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MOJ Sports Medicine

Research Article

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How does training methodology influence the tactical knowledge of football in stages of formation?

Abstract

In recent decades, the teaching of sports in general and of football in particular, has evolved from a traditional technique-based approach, into something more flexible and adaptable to both the needs and characteristics of the player and above all, to the changing nature of the game itself. The aim of this research is to analyze the influence of an analytical methodology and other global tactical football knowledge. To do this we worked with a sample of 226 male football players belonging to grassroots football clubs, between the ages of 8 and 18. They were given the CECTAF to assess their tactical comprehension of football before and after completing a specific training program of each methodology, consisting of 12 training sessions over a 6 week period. Regarding the global tactical knowledge, we found significant differences in the variable "competitive category", highlighting the youth category with the highest values with 22, 69. Regarding variable "time of data collection" it is evident how values enhance after training processes, going from 21,45 in the first round intake, to values of 22,24 in the second one, in both methodologies, without there being significant differences. We can observe a similar trend in that global tactical knowledge, obtaining in analytical methodology values of 22,24, for global methodology 22,16 and 21,23 for the control group–with no significant differences being found here, the importance of the training process is again emphasized. Finally, there are positive correlations between the "competitive category" and global methodology with defensive individual tactic, offensive collective tactic and defensive collective tactic. This research stresses the importance of the training process as a base for integral/ fundamental improvement of the football player, adapted at all times to his/her developing process and to the methodological rigor that the forming process requires, regardless of the methodology used.

Volume 2 Issue 3 - 2018

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Received: March 22, 2018 | **Published:** April 23, 2018

Introduction

Currently, soccer is the most practiced sport in the world[1] and constitutes a human and social phenomenon that has acquired a vital importance in our society. Sports forms of invasion, including football, are one of the ways of understanding the sporting phenomenon in society. In these sports disciplines has existed the traditional dichotomy between traditional teaching and teaching under an active model.[2] In the case of the first model, the technique centered the pedagogical patterns, while the perspective of active teaching understands the learning of these sports, not as a sum of techniques, but as a global system of relations between the different elements of the game.[3] In a sport such as football, in which the situations of play change constantly, it is suggested that the player possesses a prior knowledge (declarative) about the rules, the positions of the players in the field, which transcends in their ability to relate and apply new concepts, that is, in what, how and why to apply a behavior, what is known as procedural knowledge.[4,5] This statement is based on constructivist and information processing theories, which allow analyzing how the player refines learning, structuring knowledge to act strategically during the game.[6]

We are dealing with a sport in which motor problems continually appear, in no way foreseen, since they always vary in order, frequency of appearance and complexity.[7] In this same line expresses Cardenas and Lopez[8] when he says that, the characteristics of invasion sports should make us reflect on the need to develop cognitive ability or motor intelligence in our players, through the application of a model teaching. According to Méndez[9] the cognitive domain includes the ability of football players to know the rules and to articulate solutions to solve tactical problems and explain how they will execute specific skills and movements. The knowledge about the decision making of the players is a complex reality to analyze given the enormous number of variables that exert their influence in this process. Within the teaching-learning process of these skills, the coach's intervention must adapt to the characteristics of both the activity and the player and their difficulties and shortcomings, so that they can fulfill their role and be effective[10] in short, facilitate the learning of the subject.[11] For Cárdenas[12] the learning must start from the player to analyze all the circumstances and factors that may affect their learning and establish the methodological lines that help them to progress. Araujo, et al.[13] consider that the processes related to decision-making that occur are the fruit of the self-organization of the player with the context in which it is practiced more in line with the real objective of the game that will be just the destabilization of the opponent's behavior. The footballer will need to explore the context and interact with him to solve what each unique situation demands. Decision-making in collective sports such as football emerges from the continuous and critical process of seeking information to develop and act to detect information better.[14] In fact, not all the information will be relevant to achieve the objective, what should be trained in the perception of the information that can determine the game in the specific context of football. For Davids and Araujo,[15] the key to decision making focuses on the individual mental states and their knowledge about the game, excluding the properties of the environment in this approach. Despite the changes produced at a methodological level in the teaching of football, we can see how when evaluating this type of knowledge on tactical knowledge and decision making, we find difficulties such as the player knowing what to do but not able to express an appropriate decision due to lack of time,

