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Research article

Portuguese coaches' perceptions of and preferences for knowledge sources related to their professional background

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Abstract
The purpose of this study was to analyse Portuguese coaches' perceptions of, and preferences for, knowledge sources as related to professional background; namely academic education level, coach education level and coaching experience. The study's participants comprised 336 Portuguese coaches from twenty-two sports. A questionnaire was used to identify coaches' demographic characteristics and representations about their preferred sources of coaching knowledge. *MANOVA* using *Tukey's HSD* test was used to compare groups. The results highlighted that coaches perceived that coaching knowledge is built from a broad range of sources from personal coaching and playing experiences to more explicit formal, informal and non-formal learning situations. Results indicated that the coaches ascribed more importance to experiential sources such as working with experts, learning by doing, interacting with peer coaches and attending informal seminars and clinics, than to the formal learning situations provided by the national coaching certification programs. Differences, however, were found in that coaches who had a greater background within higher education (physical) and sport valued informal and non-formal learning sources more than did coaches who were defined as not coming from an academic background. The findings point to the importance of developing new learning, experientially-based, opportunities within the Portuguese context, where curricula content continues to be delivered via didactic means.

Key words: coaching science; coaching education; coaches' perceptions; learning situations.

Introduction

Coaching involves a central tenet of improving team or athlete performance which requires a cognitive activity to make decisions upon a multitude of dynamic situational factors (Jones et al., 2003). Taking coaching to be such a complex and fluid endeavour (Cushion et al., 2003), coaches need to develop a wide range of knowledge and skills to adapt to given environmental conditions (Nash & Collins, 2006). However, research has shown that current formal education programs do not adequately prepare coaches for their task (Abraham & Collins, 1998; Nelson et al., 2006; Trudel and Gilbert, 2006). For example, it has become increasingly apparent that formal learning acquisition experiences related to an increase in perceived coaching efficacy (Malete and Feltz, 2000), and decreased rate burnout (Frey, 2007) among other topics are not enough to ensure holistic coaches' development. Indeed, a consensus has emerged that such formal professional preparations only comprise a part of the development of more coaching knowledge and subsequent expertise (Erickson et al., 2008; Nelson and Cushion, 2006). Despite such growing recognition, national coach certification systems, like that within Portugal continue to be dominated by much classroom delivery and a didactic style of pedagogy; what Sfard (1998) metaphorically termed acquisition.

In contrast to formal courses, recent research has pointed to the various ways and means through which coaches gain knowledge; for example, through previous coaching and playing experiences in addition to other informal and non formal learning situations (Abraham et al., 2006; Irwin et al., 2004; Jones et al., 2003; Lemyre et al, 2007; Schempp et al., 2007; Timson-Katchis and North, 2008; Wright et al., 2007). For example, in a study of expert coaches of several team and individual sports, seven important areas related to knowledge sources were highlighted: formal education; playing experience; professional experience; mentoring; interactions with high level athletes; ongoing education; and personal commitment to coaching (Fleurance and Cotteaux, 1999). Similarly, work by Erickson et al. (2008) concluded that learning by doing was the most important knowledge sources for youth sport coaches; a finding echoed by the work of Cushion et al. (2003). It is a sentiment that has also emerged in the work of many others who concur that coaches do not value their formalized learning as much as their day by day practical experiences (Gilbert et al., 2006; Jones et al., 2004); that the process of becoming an expert coach is influenced much more by their interactive, situational coaching experiences, observations of peers and knowledge sharing with other coaches that any professional preparation programs (Jones et al., 2004; Lemyre and Trudel, 2004). In developing this work of how coaches learn, a vital role has been given to the process of reflection in terms of how experience is transformed into coaching knowledge and competence (Gilbert and Trudel, 2001; 2006). Such reflections can often be triggered by conversations with others, which have led to claims for mentoring as an important way of increasing coaches' development (Bloom, 2002; Bloom et al., 1998). Such conversations can, of course, also be held with peers as opposed to being housed in a formalised hierarchical relationship, thus locating the development of coaches' knowledge as a social process of sharing with (respected) others (Abraham et al., 2006; Erickson et al., 2008; Schempp et al., 1998; Wright et al., 2007).

