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ORIGINAL

MULTIDIMENSIONAL ANALYSIS OF PEDAGOGICAL FEEDBACK IN VOLLEYBALL TRAINING SETTING

ANÁLISIS MULTIDIMENSIONAL DEL FEEDBACK PEDAGÓGICO EN ENTRENAMIENTO EN VOLEIBOL

Pereira Marques, F.¹; Mesquita Ribeiro, I.²; Graça Santos, A.³ y Moreno Arroyo, M.P.⁴

¹ Maestrado en Ciencias del Deporte. Doctoranda en Ciencias del Deporte. Asistente de la Facultad de Deporte. Universidad de Oporto. Portugal. (fpereira@fade.up.pt)

² Doctora en Ciencias del Deporte. Profesora Asociada de la Facultad de Deporte. Universidad de Oporto. Portugal. (imesquita@fade.up.pt)

³ Doctor en Ciencias del Deporte. Profesor Asociado de la Facultad de Deporte. Universidad de Oporto. (agraca@fade.up.pt)

⁴ Doctora en Ciencias de la Actividad Física y del Deporte. Profesora Titular de Universidad. Facultad de Ciencias del Deporte. Universidad de Extremadura. España. (pmoreno@unex.es)

Spanish-English translator: Isabel Mesquita Ribeiro, e-mail: imesquita@fade.up.pt
Facultad de Deporte. Universidad de Oporto. Portugal.

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ABSTRACT

The present study aimed to analyse the pedagogical feedback (PF) of the coach in relation to the content, referential and form in youth volleyball training sessions. Twenty eight coaches of young players aged 12-18 years participated in the study. Statistical analysis was performed using multiple regression and Pearson correlation. Related to the content, the FBP centred on the knowledge process was predominant as well the verbal form to transmit it. However to provide technical information, coaches used, mainly, the knowledge centred on the process and for the tactical information coaches used result knowledge. Team information was issued in Verbal form, and the remaining content in both forms (Verbal and Visual-Verbal).

KEY WORDS: pedagogical feedback, referential, content, form of feedback, volleyball

RESUMEN

El estudio pretendió analizar el *feedback* pedagógico (FBP) del entrenador, en relación al contenido sustantivo, el referencial que comporta y la forma en la es emitido, en sesiones de entrenamiento de Voleibol juvenil. Participaron en el estudio 28 entrenadores de equipos de jóvenes jugadores con edades entre 12-18 años. El análisis estadístico se realizó mediante regresión múltiple y correlación de *Pearson*. El FBP centrado en el *conocimiento del proceso* y la forma de emisión *Verbal* fueron predominantes. La forma de emisión y el referencial del FBP determinaron la naturaleza del contenido sustantivo de la información. Para el aporte de información técnica los entrenadores emplearon fundamentalmente el *conocimiento del proceso* y para la información táctica el *conocimiento del resultado*. La información sobre táctica colectiva fue emitida de forma Verbal, y los restantes contenidos mediante ambas formas de emisión (*Verbal* y *Verbal-Visual*).

PALABRAS-CLAVE: feedback pedagógico, referencial, contenido sustantivo, forma de emisión del feedback, voleibol

INTRODUCTION

In the eighties the Pedagogical Feedback (PF) as an instructional strategy that enhances the pedagogical effectiveness has been assuming great relevance in the teaching of sport activities (Mesquita, 1998; Graça & Mesquita, 2001). The PF can be described as reaction behaviour of the teacher/ coach to a motor response from the student/athlete with the objective of acquiring, developing or change a motor skill (Fishman & Anderson, 1971; Fishman & Tobey, 1978; Piéron, 1986).

Although researchers and practitioners acknowledge the value of PF, there are no conclusive results about its effectiveness on the learning achievements in Physical Education. The studies show a null or a very reduced relation between the type of feedback and the learning achievements (Eghan, 1988; Graham, Soares & Krampitz, 1992; Yerg & Twardy, 1982). Even so, it has been proved that the most effective teachers improve the academic learning time by sending more specific, corrective and congruent feedbacks with the learning task (DeKnop, 1986; Markland y Martinek, 1988; Piéron, 1981, 1982; Werner y Rink, 1989). The role of the PF has been highlighted in Motor Learning area being responsible for the motivation and persistency exhibited by the students and athletes during the practice (Chen, 2001; Magill, 2001; Williams & Hodges, 2005).

In Sport Pedagogy, both in Physical education and training, the PF has been studied from a multidimensional analysis perspective, underlining the following dimensions: objective, form, direction, referential and content (Gilbert, Trudel, Gaumont y Larocque, 1999; Mesquita, Rosado, Barroja y Januário, 2008; Mesquita, Farias, Oliveira y Pereira, 2009; Rosado, Mesquita, Breia, & Januário, 2008; Swinnen, 1996).

The study of the content of PF has a privileged position in the investigation. Its importance comes from the relevance given by Shulman (1986) to the knowledge that is originated by the combination of the teaching matters with the instructional strategies that supports it, named by the author as *pedagogical knowledge content*. Its relevance in the Physical Education and Sport is unquestionable. This concept has been extended to research of the conceptions and knowledge of the teacher/ coach (Macedo, Mesquita & Graça 2003; Afonso; Graça & Mesquita, 2003; Valmor, Graça & Juarez, 2008) and to the pedagogical intervention of the session/ training and competition (Gilbert et al., 1999; Mesquita et al., 2009).