pressure from an opponent or competitive tension. The technical level of the player may limit the performance options, although he is aware that another decision is more appropriate. Another difficulty is that The player knows how to execute a motor situation and does not know how to verbalize it. Without forgetting that we can find players who in practice tend to evade or avoid problematic situations for him.[16]

Declarative and procedural knowledge have been tools used to assess the cognitive plot in the evaluation of invasion sports.[17] One of the evaluation instruments that have the greatest utility in the sporting context is the Team Sport Assesment Procedure (TSAP) developed by Grehaigne, Godbout & Bouthier,[18] which provides information to quantify the athlete's total offensive performance in invasion sports. , reflecting the technical and tactical aspects of successful game practice. The Game Performance Assessment Instrument (GPAI) designed by Oslin, Mitchell & Griffin,[19] also has its utility as a comprehensive tool of the game and is composed of seven variables (base, adjustment, decision making, skill execution, coverage, support and mark) that can be adapted to the different sports of the tactical classification. Other tools, such as the Observation Instrument of French and Thomas, expanded by Méndez;[9] or the Game Test 2 vs 2,[20] evaluate in a real game situation the knowledge of the players about the basic principles of football. Taking into account the processes of understanding and awareness in the tactical reasoning that take place in football, de la Vega del, Valle Maldonado & Moreno[21] created a board game in which the player must project their knowledge of the game in three basic dimensions of analysis: the collective tactical aspects, the group and the individual ones. Without neglecting these tools for the evaluation of tactical knowledge, the instrument that has been used in our research is the Tactical Knowledge Evaluation Questionnaire Applied to Football (CECTAF), created by de la Vega[22] to assess comprehension sports tactics and that is grouped into six factors. The purpose of this study was to analyze the possible differences in the tactical knowledge levels of soccer based on the use of a training program based on a global methodology or an analytical methodology.

Material and method

The sample consisted of 226 male soccer players with ages between 8 and 18 years old, with an average age of 16.6 (±2.61) years, belonging to three base football clubs in the city of León (Spain), thus encompassing the entire fringe of formative football, chosen at random. The distribution by competitive categories was benjamin (n=38), juvenile (n=37), infantile (n=49), cadet (n=52) and juvenile (n=50). For the realization of our study we divided the soccer players of all the categories into three groups, on the one hand one group worked with a global methodology (n=76), another group with an analytical methodology (n=74) and another one was used as control group (n=76), that is, no specific training methodology was assigned to it. To collect the information necessary for the study and to achieve the established objectives, two questionnaires were used, adapted to the characteristics of the participants. For the evaluation of the socio-demographic characteristics, a questionnaire prepared by the team in charge of the research was used. For the evaluation of sports tactical comprehension, the Tactical Knowledge Appraisal Questionnaire Applied to Football (CECTAF), created by de la Vega,[22] was administered. It consists of 26 items, with four possible answers, of which one must be chosen. Present different game situations grouped into six factors: Offensive Individual Tactics (TIO), Defensive Individual Tactics (TID), Offensive Group Tactics (TGO), Defensive Group Tactics (TGD), Collective Offensive Tactics (TCO) and Collective Defensive Tactics (TCD).