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Although research has highlighted the dynamism of informal, social learning, this is not to say that coaches do not see any value in more formal learning opportunities. For example, many studies exist which confirm that coaches still draw information and knowledge from participation in formal professional clinics, seminars and workshops (Schempp et al., 1998; Timson-Katschis and North, 2008; Wright et al., 2007). In addition, taking account of the internet's growing popularity as a knowledge resource, coaches appear to be increasingly citing its usefulness in terms of information acquisition (Erickson et al., 2008; Lemyre et al., 2007; Schempp et al., 2007; Wright et al., 2007). Furthermore, reading books (Abraham et al., 2006; Lemyre et al., 2007; Schempp et al., 2007; Wright et al., 2007) and magazines (Reade et al., 2008a; 2008b; Schempp et al., 2007) and watching coaching videos (Reade et al., 2008a; 2008b; Wright et al., 2007) have been also emphasized as valuable learning sources.

The recognition that coaches learn in numerous ways, and value a number of knowledge sources, suggests that an amended conceptual framework is called for to better understand this learning process. Subsequently, although located originally within the field of education, we believe the work of Sfard (1998) has much to offer in this context. Sfard (1998) distinguished two core metaphors of learning, i.e., two basic ways of understanding how we learn; the acquisition metaphor and the participation metaphor (see also Lave & Wenger, 1991; McCormick & Murphy, 2000; Rogoff, 1990). The *acquisition metaphor* conceptualizes learning as a process of knowledge acquired by an individual learner. Here, learning takes place through the transfer of information from a teacher to a learner; for example, as experts (course conductors) convey information to students (coaches) with the intention that the latter acquire knowledge and apply it later. On the other hand, the *participation metaphor* of learning emphasizes the role of social communities and social interaction. Accordingly, learning is seen as a process of participating in various cultural practices and shared learning activities, rather than a simple process of individual knowledge formation. This latter metaphor assumes that knowledge does not exist either in a world of its own or in individual minds but is an aspect of participation in cultural practices (see also, Anderson et al., 1997; Brown et al., 1989; Greeno, 1997; Lave, 1988; Lave and Wenger, 1991; McCormick and Murphy, 2000; Rogoff, 1990).

In terms of coach education, the acquisition metaphor relates to programs taught through a classroom-based curriculum. Alternatively, Sfard's (1998) participation metaphor is to do with learning through day-to-day active engagement in the coaching context, inclusive of such activities as mentoring and communities of practice (Lave and Wenger, 1991). The recognition of the role of both metaphors (Sfard, 1998) in the progression towards becoming an expert coach is already assumed by researchers. This is because the building of cognitive structures which comprise a coach's knowledge, including mediated, unmediated and internal learning situations is often dependent on complementarity between the acquisition and participation metaphors (Werther and Trudel, 2006). More specifically, it has been argued that we should recognise that mediated learning (which occurs directly by working with a more experienced coach) unmediated learning (where the learner decides what is important or not) and internal learning (which involves reflection about the new information within the existing ideas) should take place under different types of learning situations such as formal (e.g., coach education programs), informal (e.g., previous personal coaching experience) and non-formal (activities based outside the formal system, such as coaching conferences and clinics) (Nelson et al., 2006). Such a position echoes Cushion et al. (2010) point that the conceptual framework of coaches' learning sources must be essentially holistic, and not algorithmic, requiring linkages and interaction between different types of learning situations. Therefore, a mixed but still complementary learning approach, upon the framework of acquisition and participation learning metaphors, would appear to be of benefit to develop a model of professional knowledge for coaches.