In Team Sports (TS), where we can include Volleyball, the study of the information emitted by the coach related to the training contents (Botelho, Mesquita y Moreno, 2005; Gilbert et al, 1999; Hastie, 1999; Mesquita et al., 2009) assumes great importance. The multidimensional nature of the technical skills in TS, are the most important. Here Rink (1993) considers three

dimensions: a) *efficiency*, i.e, making a certain movement according to pre-established motor patterns; b) *effectiveness*, which concerns the final result; and c) *adaptation* that is related to the adjustment and the opportune use of skills (Rink, 1993). The nature of the PF content according to its reference also assumes a particular interest in the TS study. Traditionally, this study distinguishes two types of knowledge, the *performance knowledge* (PK) and the *result knowledge* (RK) (Clark, 2005). The first is related to the information provided about the movement pattern or the strategic use of abilities, implicating the *effectiveness* and *adaptation* dimensions. The second refers to the information about the result of a certain motor action, that is, the *efficiency* obtained.

In Motor Learning research, the recognition of the RK in the learning process was confirmed since the first studies (Adams, 1971; Schmidt, 1975). Those indicated that without its transmission the performance could be alienated from the pretended objectives. In fact, until the mid seventies, appealing to RK, more particularly its precision and frequency, showed to be advantageous in the learning effects. Even so, this was due to the no-utilization of the retention and transfer tests, not evaluating the permanent effects of learning (Tertuliano et al., 2007). Studies that value the RK effect in the learning process revealed that the learning effects were the same even with less employment of feedbacks centred on it (Ugrinowitsh et al. 2003; Tani, Feudenheim, Júnior, & Corrêa, 2005; Weeks & Kordus, 1998). These conclusions contradict the first studies made, showing that the excessive use of RK diminishes the performance stabilization by inhibiting the intrinsic feedback (sensorial information, which objective is to help the development of the representation memory. Adams, 1971, Schmidt, 1975), responsible for the improvement of the capability to detect and correct errors (Goodwin y Meeuwsen, 1995; Weeks & Kordus, 1998; Wulf & Shea, 2004). Furthermore, it is important to clarify that the task characteristics and the quantity of information to optimize the learning information are not independent (Tertuliano et al., 2007). Thereby, in tasks where the interference of both partners and opponents conditions the actions (characteristic that defines the TS), the RK assumes a particular importance (Carnaham et al., 1996). At the same time the PK is pertinent on the skill, which does not allow the student/athlete to see the movement during its execution. The information is only captured by a sensorial level and completed by extrinsic information. Also, PK is relevant in skills where the pretended outcome is obvious and the motor execution is decisive (Magill, 1994). PK's pedagogical value is stronger in the initial learning phases by revealing the inherent elements of the execution model (Schmidt, 1999) and by increasing the indication of the cognitive context of the task (Lee at al., 1994). These studies were carried out under laboratory condition and they shouldn't be lineally replicated on the field. However it may serve as reference for the coach/teacher to implement and structure the learning process.

The investigation show that the way PF it is transmitted always had great importance, both in Sport Pedagogy (Rosado et al., 2008; Mesquita et al., 2008) as in Motor Learning (Chiviawosky & Tani, 1993; Wrisberg & Wulf, 1997).

However the analysis of the content has been poorly investigated, emerging the need to know if by the implemented referential, the information becomes more understandable. In fact, the coach is able to appeal combine forms transmitting the information to make the communication more effective and explicit (ex: Kinaesthetic visual; visual, audition, etc.). This combined presentation may be more advantageous to the student/athlete, since the message is received in different forms, increasing the possibility to solve some comprehension problems (Mesquita et al., 2009; Williams y Hodges, 2005).

On this conceptual position, this study is centred in the following questions: There is a relationship between the PF form and its referential? The PF form and its referential determine the nature of the content?

Our study objective consists on the analysis of the coach Pedagogical Feedback (PF), namely the informative content, the referential and the way it is emitted in training sessions of young Volleyball. Specifically it is pretended: (1) to characterize the coach PF, the content information, the referential and the way the PF is emitted in training sessions of youth Volleyball; (2) analyse the nature of the relationship between the way the PF is emitted and its referential; (3) verify the predictor effect of the *form* and *referential* of PF in the information content emitted by the coach.

METHODS

Subjects

Twenty eight coaches of young Volleyball teams participated in this study. The coaches belonged to Oporto Volleyball Association, certified by the Portuguese Federation of Volleyball. The average of the coaches ages were 29.1 years with a 7.9 years mean of professional experience. Twenty eight sessions of training were observed, 1 by each coach, which represented a total of 2430 minutes. Eighty seven minutes for training and 7460 instruction units were observed, which corresponded a mean value of 226 transmissions per session, with a rate of 3 PF per minute.

Instrument of observation and variables

In order to describe the information transmitted by the coaches during the PF episodes we used a systematic observation instrument during the training sessions.

Two strategies were used to develop categories for the instrument, while fulfilling the requirements for content and construct validity. First, was conducted a literature review to explore possible categories already applied in other studies. Secondly, validity was accessed by expert validation, 3 experts evaluated whether the categories, considered in each dimension, represented the total possibilities of those instructional periods.

Since in literature there weren't available any observation instrument that covered all problems and objectives of the present study, we lead the construction and validation of a new instrument based on the theoretical and methodological references described in literature. Thereby, the dimensions related to the PF content was founded on the instrument developed by Gilbert et al. (1999) *The Systematic Analysis of Pedagogical Content Interventions (SAPCI)* adapted to Volleyball; For the *referential* dimension we recurred to the classification of Adams (1971) and Schmidt (1988), which had been adapted to the nature of TS (Rink, 1993); and for the *form* we used the classification of Mesquita et al. (2008).