The administration of the questionnaires was carried out within the competition period, in the first training session of the week and in the training schedule marked in their respective clubs. The participants were explained in detail what the study consisted of, what its purpose was and what its participation was required for. Likewise, the questionnaires were described, the order in which they were to be administered and what data they were trying to obtain in each one of them. The maximum time allowed to complete the questionnaires was 45 minutes. The evaluations were made before and after developing the training programs, consisting of twelve sessions distributed over six weeks of work. A descriptive statistic was carried out in order to find the arithmetic mean and the standard deviation depending on the variables studied. The analysis of the data was executed using the SSPS statistical package version 21.0. A multivariate analysis of variance (MANCOVA) 3x2x5 (Group x Toma x Category) was performed with all the analyzed indexes to check the tactical knowledge applied to football, which is analyzed in the present study. Likewise and to verify the concrete differences between the different groups, an analysis of the variance of repeated measures (ANOVA) was carried out by Bonferroni posthoc procedure to avoid type I errors. Finally, the relationship between variables will be analyzed using Pearson correlations ($p \leq 0,05$), taking into account the independent variable of group or work methodology, as well as the moment of data collection or intake. The multivariate analysis between the instrument used and most relevant variables (Working Group, Time of data collection and competitive category) as well as the size of the effect, using the Lambda coefficient of Wilks (λ).

Results and discussion

To start describing the results, we performed the multivariate analysis between the instrument used and the most relevant variables (Working Group, Data Collection Time and competitive category), as well as the effect size, using the Lambda coefficient of Wilks (λ). We were able to observe in relation to the variable Working group that has no significant effects on the tactical knowledge applied to football (λWilks=,949, F(12)=1.351, p=,184). The same happens for the Data Collection Moment variable, the effect size varies slightly, as we can see (λWilks=,980, F(6)=1.053, p=,391). Finally, if we take into account the variable Competitive Category, we can observe that it has an effect in the case of the general tactical knowledge of the evaluated construct (λWilks=, 815, F(24)=2.699, p=,000***). If we combine the three variables or factors to be taken into account in a MANCOVA analysis, we can see how the effect in this model is significant due to the combination of these variables (λWilks=,655, F(90)=1.433, p=,006**). In Table 1 we can see the effect of each of the variables on the different scales related to tactical, individual and group knowledge, both offensive and defensive. We can see how the variable takes a significant effect on global tactical knowledge (TCT Global). Using the same measuring instrument, de la Vega[22]concluded that tactical knowledge increased in a different way depending on the competitive categories and the age of the players. The player's own evolutionary process allows him to understand essential aspects of the game he practices, so that training should take this variable into account when planning tactical work, adapting the difficulty and progression of teaching situations learning, always global and close to the internal logic of the game, to the competitive and mature category of the players. Despite not being the category that progresses the most, it is the youth category that has the most knowledge.

Citation: Carlos FR, Alfonso S, Olga M, et al. How does training methodology influence the tactical knowledge of football in stages of formation? *MOJ Sports Med.* 2018;2(3):88–94. DOI: 10.15406/mojsm.2018.02.00053

Table 1 MANOVA analysis of the evaluated indices and effect size, in relation to the work methodology* P≤0.05. n.s. Not significant

		Program			Take			Category			h2 Program	h2 Take	h2 Category	h2Program x Take x Category
	Variables	F	gl	p	F	gl	p	F	gl	p				
CECTAF	TIO	,560	2	n.s.	1,423	1	n.s.	1,679	4	n.s.	,142	,221	,513	,377
	TID	2,546	2	n.s.	1,462	1	n.s.	1,145	4	n.s.	,507	,226	,359	,715
	TGO	1,165	2	n.s.	,567	1	n.s.	1,467	4	n.s.	,255	,117	,454	,787
	TGD	1,715	2	n.s.	1,214	1	n.s.	,225	4	n.s.	,359	,196	,099	,454
	TCO	1,545	2	n.s.	,061	1	n.s.	2,846	4	,024*	,327	,057	,771	,765
	TCD	,210	2	n.s.	,565	1	n.s.	1,233	4	n.s.	,083	,116	,385	,286
	TCT Global	,143	2	n.s.	4,439	1	,036*	,922	4	n.s.	,072	,556	,292	,270