In attempt to foster coaching knowledge and expertise, there has been a considerable growth in the importance attached to coach education in many Western countries (Erickson et al., 2008; Gilbert and Trudel, 1999; Lyle, 2002). For example, the United Kingdom Coach Certification (UKCC) in the UK, and the National Coaching Accreditation Scheme (NCAS) in Australia among others, have similar features as considering different levels and having precise content for each level (Wright et al., 2007). The results from the research in those countries have given fruitful information to the governing bodies allowing structural improvements to curriculum-based approaches. However there are many countries where the coach education is not so well developed, funded or documented. For example, in Portugal, each sportive federation decides the structure and development of their own coach education curriculum which results in a large variety of approaches. Often, in consequence, three or four coaching levels are considered, whilst the boundaries of each coach level are not well defined according their aims, context of practice and contents (Mesquita et al., 2009). The sport governing bodies are also the institutions that can certify undergraduate and post graduates studies in coaching and sports sciences. Thus each higher education institution, if it is to offer such courses, must have the support and recognition of relevant sports federations (Mesquita, 2010). It is a situation which has resulted in coach education which is not systematic and is some cases not mandatory (Mesquita, 2010), whilst being characterised by some traditional, ad hoc features which limit maximal coach learning and development. Similarly, the curriculum continues to be centered on a classroom–based approach heavily taught along didactic lines where prescriptive teaching methods dominate and where supervised practice field is absent. It is also a syllabus heavily driven by sport-specific technical concerns, with social and philosophical considerations being largely absent (Mesquita, 2010).

Most previous studies examining coach learning sources have employed inductive analysis from interview data (Abraham et al., 2006; Fleurance and Cotteaux, 1999; Irwin et al., 2004; Jones et al., 2004; Salmela, 1995;

Wright et al., 2007). Conversely, studies using extensive questionnaire samples, that could give a more representative portrait, are rare (Reade et al., 2008a; Timson-Katchis and North, 2008). Similarly, the current research agenda has focused on the analysis of elite (Abraham et al., 2006; Fleurence and Cotteaux, 1999; Gould et al., 1990; Irwin et al., 2004; Jones et al., 2003; 2004) and developmental sport coaches in terms of learning preferences or knowledge sources (Erickson et al., 2008; Lemyre et al., 2007; Wright et al., 2007), somewhat ignoring a sample across both domains from where comparisons could be drawn. Additionally, such a sample would include coaches who not only possess very different background influences but also a variety of learning preferences. Indeed, finding out the backgrounds of coaches, in terms of their considered learning preferences, can provide a richer and complete understanding about the coaching process in general and how current coach education programs are perceived (Demers et al., 2006; Jones, 2006; Rupert & Buschner, 1989). This would appear to be of particular relevance in a country like Portugal where the majority of coaches do not hold a higher educational degree (Almeida, 2006). Indeed, findings from previous studies indicate that the variable of educational background has a potentially powerful influence on knowledge and perception of coaching competence (Gilbert and Trudel, 2001; Irwin et al., 2004; Jones et al., 2002; 2003; 2004).

Therefore, the general intention of this study was to provide a greater understanding of coaches' preferences for how they learn their craft; taken from both a large sample and a new, unexplored context (i.e., Portugal). The main contribution of this study was to provide useful information not only to compare and contrast with qualitative work from other countries as Canada, United States and United of Kingdom but also to provide important guidelines to developing coach education in Portugal. The specific purpose of this study was to analyse Portuguese coaches' perceptions of and preferences for learning sources as related to personal and professional background in order to answer two main questions: (1) What are the main learning sources considered by coaches to develop coaching knowledge as coach? (2) Are those representations changing according to the coaches' professional background namely academic education level, coaching experience and coach education level gender, and the possible interactions between these variables?

Methods

Participants

The participants comprised 336 coaches, 284 males and 52 females, a ratio that reflects the general distribution of coaches according to gender in Portugal (Almeida, 2006). Their ages ranged from 16 to 65 (32.25 ± 9.78). The coaches came from twenty two (n = 22) sports; the purpose here was to obtain a wide representation from a variety of sports. Two-hundred seventy four (79,9%) came from team sports, whilst 69 (20,1%) came from individual sports.

The coaches were classified according to *coaching experience*, *academic education level* and *coach education level* in order to perform comparative analysis. *Coaching experience* ranged from 1 to 25 years (8.34 ± 8.56). Although *coaching experience* is a multidimensional variable not well characterized only by years of working as a coach (Côté and Gilbert, 2009) because this study comprises an extensive sample it was not possible to apply a broad range of criteria to characterize this variable. Therefore, years of experience was considered a valid measure to characterize coaching experience. The mark of ten years highlighted by Abraham et al., (2006) as a demand to reach some quality as a coach was used to differentiate the *more experienced* (more than 10 years of experience: n = 103; 35%) of the *less experienced* (1 to 9 years of experience: n = 158; 53,7%).