The expertise method was used to validate the content. Each expert was given a list of categories and samples of the training of young Volleyball teams to check if the dimensions and categories of the instrument responded to the assumptions of exclusivity and exhaustiveness. The percentage of agreement between experts reached 95.3%, meaning a strong consistency. The observation system is presented on Table 1.

Table 1: Observation system categories of the content, referential and the PF form.

<i>A. Substantial content of PF</i>
A.1. Technique: information emitted by the coach related to the fundamentals and techniques variables.
A.2. Individual Tactic: Information emitted by the coach related to the tactical actions, that relates with every player individually.
A.3. Team Tactics: Information emitted by the coach related to the group actions, according to the principles and the game rules.
A.4 Physical and rules: Information emitted by the coach related to the physical performance or the game rules.
A.5 Undefined Information: Information emitted by the coach without particular reference to any specific content of Volleyball.
<i>B. PF referential:</i>
B.1. Performance Knowledge (PK): Information emitted by the coach related to the correct execution of the skills/ actions (efficiency) as its strategic utilization (adaptation).
B.2. Result Knowledge (RK): Information emitted by the coach related to the result to achieve (effectiveness) that may be established in form of time, repetitions and points.
B.3. No Criteria (NC): Information emitted by the coach without referring to any substantial content in particular.
<i>C. PF Form:</i>
C.1. Verbal (Ve): Information emitted by the coach in an exclusively verbal manner.
C.2. Visual (Vi): Information emitted by the coach in a non-verbal manner, trough gestures or facial expressions, that can be approval, disapproval or demonstration
C.3. Kinaesthetic (K): Information emitted by the coach by the contact or body manipulation of the student/ athlete.
C.4. Verbal-Visual (VV): Information emitted by the coach combining the gestural and verbal form.
C.5. Verbal-Kinaesthetic (VK): Information emitted by the coach combining the verbal form and the body manipulation of the athlete.
C.6. Verbal-Visual-Kinaesthetic (VVK): Information emitted by the coach combining all the forms of PF.

Data collection

With the intention of confirm their availability we made a previous contact with the coaches, were we explain the study objectives, standing out its non-evaluative character. The anonymity and confidentiality were also guaranteed, as the non-utilization of the information collected in an abusive way.

The observed trainings were strategically selected, highlighting the central part of the practice, so that every team could be in the same competitive moment of the season. With this criterion we pretended to homogenous the characteristics of the observed training (Potrac et al., 2007) in relation to its position in the weekly micro-cycle. We analyse the principal part of the training, excluding the initial (warm up) and the final part of it (return to calm). That way we focused on the learning contents (Siedentop, 1991) in tasks oriented to the training session objectives.

To record the trainings in its natural context we used a video camera system Samsung digital-cam VP-D903iPAL, and a wireless microphone of great range Fonestar MSH-135 placed in the coaches for the registration of the instructions made by each one of them. The camera was placed strategically in the gym to obtain the best record angle. Previously trainings were leaded so the best position of the camera was found to observe the study variables.

Data analysis

A descriptive analysis, tendency and dispersion measures (average and standard derivation), frequency and percentage of occurrences were done to analyse the PF.

We resorted to the correlation of Pearson to verify the correlation between the emission forms of PF and its referential assuming the values suggested by Gageiro & Pestana (2005) (up to ± 0.2 very low association; between ± 0.2 and ± 0.39 low association; between ± 0.4 and ± 0.69 moderated; between ± 0.7 and ± 0.89 high association, and superior to ± 0.9 very high association).

We recurred to the multiple regressions to verify if the *referential* and the emission *form* of PF (independent variables) determine its content (dependent variable). The *enter* method was utilized to include the variables.

For its application we verified the collinearly diagnose, with the tolerance values situated between 0.041 and 0.608, according to the reference values indicated by Pestana & Gageiro (2005).

We utilized the non-standardized coefficients instead of the standardized to present the results, since all the variables are in the same measure scale.

We used the values of the semiparcials correlations to verify the predict effect that the independent variables had over the dependable ones. For the purposes of interpretation and analysis of the results, we assumed the value of 0.05 for the confidence level.

Reliability

To assure the objectivity of the results, we performed an inter and intra-observers' analysis for every categories of the observation instrument. Three coaches were observed (a training session for each one) in a total of 1280 interventions (17.2%), value that considerably overcomes the 10% of the total sample that is the minimal required (Tabachnick y Fidell, 1989).

Cohen's Kappa was also calculated to eliminate the agreement by chance, placing the values for the agreement of Intra-observer consistency ranged from 0.97 to 1, and the inter-observer consistency ranged from 0.96 to 1. The results of the reliability shows that the data provided by this study may be utilized as a scientific tool.

RESULTS

The Table 2 shows the descriptive results of the PF *referential* and the PF *form*. The coaches emitted with more frequency information related to the PK (45.5%), followed by non-criteria information (NCI) (39.0). Less expressive was the PF related to RK with only 15.5% of the occurrences.

Table 2: Descriptive results of the *form* and *referential* of the PF

PF referential				
PK	3393	45.5%	121.14±53.65	1.40 min
RK	1156	15.5%	41.29±35.90	0.48 min
NCI	2911	39.0%	104.43±54.06	1.20 min
Total	7460	100.0%		3.07 min
PF form				
Verbal (Ve)	6500	87.1%	229.93±100.26	2.67 min
Verbal-Visual (VV)	915	12.3%	32.68±24.41	0.38 min
Verbal-Kinaesthetic (VK)	24	0.32%	0.89±1.89	0.0099 min
VVK	21	0.28%	0.71±1.27	0.0086 min
Total	7460	100.0%		3.07 min

The information presented shows that the Verbal information (Ve) was elected by the coaches to be the preferential way to transmit the information (87.1%). The combination Verbal and Visual (VV) almost completed the remaining communication (12.3%), the combination Verbal and Kinaesthetic (VK) or Visual Kinaesthetic (VVK) only registered 0.32% and 0.28%, respectively. Coaches do not implement the Visual form (Vi) and the Kinaesthetic (K) one in any situation, reason why it does not appear represented in the table. It can be stated that the PF rate per minute was 3.07, mostly regarding to feedback centred in PK (1.40/min.), so Ve (2.67/min).

