert, D. (2018). EEG alpha activity during imagining creative moves in soccer decision-making situations. *Neuropsychologia*, 114, 118-124. <https://doi.org/10.1016/j.neuropsychologia.2018.04.025>
- García, V., Ruiz, L. M. & Graupera, J. L. (2009). Perfiles decisionales de jugadores y jugadoras de voleibol de diferente nivel de pericia. *Revista Internacional de Ciencias del Deporte*, 14, 123-137. <https://doi.org/10.5232/ricyde2009.01410>
- Gentile, A. M. (1998). Movement science: Implicit and explicit processes during acquisition of functional skills. *Scandinavian Journal of Occupational Therapy*, 5(1), 7-16. <https://doi.org/10.3109/11038129809035723>
- González-Villora, S., Evangelio, C., Guijarro, E., & Rocamora, I. (2020). Innovando con el modelo de Educación Deportiva: si buscas resultados distintos, no eduques de la misma manera. *Madrid: Aula Abierta-McGraw-Hill*.
- González-Villora, S., García-López, L. M., Gutiérrez-Díaz, D.

- y Pastor-Vicedo, J.C. (2013). Tactical awareness and decision making in youth soccer players (under-14 years). *Journal of Human Sport and Exercise*, 8 (2), 444-452. <https://doi.org/10.4100/jhse.2012.82.09>.
- Guijarro, E., Rocamora, I., González-Víllora, S., & Arias-Palencia, N.M. (2019). The role of physical education in the achievement of international recommendations: A study based on pedagogical models. *Journal of Human Sport and Exercise*, in press. <https://doi.org/10.14198/jhse.2020.154.12>
- Hambrick, D., Oswald, F., Altmann, E., Meinz, E., Gobet, F. y Campitelli, G. (2014). Deliberate practice: is that all it takes to become an expert? *Intelligence*, 45, 34-45. <https://doi.org/10.1016/j.intell.2013.04.001>
- Jiménez A. C. (2007). *Análisis de las tomas de decisión en los deportes colectivos: Estrategias de las jugadoras aleros de baloncesto en posesión del balón*. Sevilla:Wanceulen.
- Kirk, D. (1990). *Educación física y currículum*. Universidad de Valencia. Valencia.
- Lago, P. C. (2010). La toma de decisión desde la perspectiva de los sistemas complejos. La influencia de las variables contextuales de la competición en el comportamiento de los jugadores en los deportes de equipo. En V. López-Ros, A. C. Jiménez, F.J. Castejón & C. Lago. *La Táctica deportiva y la toma de decisiones*. Universitat de Girona. Càtedra d'Esport i Educació Física.
- Lavega, P., Filella, G., Lagardera, F., Mateu, M., & Ochoa, J. (2013). *Juegos motores y emociones. Cultura y educación*, 25(3), 347-360. <https://doi.org/10.1174/113564013807749731>
- Lavega, P., Planas, J.A., & Ruiz, P. (2014). Juegos cooperativos e inclusión en educación física. *Revista Internacional de Medicina y Ciencias de la Actividad Física y del Deporte*, 14 (53), 3-15. Disponible en: <http://www.redalyc.org/articulo.oa?id=54230508003>
- Lavega, P., Sáez-de-Ocáriz, U., Lagardera, F., March-Llanes, J., & Puig, N. (2017). Emotional experience in individual and cooperative traditional games. A gender perspective. *Anales De Psicología / Annals of Psychology*, 33(3), 538-547. <https://doi.org/10.6018/analesps.33.3.260811>
- López Ros, V., (2010). La táctica individual y la toma de decisiones en el deporte. A modo de introducción. En V. López-Ros, A.C. Jiménez, F.J. Castejón & C. Lago. *La Táctica deportiva y la toma de decisiones*. Universitat de Girona. Càtedra d'Esport i Educació Física.
- Maldonado, A. (1998). *Aprendizaje, Cognición y Comportamiento Humano*. Madrid: Biblioteca Nueva.
- Marteniuk, R. (1976). *Information processing in motor skills*. Nueva York: Holt, Rinehart and Winston.
- Memmert, D., Hagemann N., Althoetmar R., Geppert S., & Seiler D. (2009) Conditions of practice in perceptual skill learning. *Research Quarterly for Exercise and Sport*, 80(1), 32-43. <http://dx.doi.org/10.1080/02701367.2009.10599527>
- Parlebas, P. (1981). *Contribución a un lexique commenté en science de l'action motrice*. París: INSEP.
- Perales, J.C. (2009). *La toma de decisiones en el deporte*. Seminario desarrollado en la Facultad de Ciencias de la Actividad Física y el Deporte. Inédito.
- Poveda, L. J., & Benítez, S. J. (2010). Fundamentos teóricos y aplicación práctica de la toma de decisiones en el deporte. *E-balonmano. com: Revista de Ciencias del Deporte*, 6(2), 101-110. Recuperado de <http://www.e-balonmano.com/ojs/index.php/revista/article/view/54>
- Pic, M., Lavega-Burgués, P., & March-Llanes, J. (2019). *Motor behaviour through traditional games. Educational Studies*, 45(6), 742-755. <https://doi.org/10.1080/03055698.2018.1516630>
- Punset, E. (2006). *El alma está en el cerebro*. Madrid: Aguilar.
- Roca, A., Ford, P. R., McRobert, A. P., & Williams, A. M. (2013). Perceptual cognitive skills and their interaction as a function of task constraints in soccer. *Journal of Sport & Exercise Psychology*, 35(2), 144-155. <https://doi.org/10.1123/jsep.35.2.144>
- Sánchez, M. (2002). *El proceso de llegar a ser experto en baloncesto. Un enfoque psicosocial*. Tesis doctoral no publicada. Toledo: Universidad de Castilla-La Mancha.
- Scharfen, H. E., & Memmert, D. (2019). Measurement of cognitive functions in experts and elite athletes: A meta analytic review. *Applied Cognitive Psychology*, 33(5), 843-860. <https://doi.org/10.1002/acp.3526>
- Slovic, P., Peters, E., Finucane, M. L., & MacGregor, D. G. (2005). Affect, risk, and decision making. *Health psychology*, 24(4S), S35. <https://doi.org/10.1037/0278-6133.24.4.S35>
- Stratton, G., Reilly, T., Williams, A. M., & Richardson, D. (2004). *Youth soccer: Science to performance*. London & New York: Psychology Press.
- Suárez-Cadenas, E., Courel-Ibáñez, J., & Cárdenas-Vélez, D. (2017). Decision-making in Basketball. A Proposal of Decision Trees for Teaching Pick and Roll. *Acción Psicológica*, 14(1), 43-56. <https://dx.doi.org/10.5944/ap.14.1.19259>
- Thorpe, R.D. & Bunker, D.J. (1982). A model for the teaching of games in secondary schools. *London: Bulletin of physical education*, 19, 5-9.
- Wein, H. (1991). *Hockey*. Madrid: Comité Olímpico Español.