As higher education (in physical education and sport) has the potential to develop general and specific personal and professional coaching competences (Santos et al., 2010), the coaches were differentiated according their achieved academic education level. Here, 40.2% (n = 135) of the participants had obtained a degree *Below Higher Education* and 45.8 % (n = 154) a *Higher Education degree in Physical Education and Sport.* Coaches with other Higher Education degrees were not considered as they represent a small group (n = 40; 11.9%) and its inclusion will preclude the data analysis considered, multivariate analysis of variance (MANOVA).

The coach education level was divided into three levels; *level I* (n = 60, 17.9%), *level II* (n = 118, 35.1%), and level *III and IV* (n = 116, 34.5%). In general, the *level I* is orientated to the beginners athletes (recreational setting), the level II to the intermediate athletes (developmental level) and the level III to the advanced athletes (elite performance level). The level III and IV was aggregated because, in Portugal, they have been similar on the curriculum agenda of national certification programs and coaches perform in the same level of practice, the elite level. All coaches obtained their certifications at the national certification programs.

Instrumentation

A questionnaire was created with two distinct parts, the first part requested demographic information, such as age, gender, academic education level, coaching experience, coach education level and sport coached and the second part referred to the learning sources preferences of coaching knowledge. The development of the questionnaire was based on three conceptual frameworks: Sfard's metaphors of learning (1998) (acquisition metaphor and participation metaphor) and the learning situations of Nelson et al. (2006) (formal, informal and non-formal) and Werther and Trudel (2006) (mediated, unmediated and internal learning situations); and by an analysis from the most representative empirical qualitative studies about the learning sources available in the literature (Abraham et al., 2006; Erickson et al., 2008; Fleurance and Cotteaux, 1999; Irwin et al., 2004; Jones et al., 2003, 2004; Lemyre et al., 2007; Nelson et al., 2006; Reade et al., 2008a; 2008b; Salmela, 1995; Schempp et al., 1998; 2007; Timson-Katchis and North, 2008; Wright et al., 2007). All those studies were carried out using qualitative analysis from other countries (i.e. Canada, United States and United Kingdom). The learning sources cited within those

twelve articles were used as a foundation for the developed questionnaire; the only exception being *academic background*. The inclusion of this last variable was because in Portugal there ex ists a high variability between coaches' education background which could have an impact on preferred knowledge sources. Through those procedures the construct validity of the questionnaire was guaranteed.

Subsequently, the content validity was carried out by two complementary steps: firstly, a group of experts with PhD's in sport sciences and specialization in coach education examined and then selected the most important presented knowledge sources taking into account the Portuguese coach education reality. The second step involved evaluating the clarity, accuracy and intelligibility of the items. For this, a pilot study was conducted through the participation of thirty (n = 30) coaches from several sports, with different professional experiences (ranging from 3 to 21 years as coach) and from distinct academic education levels (all levels were represented).

The final version of the questionnaire prompts coaches to rate their preferences knowledge sources which includes eleven-items using a *Likert* scale from 1 to 4: *nothing important, minor important; important, very important*. Four items were considered related to personal and athlete background: *experience as athlete* (practice years); *practice level as athlete* (performance outcomes throughout the career); *education background* (schooling level) and *personal knowledge* (interpersonal knowledge as the reciprocally-influential process based on systems of social interactions, i.e. relationship with athletes, the coaching community, the local community, and the intrapersonal knowledge, as the understanding of oneself and the ability for introspection and reflection, i. e. reflection, ethics and dispositions) (Côté and Gilbert, 2009). Seven items related to learning situations: *attending seminars/clinics outside the formal systems* (coaching conferences, seminars, clinics or workshops carried on outside the framework of the formal system to provide select issues to particular coaches subgroups); *learning by doing* (learning that comes from experience in the field practice); *working with expert coaches* (assisting or accompanying the field work of expert coaches); *interaction with peer coaches* (working, observing, discussing, with coaches belong to the same level or context of practice); *national coaching certification programs* (certificate courses); *information in internet* (searching in the internet available information related to coaching). Those items were defined in an appendix attached to the questionnaire for helping coaches to recognize their meanings.