The correlation between the emission *form* and PF *referential* showed a positive correlation. The analysis of each *referential*, showed that PK presented a positive and high correlation, both in Ve and VV form ($r=.838$; $p=0.000$ y $r=.839$; $p=0.000$, respectively). RK presented a high correlation with the Ve form ($r=.784$; $p=0.000$) and a low correlation with the VV form ($r=.335$; $p=0.000$). Regarding the NCI referential, the highest correlation emerged with the Ve form of PF emission ($r=.931$; $p=0.000$) showing a moderate correlation with the VV combined form ($r=.472$; $p=0.000$).

Table 3 presents the relation between the PF referential variables and its content. The tested model was significant ($r^2=0.881$; $p<0.001$), revealing that the higher level of PK explained the variance of 88.1% of the technical information over the RK referential. The NCI referential did not show any predictive power.

Table 3: Relation between the PF referential and the emitted information content

	No standardized correlation		Semiparcial correlation	t	Sig.
	B	Std. Error			
Technique					
(Constant)	1.188	.518		2.295	.023
PK	.755	.030	.588	25.231	.000
RK	.195	.050	.090	3.880	.000
NCI	.051	.031	.038	1.647	.101
Individual tactics					
(Constant)	-.725	.362		-2.004	.046
PK	.199	.021	.317	9.518	.000
RK	.206	.035	.195	5.864	.000
NCI	.131	.022	.203	6.078	.000
Team tactics					
(Constant)	-.977	.341		-2.865	.005
PK	.028	.020	.062	1.440	.151
RK	.339	.033	.441	10.269	.000
NCI	.067	.020	.142	3.300	.001
Information Without Content					
(Constant)	.234	.622		.591	.555
PK	.023	.023	.018	1.018	.310
RK	.233	.038	.110	6.058	.000
NCI	.741	.024	.567	31.316	.000

The tested model for the information content of the individual tactics showed to be significant ($r^2=0.756$; $p<0.001$), where the predictive power is confirmed in all the model variables. The global value was 75.6% of variance explained. The same happened with the model tested for the team tactics content information, ($r^2=0.599$; $p<0.001$). The RK and NCI referential explained 59.4% of the variance with a higher level of RK over NCI (Table 3). Finally, the tested model for undefined information showed to be significant ($r^2=0.928$; $p=0.000$), with a 92.8% of explained variance. The PK referential was the only without any predictive power ($p=0.310$) and the NCI showed a superior value than RK.

Table 4 presents the relation between the two variables of the PF *form* (verbal and verbal-visual) and the content of the emitted information.

Table 4: Relation between the PF form and the content of the emitted information.

	No standardized correlation		Semiparcial Correlation	t	Sig.
	B	Std. Error			
Technique					
(Constant)	2.116	.594		3.560	.023
Verbal	.267	.015	.485	17.875	.000
Verbal-Visual	1.087	.080	.368	13.568	.000
Individual tactics					
(Constant)	-.646	.363		-1.780	.076
Verbal	.171	.009	.636	18.785	.000
Verbal-Visual	.183	.049	.127	3.738	.000
Team tactics					
(Constant)	-1.224	.364		-3.360	.001
Verbal	.127	.009	.664	13.828	.000
Verbal-Visual	-.093	.049	-.088	-1.884	.061
Information without content					
(Constant)	-.456	.545		-8.838	.403
Verbal	.433	.014	.797	31.594	.000
Verbal-Visual	-.167	.073	-.153	-2.279	.024

The model tested for the technical information was significant ($r^2=0.838$; $p<0.001$), explaining the 83.8% of the variance. Ve and VV showed the same predictive power (Table 4). The regression model tested to the tactical information, also proved to be significant ($r^2=0.747$; $p<0.001$). Both of the variables included in the model explained 74.7% of variance. The higher predictive power comes from the Ve form in comparison to the VV form (Table 4). The PF form explained the 52.2% variance of the team tactics information ($r^2=0.522$; $p<0.001$). The combined form of PF (VV) did not show any predictive power; therefore only Ve form determined the team tactics information.

The model that involves the relation between the undefined information and the emission form of PF proved to be significant ($r^2=0.860$; $p=0.000$). The undefined information showed 86.0% of variance, determined by the categories of PF form (Ve and VV) (Table 4).

Discussion

The main objective of this study was to characterize the coach PF in training sessions of youth volleyball, according to its referential and the form that the information was emitted. Coaches emitted more PF oriented by the PK than the

RK, valorising the process of the action performance, concerning to its strategic use and/ or the nature of the execution pattern. The technical issues of Volleyball may justify the biggest reference to PK by the coaches. Volleyball is a sport that requires a minimal level of ball control so it could be maintained in the air, which is indispensable for the game actions organization (Mesquita, 2006). French et al. (1996) reinforce that the technical level of the player may limit the tactical options during the game, which means that the domain of the minimal requirements of execution are necessary, so the teaching of the technique and the tactic can be integrated in a combined way (Rink et al., 1996). Mesquita (2008) emphasize the importance of the information centred on the technical execution, considering that the acquisition of the technical fundamentals should be made without errors in a formation level; however the author warns that the excessive preoccupation and utilization of those assumptions may cause a deviated learning, outside the game constraints. In our study it was shown a reduced employment of the PF centred in RK, what makes it surprising attending to the nature of the TS, where the result conditioned the success of the game actions (Carnahn, Hall y Lee, 1996). Also Rink (1985) indicates that the RK may be particularly motivating and positive for the young student/ athlete, as far as it provides an immediate knowledge about the objectives. Nevertheless the excessive use of that form can inhibit the intrinsic PF, which is fundamental for the development of the capabilities of error detection and correction (Wulf y Shea, 2004). Plus, the reduced utilization of PK, in technical skills performed in conditions without the direct interference of the opponent, as the under hand serve in Volleyball, did not show to be prejudicial to learning (Tertuliano et al. 2007).