Ford, Williams and Yates,[23] ensure that with training methodologies away from the essence of the game is lost more time than with specific methodologies, demonstrating the latter, be more efficient. Allison and Thorpe[24] confirmed that the athletes who worked in the tactical group became more involved in the task and with a more positive attitude in their learning. Vegas[22] confirmed in most of the categories, except in the juvenile and juvenile category, that the global methodology was focused on the cognitive processes inherent in the practice, achieving better results than traditional methods, because in this way the same mechanisms are involved. Later he will use the footballer in the competition, thus achieving a specific degree of training. In a work done by Sánchez-Sánchez, et al.[25] it was observed that with a training based on the application of soccer games, one could improve the technical aspect, as well as with those analytical interventions, but these tactical programs seem to be valued as more fun in the opinion of the young players.[25]

If we take into account the different independent variables used in our analysis, we can see in Table 2, how there are differences depending on the methodology used, but not significant. We can verify how the difference in favor of the analytical methodology is minimal, achieving values similar to the global methodology. If we take into account the competitive category to which the participants belong, there are statistically significant differences in the TID indices (p=0.003**), TGO (p=0.000***), TCO (p=0.049*) and TCD (p=0.002**) and in the global tactical knowledge index of the group (p = 0.035 *), in all cases in favor of the older athletes. All the groups, after the intervention, increase the assessment indices of the group. Tactical knowledge, but only happens in a significant way in the TCTGlobal (p=0.034*). When working with a global methodology, the results increased in terms of decision-making, over those that worked with a traditional method,[26] and like Trandafirescuy Visan[27] affirm that tactical training The quality of the training increases, obtaining a greater tactical knowledge than a control group. Memmert[28] confirmed the greater tactical knowledge with training based on the reality of the game, as the players of our sample, managed to increase their tactical knowledge thanks to the global and analytical methodology, for its specificity and closeness to the real game and the aspects that it demands the internal logic of the game.

Harvey[29] reflected that players propose tactically more effective solutions when they experience methodologies based on the essence of the game, soccer players and football demand situations of high pressure and this improvement at the tactical level with training based on the game, being evident that closer are the training tasks to the game situations in terms of the different elements and processes involved in it, more efficient will be the training process.[30] Turner, Allison and Pissanos[31] revealed that better results are obtained by treating the principles of the game in invasion sports in a contextualized and specific way, all of them, like the players in our sample, in both analytical and global methodologies. If we observe the variable time of data collection according to the training methodology developed during a certain period of time (Table 3), to see the improvement that could be produced by one or another form of work, we can corroborate what we have already indicated. Effect of this last variable, since there are no differences in the sample studied, between the fact of using a work method or another, despite improving the records in the three groups after completing the specific training process or program. Superiors have a greater cognitive maturation and a greater number of specific motor experiences and knowledge of the deeper sport.[28,32,33] The players with more previous experience get better results in terms of declarative knowledge of football and decision making.

De la Vega et al.[21] highlight how soccer players in the youngest and youngest categories get lower levels of tactical knowledge of football due to the limitations they have to reason different situations of the game, as well as their limited previous experience. However, it is the infantile, cadet and juvenile categories that, as in our study, achieve higher values in tactical knowledge due to their greater tactical reasoning and their greater previous experience. As in our study, McPherson[34] and Ponce[35] to greater experience and competitive category we will achieve a greater declarative knowledge of football and likewise working with active and global methods. Finally and with the intention of not leaving any possible crossing without analyzing, if we combine the independent variables that we are taking into account we observe, as at a general level, using a methodology more focused on the analytical methods of teaching football tactics, we can observe a small tendency towards improvement in the Global Tactical Knowledge Index, with the exception of the players in the Children category, that there is a slight regression in this aspect, but none of them is significant. We find research that defends and uses a specific football methodology extolling the importance of individual tactical knowledge.[36–38] They argue that tactics give meaning to the game and that it has to be present in the training as our study[39–41]

achieve greater values of offensive individual tactics in global methods than in analytical and In the case of the subjects that worked through a global methodology, there is a significant improvement in the categories of Benjamin and Children and of opposite sign in the case of the categories Avile and Juvenile.