Data collection

At the coaching education seminars during the 2008/2009 season, the data collection was obtained from 76% of the coaches that attended them. Those seminars are organized by the Portuguese sport's governing bodies and they are not mandatory. They happened two or three times a year and the thematic are around specific issues related to coach and athlete development and they are not sport-specific**.** The seminars happened throughout a day and the inviters speakers are from national and international setting, being specialists or researchers on the thematic under analysis. Those seminars are attended usually by coaches from different levels and from different sports.
To answer the questionnaire, the informed consent was obtained and the confidentiality and anonymity was guaranteed. Volunteer coaches were taken to a silent room where they received an explanation on how to answer the questionnaire. They were given the opportunity to clarify doubts and unlimited time to complete the questionnaire. Twelve to eighteen minutes was the time that coaches needed to fill in the questionnaires.

Data analysis

Descriptive statistics were used to calculate means and standard deviations. Data was screened for outliers through univariate normality tests and plots. The skewness and kurtosis divided by the standard errors was calculated; values were between the +2 to -2 range assuming a normal distribution (Schumacker and Lomax, 2004). The normal uni-variate distribution of each variable by Kolmogorov-Smirnov test was acceptable.

The Manova test was used since the sources of coaching knowledge measures could be correlated and this must be taken into account when performing the significance test. As the equality of covariance matrices, using Box's Test, was not guaranteed the Pilai´s Trace test, adapted to small dimension groups and heterogeneous covariances, was used (Johnson, 1988). Groups' comparisons were analysed using a 2 (academic level) x 2 (coaching experience) x 3 (coach education level) multivariate analysis of variance (MANOVA) for main effects and two-way interactions. Following a significant Manova, a multiple Anova was applied to identify possible group differences for each dependent variable. Levene's Test proved the equality of error variances for all the variables.

Results

Descriptive analysis

In regard to the coaches' sources preferences to develop coaching knowledge the results obtained were located in the gap between *important* (2.79) and *very important* (3.50) (Table 1). The highest mean value was obtained in *working with expert coaches*, followed by *personal knowledge, learning by doing, attending seminars/clinics outside the formal systems and interaction with peer coaches.* The lowest mean value was obtained in the category *information in the internet,* preceded in increasing order of importance by *practice level as athlete*, *national coaching certification programs*, *reading books/ magazines and watching videos of coaching education*, *personal experience as athlete* and *education background*.

Comparative analysis

From the multivariate analysis of variance the results showed a significant multivariate effect for *academic education level* (Pillai´s Trace= 0.26; $F(11, 151) = 4.73$; $p = 0.001$; $\eta^2_p = 0.26$; $\pi = 1$. Concerning coaching experience and coach education level no significant statistic differences were found for main effect and for all two-way interaction effects (Table 2).

Subsequently, univariate analysis for *academic*

Table 1. Descriptive results of coaches' knowledge sources.

Sources of Coaching Knowledge		
Personal and Athlete background	Mean	Std. Deviation
Personal knowledge	3.38	.62
Education Background	3.28	.92
Experience as athlete	3.28	.74
Practice Level as athlete	2.88	.83
Learning Situations		
Working with expert coaches	3.50	.67
Learning by doing	3.37	.63
Attending Seminars/ Clinics outside the formal systems	3.35	.68
Interaction with peer coaches	3.30	.67
Reading books /magazines and watching videos of coaching education	3.22	.69
National Coaching Certification Programs	3.05	.78
Information in Internet	2.79	.87

Likert scale from 1 to 4: *nothing important, minor important; important, very important*

education level resulted in significant *F* values for five of the sources of coaching knowledge: *academic background, F*(1, 161) =41.20, $p < 0.001$, $n^2_p = 0.204$; working with experts, F (1, 161) = 9.43, $p = 0.003$, $n^2_p = 0.06$; attending seminars/clinics outside the formal systems , F(1, 161) = 4.00, p =0.04, $n^2_p = 0.02$, reading books /magazines and watching videos of coaching education, F(1, 161) = 4.44, p = 0.03, $n^2_p = 0.02$ and coaching experience, F(1, 161) = 5.14, p=0.02, $n^2_p = 0.03$ (Table 3).