Notwithstanding both the emission of PK and RK shouldn't be excessive. The student/ athlete should use the intrinsic feedback and consequentially provide a greater solicitation of the cognitive process, diminishing the need and dependence of the extrinsic feedback (Chambers y Vickers, 2006; Tertuliano et al., 2007). Chambers and Vickers (2006) reinforce the importance of diminishing the emission of the extrinsic feedback, with the aim of increasing the student/ athlete responsibility, since it obligates them to modify their behaviours by the need of self-regulation.

In this study the coaches revealed to be less centred in the training content, what shows their tendency to be generalists. These results are explained by high utilization of the *no criteria referential* (NC). These results are consistent with the ones obtained by Trudel & Brunelle (1985), in ice hockey, and Lima et al., (2007), in Volleyball training. Opposing to these results are the ones obtained by Cushion y Jones (2001) with expert coaches, where the specific information prevailed over the general. As Boyce (1991) adverts, the information without content does not contribute to the improvement of performance and ends up deviating the student/ athlete attention.

The coaches in this study opted to use, almost exclusively, the verbal form to emit the PF. This preference had been confirmed by others studies (Mesquita et al., 2008; Rosado et al., 2008). As the motor performance usually depends on

the quality of the demonstrations, because they offer a visual reference (McCullagh, Stiehl, y Weiss, 1990; Weiss, Ebbeck y Rose, 1992; Freedman, 2000), the reduced employment of the visual form, combined with the verbal, may be an indicator of some pedagogical ineffectiveness of the coaches. Different authors as Kwak (2005), and Williams & Hodge (2005), indicate that the resource to instructional strategies responsible for increasing comprehension and contextualization of the motor actions, standing out the demonstration, are essentials to the optimization of the learning process.

Regarding to the emission rate of PF, the values that we obtained were not different from those of others studies (Mesquita, 1998; Piéron & Delmelle, 1982). It is important to highlight the perspective of Williams & Hodges (2005), that indicates that in one initial phase the superior rate of PF emission are justified. However coaches seem to diminish the PF emission as the student/athlete increase their performance with the intention to trigger the intern mechanism of perception and self-correction.

In relation to the second purpose of our study, the present study shows the existence of a significant correlation between the emission *form* of PF and its *referential*, where the *Ve form* presented the highest correlations with all PF referential. That correlation was predictable since this PF form it is the most utilized by the coaches. The combined form VV also showed a correlation with all PF referential, establishing the highest correlation with the referential PK. When we are referring to PK, it is important that coaches use demonstrations in the learning process so that the student/athletes get a correct representation of the execution model or if that's the case, an error representation (Dardan, 1997; Rink, 1994; Williams y Hodges, 2005). Authors like Magill (2001), and Magill & Schoenfelder-Zohdi (1996) demonstrate that both the visual and the verbal forms allow the development of a memory representation of a motor skill that can be translated in learning improvement. In the present study, even with less expression, the RK and the VV are also correlated. Ford et al. (2006) when studied the importance of the visual information and the emission of RK in the execution of a motor skill discovered that the visual information affected the performance of the sportsman, therefore representing a great value.

Another objective of our study was to investigate if the emission form of PF and its referential can determine the nature of the content information transmitted by the coach. The information of technical content was determined by the referential oriented to the PK and the RK, where the NC was excluded. However, the greatest explanatory power obtained by the referential oriented to the PK in the transmission of the technical content information is proved by others studies. They showed importance in the particular learning of the some skills (Zubiaur et al., 1999). In fact the solicitation of PK assumes a particular importance in the acquisition phase of a new ability (Schmidt, 1991), where the elementary factors of the technical execution are fundamental.

In relation to the content of the tactical information (individual and collective), the RK presented the biggest predictive power. When the coach emitted

information centred in RK, the focus of the activity changed from its execution to be centred in the result of the action, i.e., the accomplishing of an external objective (Rink, 1993; Mesquita, 2005; Carnahan et al., 1996). Being the RK the information about the result (product) of a motor response in a specific context (Magill, 2001), its contribution it is particularly advantageous in tasks where the actions depends on the colleagues and adversaries intervention, commonly subordinated to a more tactical than technical character. This can be the starting point to justify the fact that the PK isn't a predictor of the team tactical information. Nevertheless, in TS, the instruction process would be more advantageous with the employment of both the PK and the RK, since the content is centred on the correct execution of an skill (technical) in its strategic use (individual tactics) or in the configuration of the system game (team tactics) and should be sustained by explicit information, not only related to the pretended result but also to its achieving process.

Another aspect that is important to stand out in this study is that the PK alone does not determine the *undefined information*, as the NC was not a predictor of the *technical information*. That suggests that the coaches are more specific when the information content is technical and oriented to the PK. Contrarily, the referential centred in RK shows predictive power of the undefined information. The motivational characteristics of RK may be the cause of it. The coaches use verbal interventions without content to stimulate the student/ athlete to focus their attention on the task (Boyce, 1991; Mesquita, 1998).