Table 2 Mean and standard deviation of the indexes evaluated by the "Tactical Knowledge Evaluation Questionnaire Applied to Football" (CECTAF), depending on the methodology developed, competitive category and time of data collection ns: Not significant. *p≤0.05, **p≤0.01, ***p = 0.000

Variables			TIO	TID	TGO	TGD	TCO	TCD	TCT GLOBAL
Training Method	ANALITICO	M	4,65	2,28	6,58	1,70	4,98	2,04	22,24
		Sd	1,60	1,53	2,45	1,20	1,81	1,11	4,14
	GLOBAL	M	4,67	2,19	6,31	2,04	4,97	1,98	22,16
		Sd	1,79	1,43	1,96	1,18	1,74	1,46	4,04
	CONTROL	M	4,32	2,48	6,15	1,82	4,63	1,73	21,13
		Sd	1,86	1,63	2,16	1,18	1,86	1,12	3,88
	Sig.		n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Category	BENJAMIN	M	4,5	2,77	5,19	1,88	4,81	1,46	20,62
		Sd	1,94	1,57	2,24	1,28	1,86	1,29	4,15
	ALEVIN	M	4,61	2,82	5,96	2,04	4,63	1,9	21,96
		Sd	1,77	1,4	2,14	1,09	1,88	1,17	3,83
	INFANTIL	M	4,44	2,08	6,73	1,73	4,61	1,76	21,35
		Sd	1,44	1,49	1,87	1,08	1,78	1,01	3,61
	CADETE	M	4,43	2,11	6,88	1,84	4,8	2,34	22,41
		Sd	1,84	1,56	2,39	1,24	1,79	1,47	4,83
	JUVENIL	M	4,82	2,03	6,52	1,88	5,45	1,99	22,69
		Sd	1,82	1,46	1,93	1,25	1,66	1,16	3,29
	Sig.		n.s.	0,003**	0,000***	n.s.	0,049*	0,002**	0,035*
Moment of data collection	FIRST	M	4,43	2,23	6,28	1,81	4,78	1,93	21,45
		Sd	1,69	1,52	2,2	1,22	1,77	1,34	4,06
	MONDAY	M	4,73	2,42	6,44	1,94	4,99	1,9	22,43
		Sd	1,83	1,53	2,17	1,15	1,84	1,14	3,96
	Sig.		n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	0,034*

Table 3 Score of the overall offensive and defensive tactics depending on the administration and methodology used (Analytical, Global or Control Group). n.s. Not significant

	Training method		TIO	TID	TGO	TGD	TCO	TCD	TCT GLOBAL	Sig.
First Shot	ANALITICO	Media	4,64	2,03	6,48	1,55	4,86	2,12	21,69	n.s.
		Sd	1,61	1,49	2,33	1,2	1,61	1,11	3,91	
	GLOBAL	Media	4,42	2,09	6,45	1,98	4,89	2,02	21,85	n.s.
		Sd	1,85	1,33	1,97	1,24	1,86	1,63	4,3	
	CONTROL	Media	4,23	2,57	5,9	1,87	4,57	1,67	20,8	n.s.
		Sd	1,58	1,71	2,3	1,19	1,84	1,17	3,91	

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Table Continued

	Training method		TIO	TID	TGO	TGD	TCO	TCD	TCT GLOBAL	Sig.
Second Take	ANALITICO	Media	4,67	2,6	6,72	1,91	5,14	1,93	22,98	n.s.
		Sd	1,6	1,55	2,62	1,17	2,07	1,12	4,36	
	GLOBAL	Media	4,98	2,31	6,13	2,12	5,08	1,94	22,56	n.s.
		Sd	1,67	1,55	1,96	1,1	1,58	1,23	3,7	
	CONTROL	Media	4,46	2,36	6,54	1,74	4,72	1,82	21,64	n.s.
		Sd	2,23	1,51	1,89	1,19	1,92	1,05	3,82	