The results revealed that the coaches with *Higher Education in Physical Education and Sport* considered informal and non-formal learning situations, such as *working with expert coaches, attending seminars/clinics outside the formal systems, reading books /magazines and watching videos of coaching education* ($p < 0.01$) and personal background (*academic background* and *coaching experience*) ($p = 0.02$) as more important knowledge sources than coaches with a degree *Below Higher Education*.

Discussion

All the sources considered in this study were emphasized by coaches as being either important or very *important* to the development of their knowledge indicating that they recognized a broad range of sources as valuable for coach development. Indeed, not much difference was even found between such distinct sources *national certification programs* and *working with expert coaches*, although this could be due to the unique Portuguese coach education context. In this regard, whilst the importance given to working with experts may be a generally found phenomenon (e.g., Jones et al., 2003), the close value attached to such an apparently different resources (i.e., *national certification programs*) could stem from the fact that the classroom-based curricula delivered by the Portuguese system is what such coaches have become familiarised to. Additionally, even though coaches valued *working with experts*, this was from a personal perspective as they were rarely exposed to any formal learning of the kind; a point for Portuguese coach educators to consider.

Notwithstanding sources, related to informal (*working with expert coaches, learning by doing,* and *interaction with peer coaches)* and non-formal learning (attending *seminars/clinics outside the formal systems)* developed under mediated and unmediated situations achieved major importance for coaches. Since these sources of coaching knowledge promote the active learning throughout the resolution of the dilemmas of coaching practice (Jones et al., 2004) they endorse the internal learning situation where the learner has freedom to be involved in a reflection process. However as the "development of reflective skills is not a simplistic process even with structures support" (Knowles et al., 2001, pp.204), coach education programs should promote opportunities for coaches to be engaged in structured reflection. According to the Sfard's learning metaphors, these findings attribute the importance of applying the participation metaphor in coaching education process where experiential learning that occurs under the influence of cultural practices assumes a primary role.

Reiterating previous research among those knowledge sources cited, *working with expert coaches* was the most important one highlighted by coaches (Salmela, 1996). This echoes findings on the value placed by coaches on informal mentoring in developing knowledge (e.g., Bloom et al, 1998; Cushion et al., 2003) and some studies (Irwin et al., 2004; Salmela, 1996). Indeed, some expert coaches have even proclaimed that such guidance was the most important resource identified in the development of their own progress (Bloom et al., 1995).

Emphasizing the experiential guided sources,

Table 2. Multivariate analysis of variance of coaches' knowledge sources according to their personal and professional background.

Personal and professional background	λ	F	dgf	p
Academic Education Level (A)	.26	4.74	11,151	.00
Coaching Experience (B)	.09	1.31	11,151	.22
Coach Education Level (C)	.11	.82	22,304	.69
AXB	.07	1.08	11,151	.38
AXC	.07	.53	22,304	.96
BXC	.16	1.22	22,304	.23

Table 3. Coaches' knowledge sources according to their academic education level.

Sources of Coaching Knowledge	Academic Education Level	Mean	Std.Deviation
Personal and Athlete Background			
Personal knowledge	Below Higher Education	3.28	.07
	Higher Education in P.E./S	3.45	.06
Personal Experience as athlete	Below Higher Education	3.41	.07
	Higher Education in P.E./S.	3.18	.07
Education background	Below Education in P.E./S	2.87	.05
	Higher Education in P.E./S	3.65	.06
Practice Level as athlete	Below Higher Education	3.04	.05
	Higher Education in P.E./S.	2.73	.07
Learning Situations			
Working with *expert* coaches	Below Higher Education	3.06	.09
	Higher Education in P.E./S.	3.68	.07
Learning by doing	Below Higher Education	3.16	.06
	Higher Education in P.E./S.	3.54	.05
Attending Seminars/Clinics outside the formal systems	Below Higher Education	3.17	.08
	Higher Education in P.E./S	3.54	.05
Interaction with peer coaches	Below Higher Education	3.36	.07
	Higher Education in P.E./S	3.28	.06
Reading books/magazines and watching videos of coaching education	Below Higher Education	3.02	.08
	Higher Education in P.E./S	3.35	.06
National Coaching Certification Programs	Below Higher Education	3.08	.08
	Higher Education in P.E./S.	2.96	.07
Information in Internet	Below Higher Education	2.89	.08
	Higher Education in P.E./S	2.69	.08