It is important to highlight that the emission form of PF determined the nature of the content transmitted by the coach. The present study reinforces the preference of the Ve form, despite the information content transmitted by the coach. The combined form VV does not determine the information of the team tactic what suggests that when coaches transmit information about the functional relations of the players in the game system, they do not use demonstrations; this may be a gap because from this comprehension results the effective interpretation of the team tactic. As indicated by the following authors (Mesquita et al., 2008; Rosado, Mesquita, Breia & Januário, 2008; Williams e Hodges, 2005) the PF emission in the combined form allows the resolution of certain misunderstandings about the game actions.

CONCLUSIONS

The present study emphasized the higher prevalence of PF centred in PK and the reduced solicitation of instructional strategies that enhance the comprehension of the information, as the visual demonstrations. Moreover it was verified that the PF centred in the RK and in the NC were conveyed mainly by Ve form. Meanwhile PF centred in the PK was conveyed by Ve and VV.

The present study demonstrated that the PF was conveyed as its referential determined the content nature of the information emitted by the coach. Coaches prioritized the use of PK for the technical information, while the RK was

preferentially used for the tactical information. For PF related with the team tactic information, coaches did not select the combined form (VV) to transmit the information. In the remains content it was shown the resource of both emission forms (Ve and VV).

By considering the PF as an instructional strategy of high pedagogic relevance, the present research reaffirm the scientific pertinence of applying research in practice field during an extensive time in order to examine and understand the instructional strategies used taking into account the particularities of coaching. Therefore future research should use qualitative analysis to access the specific coaching constrains.

REFERENCIAS BIBLIOGRÁFICAS

- Adams, J.A. (1971). A closed-loop theory of motor learning. *Journal of Motor Behaviour*, 3, 111-149.
- Afonso, C., Graça, A., y Mesquita, I. (2003). O conhecimento do treinador a respeito das metodologias de ensino e treino do voleibol na formação. In I. Mesquita, C. Moutinho & R. Faria (Eds.), *Investigação em Voleibol-Estudos Ibéricos* (pp. 22-31). Porto: Faculdade de Ciências do Desporto e Educação Física.
- Botelho, S., Mesquita, I., y Moreno, M.P. (2005). A intervenção verbal do treinador de Voleibol na competição. Estudo comparativo entre equipas masculinas e femininas dos escalões de formação. *Portuguese Journal of Sport Sciences*, 5(2), 174-183.
- Boyce, A. (1991). The effects of an instructional strategy with two schedules of augmented KP feedback upon skill acquisition of a selected shooting task. *Journal of Teaching in Physical Education*, 11, 47-58.
- Carnahn, H., Hall, C., y Lee, T.D. (1996). Delayed Visual Feedback While Learning to Track a Moving Target. *Research Quarterly for Exercise and Sport*, 67(4), 416-423.
- Chambers, K.L., y Vickers, J.N. (2006). Effects of bandwidth feedback and questioning on the performance of competitive swimmers. *Sport Psychologist*, 20, 184-197.
- Chen, D. (2001). Trends in augmented feedback research and tips for the practioner. *JOPERD: The Journal of Physical Education Recreation & Dance*, 72(1), 32-36.
- Chiviawowsky, S., y Tani, G. (1993). Efeitos da frequência co conhecimento do resultados na aprendizagem de uma habilidade motora em crianças. *Revista Paulista de Educação Física*, 7(1), 45-57.
- Clark, S. C. (2005). Frequência de Conhecimento de Resultados e Aprendizagem Motora: Linhas Atuais de Pesquisa e Perspectivas. In Go Tani (Ed.), *Comportamento Motor- Aprendizagem e Desenvolvimento* (pp. 185-207). São Paulo: Editora Guanabara Koogan.
- Cushion, C.J., y Jones, R.L. (2001). A Systematic Observation of Professional Top-level Youth Soccer Coaches. *Journal of Sport Behavior*, 24(4), 354-378.
- Dardan, G.F. (1997). Demonstrating motor skills – rethinking that expert demonstration. *JOPERD: The Journal of Physical Education Recreation & Dance*, 68(6), 31-35.
- DeKnop, P. (1986). Relationship of specified instructional teacher behaviours to student gain on Tennis. *Journal of Teaching Physical Education*, 5, 71-78
- Eghan, T. (1988). The relation of teacher feedback to student achievement in learning selected tennis skill. Louisiana State University: Baton Rouge.
- Fishman, S.E., y Anderson, W.G. (1971). Developing a System for Describing Teaching. *Quest*, 15(1):9-16.
- Fishman, S., y Tobey, S. (1978). Augmented feedback. In Anderson, W. & G. Barrette (Eds.), *What's Going on in Gym: Descriptive Studies of Physical*

Education Classes. Monograph 1 (pp. 51-62). Newton, CT: Motor Skills: Theory into Practice.

Ford, P., Hodges, N.J., Huys, R., y Williams, A.M. (2006). The Role of External Actions-Effects in the Execution of a Soccer Kick: A Comparison Across Skill Level. *Motor Control*, 10(4), 386-404.

Freedman, M.P. (2000). Using effective demonstration for motivation. *Science and Children*, 38(1), 52-55.

French, K., Werner, P., Rink, J., Taylor, K., y Hussey, K. (1996). The effects of a 3-week unit of tactical, skill, or combined tactical and skill instruction on badminton performance of ninth-grade students. *Journal of Teaching in Physical Education*, 15(4), 418-438.