Once it has been verified that there is no effect of the training methodology variable on the different assessment indexes of global tactical knowledge in soccer and according to the partial correlations made in the two moments of data collection, we can see how a weak relation at significant level (p=0.001**) between the Indexes of Offensive Group Tactics (r=0.164, p=0.05*) and Collective Defensive Tactics (r=0.235, p=0.001**) and the category in the that players participate in the first data collection. As for the second moment of data collection, after having performed the intervention with the different groups, we can observe how they are again weak, relationships between the Defensive Individual Tactics (r=-0.259; p=0.003**), the Offensive Group Tactics (r=0.285, p=0.001**) and the category in which they compete. If these same partial correlations are made based on the three work methods in the training, we can observe Pearson values somewhat higher than the previous ones in the case of those participants who experienced a more analytical method, between the category and the Individual Tactics Defensive (r=-0.303, p=0.002**), Offensive Group Tactics (r=0.444, p=0.000***) and Collective Defensive Tactics (r=0.358, p=0.000***). In the case of those trained by a more global methodology, focused on aspects of application to the game, we can see that the relationship between the competitive level and other variables take more strength: Defensive Individual Tactics (r=-0.303, p=0.002**), Offensive Group Tactics (r=0.444, p=0.000***) and Collective Defensive Tactics (r=0.358, p=0.000***). None of these correlations are statistically significant in the case of subjects included in the control group.

Konzag,[42] Mc Morris & Beazeley[43] and William, et al.[44] corroborate the improvement in decision-making in groups that worked with methods based on cognitive processes confirming that constructivist models improve tactical football knowledge. Gabriele and Maxwell[45] confirm that the tactical group improved in the decision making and understanding of the game over the traditional group. Like the players in our sample, Contreras, García and Cervelló,[46] García,[47] Griffin, Mitchell & Oslin[48] and Turner & Martinek[49] claim that it is the players who worked with a tactical methodology who achieve high values in football knowledge, without reaching be meaningful All of them, as in our study, obtained a correlation between the methods used in favor of the global method despite not being significant, due to the proximity to the essence and logic of the game.

Conclusion

The competitive category variable has turned out to be the most relevant when carrying out the different analyzes, specifically in the rates of Individual Defensive Tactics, Group Defensive Tactics, Collective Offensive and Defensive Tactics and in the global tactical knowledge index of the group. Without being significant, the global tactical knowledge index improves in the analytical methodology, with the exception of the players in the children's category and in the overall methodology, except for the young and juvenile footballers. As for the individual offensive tactics, the Global methodology improves to a greater degree than analytical methodology; however it is the other way around, in terms of defensive individual tactics, being significant in both cases. There are more significant correlations between the competitive category and the global methodology than the analytical one with the Defensive Individual Tactics, the Offensive Group Tactics and the Collective Defensive Tactics. From the conclusions of this study, the following considerations can be made for the practice of training. The tactical aspects of the game are susceptible to be taught and learned at an early age, against the traditional approach that focuses a large volume of work on technical work and a minimum percentage of tactical work, we propose that the factors involved be progressively facilitated in the game depending on the age of the player, based on the game itself and on equipping the player with the greatest number of situations and experiences, drawn from the open and changing nature of our sport.[50]

Acknowledgements

None.

Conflict of interest

Author declares that there is no conflict of interest.

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Citation: Carlos FR, Alfonso S, Olga M, et al. How does training methodology influence the tactical knowledge of football in stages of formation? *MOJ Sports Med.* 2018;2(3):88–94. DOI: 10.15406/mojsm.2018.02.00053

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