NOTE. Higher Education in P.E./S -Higher Education degree in Physical Education and Sport.

learning by doing followed *working with experts* among the sources highlighted by coaches corroborating somewhat the findings of Erickson et al. (2008). One of the biggest values of *learning by doing* consists on the possibilities to develop skills of reflection in and on action (Gilbert and Trudel, 2001), as coaches could be aware of what decisions or behaviours are appropriate, facing the difficulties placed by the environment and discriminating elements to reach effective coaching practices. However, to reach this goal experiential learning must be intentional, where coaches develop and evaluate strategies for solving the problems already identified (Trudel and Gilbert, 2006). This means that reflective processes must be integrated into coach education to enable coaches to better interpret and understand their practices.

In relation to this source, coaches accentuated the importance of the *interaction with peer coaches*, following the tendency confirmed in Erickson et al. (2008) study about the actual sources of coaching knowledge. The authors recognized that the *interaction with peer coaches* is a source commonly used in Canada, the country where the study was applied, which is far from the current coaching education practices in Portugal. In spite of this reality, coaches of this study highlighted its importance as a source of coaching knowledge, claiming the necessity to be included in the coach education throughout the development of coach career. These findings again proclaim the importance ascribed by coaches to the experiential learning (through own experience and sharing with others) and suggest the value of the communities of practices (Culver and Trudel, 2006). As Trudel and Gilbert (2004) claim, traditionally in the coach education programs the focus has been to foster individual coach development as opposed to recognising the benefits of group discussions into the groups, particularly in relation to the development of social skills.

The explicit sources related to *books/magazines, watching videos,* and *information from the internet* were also emphasized by coaches as important, corroborating the findings of Gilbert and Trudel (2001) and Wright et al., (2007) where coaches referred to such resources as important in generating strategies to solve specific issues. Moreover, nowadays the improvement of coaching knowledge could be sustained by the information available on websites, specifically developed for coaches' communities; a situation until now which has had little expression in Portugal. In this study the lowest value given to the source *information in internet* could be explained by the lack of coaches' acknowledgement about its actual value. The role of online technology in coaching is already recognized since coaches hold the capacity to select the available information from the internet (Vargas-Tonsing, 2007). Some studies show that coaches use the web mainly to exchange emails (Wright et al., 2007) and read messages from others, and not posting messages. This fails to realise the full interactive potential of the internet in the re (construction) of coaching knowledge. On the other hand, as coaching is a social activity (Cassidy et al., 2004) it is understandable that coaches preferred to meet each other face-to-face to discuss coaching practices (Wright et al., 2007). Nevertheless, additional research is needed in relation to understanding the real value of this source.

The *attendance at seminars/clinics outside the formal systems* as a non-formal learning activity was also highlighted by coaches. This result somewhat reinforces Bloom et al., (1995, p. 403) findings that coaches recognised the benefits of attending seminars and symposiums "where they interacted and exchanged ideas with expert and novice coaches". Notwithstanding, the impact of these non-formal learning activities on the development of coaches is unknown because empirical research in this

area is rare (Cushion et al., 2010). Furthermore, to better reach stated learning outcomes in coach development programmes such as the one currently operating in Portugal, there should be a more explicit diversity between the objectives of differing coaching curricula (e.g., between formal and non-formal courses) which at present remain undifferentiated.