Gilbert, W., Trudel, P., Gaumont, S., y Larocque, L. (1999). Development and Application of an Instrument to Analyse Pedagogical Content Interventions of Ice Hockey Coaches. *SOSOL: Sociology of Sport Online*. 2(2).

Goodwin, J.E., y Meeuwse, H.J. (1995). Using bandwidth knowledge of results to alter relative frequencies during motor skill acquisition. *Research Quarterly for Exercise and Sport*, 66, 99-104.

Graça, A., y Mesquita, I. (2002). A investigação sobre o ensino dos jogos desportivos: Ensinar e aprender as habilidades básicas do jogo. *Revista Portuguesa de Ciências do Desporto*, 2(5), 67:79.

Graham, G., Soares, P., y Harrington, W. (1983). Experienced teachers' effectiveness with intact classes: Na ETU study. *Journal of Teaching in Physical Education*, 2(2), 3-14.

Hastie, P. (1999). An Ecological Perspective on Physical Education. *European Physical Education Review*, 5(1), 9-29.

Kwak, E.C. (2005). The immediate effects Various Task presentation types on Middle School Students' Skill Learning. *International Journal of Applied Sports Sciences*, 17 (1), 7-17.

Lee, T.D., Swinnwn, S.P., y Serrien, D.J. (1994). Cognitive effort and motor learning. *Quest*, 46, 328-344.

Lima, A., Mesquita, I., y Pereira, F. (2007). Análise da informação transmitida pelo treinador, no treino em voleibol. In *Actas do 1º congresso Internacional de Jogos Desportivos – Olhares e contextos da performance. Da iniciação ao Rendimento*. Porto: Centro de estudos de jogos desportivos, Faculdade de Desporto, Universidade do Porto [CD-ROM].

Macedo, J., Mesquita, I., y Graça, A. (2003). Concepções e metodologias do ensino do Voleibol-Estudo aplicado em treinadores de do escalão de juvenis feminino. In I. Mesquita, C. Moutinho & R. Faria (Eds.), *Investigação em Voleibol-Estudos Ibéricos* (pp. 32-40). Faculdade de Ciências do Desporto e Educação Física: Porto.

Magill, R. (1994). The influence of augmented feedback during skill learning depends on characteristics of the skill and the learner. *Quest*, 46, 314-327.

Magill, R. (2001). The effect of augmented feedback on skill learning. In R. Magill (Ed.), *Motor Learning Concepts and Applications* (6ª ed., pp. 235-245). New York: The McGraw-Hill Companies, Inc.

- Magill, R.A., y Schoenfelder-Zohdi, B. (1996). A visual model and knowledge of performance as sources of information for learning a rhythmic gymnastic skill. *International Journal of Sport Psychology*, 27, 7-22.
- Markland, R., y Martinek, T.J. (1988). Descriptive analysis of coach augmented feedback given to high school varsity female volleyball players. *Journal of Teaching in Physical Education*, 7, 289-301.
- McCullagh, P., y Caird, J.K. (1990). Correct learning models and use of knowledge of results in the acquisition and retention of a motor skill. *Journal of Human Movement Studies*, 18, 107-116.
- Mesquita, I. (1998). *A instrução e a estruturação das tarefas no treino de Voleibol: estudo experimental no escalão de iniciados feminino*. Porto: FCDEF-UP. Doctoral Thesis presented to Faculty of Sport Sciences and Physical Education, of University of Porto.
- Mesquita, I. (2005). A contextualização do treino no Voleibol: a contribuição do construtivismo. In D. Araújo (Ed.), *O contexto da decisão táctica. A acção táctica no desporto* (pp. 355-378). Lisboa: Visão e Contextos.
- Mesquita, I. (2006). Ensinar bem para aprender melhor o jogo de voleibol. In G. Tani, J.O. Bento e R. Peterson (eds.), *Pedagogia do Desporto* (pp. 327-344). Rio de Janeiro: Editora Guanabara Koogan.
- Mesquita, I. (2008). A magnitude adaptativa da técnica nos jogos desportivos. Fundamentos para o treino. In F. Tavares, A. Graça, J. Garganta e I. Mesquita (eds.), *Olhares e contextos da performance nos jogos desportivos* (pp. 93-107). Porto: Faculdade de Desporto, Universidade do Porto.
- Mesquita, I., Farias, C., Oliveira, G., y Pereira, F. (2009). A intervenção pedagógica, sobre o conteúdo, do treinador de Futebol. *Revista Brasileira de Educação Física e Esporte*, 23(1) (in press).
- Mesquita, I.; Rosado, A., y Januário (2008). Athlete's retention of a coach's instruction before a judo competition. *Journal of Sports Science and Medicine*, 7(3), 402-407.
- Metzler, M. (1989). A review of research on time in sport pedagogy. *Journal of Teaching in Physical Education*, 8(2), 87-103.
- Pellet, T. L., y Harrison, J. M. (1995). The influence of a Teacher's Specific, Cognate, and Corrective Feedback on Female Junior High School Students' Immediate Volleyball Practice Success. *Journal of Teaching in Physical Education*, 15, 53-63.
- Pestana, M., y Gageiro, G. (2005). *Análise de Dados para Ciências Sociais-A Complementaridade do SPSS*. Lisboa: Edições Sílabo.
- Piéron, M. (1986). Recherche en Enseignement des Activités Physiques: Méthodologie Utilisée à l'Université de Liège. In M. L.Pare, M. Lirette & M. Piéron (Eds.), *Méthodologie de la Recherche en Enseignement de l'Activité Physique et Sportive* (pp. 93-111). Québec : Université du Québec.
- Piéron, M. (1981). Research on teacher change: effectiveness of teaching a psychomotor task study in a micro-teaching setting. Paper presented at the *American Alliance for Health, Physical Education, Recreation, and Dance*. National Convention, Boston.
- Piéron, M. (1992). Reactions a la prestation (Rétroactions - feedback). In *Pédagogie des activités physiques et du sport*. Paris: Revue EPS.

- Piéron, M., y Delmelle, R. (1982). Augmented Feed-Back in Teaching Physical Education: Responses from the Athletes. In M. Piéron & J. Cheffers (Eds.), *Studying the Teacher in Physical Education* (pp. 141-150). Liège: Université de Liège.
- Potrac, P., Jones, R., y Cushion, C. (2007). Understanding power and the coach's role in professional English soccer: A preliminary investigation of coach behaviour. *Soccer e Society*, 8, 33-49.
- Rink, J. (1993). *Teaching physical education for learning*. 2nd edition. Mosby, St. Louis.
- Rink, J. (1994). The Task Presentation in Pedagogy. *Quest*, 46, 270-280.
- Rink, J., Frensh, K., y Tjeedsma, B.L. (1996). Foundations for the learning and instruction of sport and games. *Journal of Teaching in Physical Education*, 15, 399-417.
- Rosado, A., Mesquita, I., Januário, N., y Breia, E. (2008). Athlete's Retention of Coach's Instruction on Task Presentation and Feedback. *International Journal of Performance Analysis in Sport*, 8(1), 19-30.
- Schmidt, R.A. (1975). A schema theory of discrete motor skill learning. *Psychological Review*, 82, 225-260.
- Schmidt, R.A. (1988). *Motor control and learning* (2nd ed.). Champaign, IL: Human Kinetis.
- Schmidt, R.A. (1991). Frequent augmented feedback can degrade learning: evidence and interpretations. In J. Requin & G.E. Stelmach (Eds.), *Tutorials in motor neuroscience* (pp. 59-75). Amsterdam: Kluwer Academic.
- Shulman, L. (1986). Those who understand: Knowledge growth in teaching. *Educational researcher*, 15, 4-14.
- Siedentop, D. (1991). *Developing teaching skills in physical education* (3rd ed.). Mountain View, CA: Mayfield.
- Swinnen, S.P. (1996). Information feedback for motor skill learning: a review. In H.N. Zelaznik (Ed.), *Advances in Motor Learning and Control* (pp. 37-66). Champaign, IL: Human Kinetics.
- Tabachnick, B. G., y Fidell, L. S. (2000). *Using multivariate statistics*. 4th ed. edition. Boston, MA: Allyn and Bacon.
- Tani, G., Feudenheim, A.M., Júnior, C.M.M., y Corrêa, U.C. (2005). Aprendizagem Morora: Tendências, Perspectivas e Aplicações. *Revista Paulista de Educação Física*, 18, 55-72.
- Tertuliano, I., Ugrinowitsch, A., y Corrêa, U. (2007). Efeitos da frequência de feedback na aprendizagem do saque no voleibol. *Revista Portuguesa de Ciências do Desporto*, 7(3), 328-335.
- Trudel, P., y Brunelle, J. (1985). Les situations d'apprentissage offerts aux joueurs inscrites dans des liges de hockey mineur. L'Association Canadienne pour la Santé: *L'Education Physique et le Loisir*, 51, 18-25.
- Ugrinowitsh, H., Tertuliano, I.W., Coca, A.A., Pereira, F.A.Z., y Gimenez, R. (2003). Frequência de feedback como um fator de incerteza na aprendizagem de uma tarefa de preensão. *Revista Brasileira de Ciência e Movimento*, 11, 41-47.

- Valmor, R., Graça, A., y Nascimento, J. (2008). O conhecimento Pedagógica do Conteúdo: Estrutura e implicações para a formação em Educação Física. *Revista Brasileira de Educação Física e Esportes*, 22(2), 161-171.
- Weeks, D.L., y Kordus, R.N. (1998). Relative frequency of knowledge of performance and motor skill learning. *Research Quarterly for Exercise and Sport*, 69, 224-230.
- Weiss, M.R., Ebbeck, V., y Rose, D.J. (1992). "Show and tell" in the gymnasium revisited: Developmental differences in modeling and verbal rehearsal effects on motor skills learning and performance. *Research Quarterly for Exercise and Sport*, 61(4), 344-350.
- Werner, P., y Rink, J. (1989). Case studies of teacher effectiveness in second grade physical education. *Journal of Teaching Physical Education*, 8, 280-297.
- Williams, A. M., y Hodges, N. (2005). Practice, instruction and skill acquisition in soccer: Challenging tradition. *Journal of Sports Sciences*, 23(6), 637-650.
- Wrisberg, C.A., y Wulf, G. (1997). Diminishing the effects of reduced frequency of knowledge of results on generalized motor program learning. *Journal of Motor Behavior*, 29, 17-26.
- Wulf, G., y Shea, C.H. (2004). Understanding the role of augmented feedback. In A.M. Williams & N.J. Hodges (Eds.), *Skill Acquisition in Sport: Research, Theory and Practice* (pp. 121-144). New York: Routledge.
- Yerg, B., y Twardy, B. (1982). Relationship of Specified Instructional Teachers Behaviours to Pupil Gain on a Motor Skill Task. In M. Piéron & J. Cheffers (Eds.). *Studying the Teaching in Physical Education* (pp. 61-68). Liège: AIESEP.
- Zubiaur, M., Oña, A., y Delgado, J. (1999). Learning volleyball serves: a preliminary study of the effects of knowledge of performance and of results. *Perceptual and Motor Skills*, 89, 223-232.