The only source that is related to formal learning situation, *national coaching certification programs* was considered by coaches as the less importance, excluding *information in the internet*, than all the sources related to informal and non-formal learning situations. This result could be explained by the fact that in Portugal the courses have had a framework based on the classroom-curriculum without supervised field practice and formal mentoring programs (Rosado and Mesquita, 2009). Cushion et al. (2003) argue that the training programs should include supervised experience in the field, providing coaches the chance of making mistakes, reflect and learn from them. When a beginner coach is observed and subsequently assisted by an expert, the likely result is a development in the former's coaching knowledge (Cushion et al., 2003). Indeed, mentoring processes have the advantage of integrating attitudes, behaviours and valuable resources from experts to coaching practice of beginner coaches. Moreover, as mentoring increases formalization of a practice that is inherently informal (Colley at al., 2003) it allows beginner coaches to learn from expert coaches in a more structured although open learning environment. As Colley et al. (2003) argue mentoring promotes the best conditions for formal and informal learning to meet in practice.

Since coaching certification programs are a source of coaching knowledge and, therefore, somewhat irreplaceable for coach education (Erickson et al., 2008), the findings of the study claim the need to improve the coaching certification programs namely in Portugal. Therefore, declarative knowledge (i.e., information about concepts, elements and relationships between them) and procedural knowledge (i.e., steps or activities required to perform a task or job) (Côté and Gilbert, 2009) should be integrated into the same pathway, thus confirming Sfard's acquisition and participation metaphorical framework as a meaningful and fruitful approach.

Considering the sources related to the personal and athlete background, coaches primarily highlighted the *personal knowledge*. Nowadays researchers and practitioners acknowledge that the coaches' performance and social recognition depends mainly on their ability to make all sportspersons (athletes, parents, directors, managers, etc.) trust their skills (Santos et al., 2010). As coaches are social beings operating in a social environment (Jones et al., 2002) the personal skills related to social interactions have key importance on the coaching process. So, the effective communication skills, the leadership, the good teaching practices (Santos et al., 2010), the moral values and social and cultural sensitivity (Salmela, 1996) claim that interpersonal knowledge is essential to develop good practices. Moreover, intrapersonal knowledge "[as] refers to the understanding of oneself and the ability for introspection and reflection" (Côté and Gilbert, 2009, pp.311) allows coaches to do a systematic introspection, review, and revision of one's practice (Côté and Gilbert, 2009).

Academic background was also emphasized by coaches showing the importance ascribed to the educational level as source of coaching knowledge even more in Portugal where the majority of the coaches do not reach a higher educational degree and a significant part only complete the elementary school (Mesquita, 2010). Considering the different educational background among coaches, coach education programs should attend it on the curriculum development in order to create to all students (coaches) favourable conditions for learning.

The *experience as athlete* was also recognized by coaches as a valuable source of coaching knowledge, more so than the particular level reached. Indeed, both voluntary coaches (Erickson et al., 2008; Lemyre et al., 2007; Wright et al., 2007) and elite coaches (Abraham et al., 2006; Irwin et al., 2004; Salmela, 1995; Schempp, 1998) stated that as athletes they acquired a vast understanding of the coaching role. Furthermore, Gilbert et al. (2009, pp. 428) echo that "the developmental process of future coaches may be accelerated if youth-sport athletes occasionally assume the role of coach" creating opportunities to design and deliver practice drills and sharing some of the organizational and administrative decisions. However, there is some controversy among coaches about the actual role of this variable; while some of them believe fixedly that past athletic experience is an advantage others indicate that it is not very important (Wright et al., 2007). These stances suggest that the years of experience as athletes could not be important to acquire some understanding about coaching role if they are not involved and committed with the coaching practices. Further research is needed to analyze the characteristics of the athletes' coaching engagement throughout their carriers.

Regarding the personal and professional characteristics of the coaches, the major finding demonstrates that the profile of coaching knowledge sources is stable among coaches. Only the *academic education level* differentiated the importance ascribed to some sources whilst no interaction between the three variables (coaching experience, academic education level and coach certification level) was found.

Concerning coach education in Portugal, there is a high diversity within each level due to the variability between differing coach education curriculum among the national sport federations (Mesquita, 2010). This could lead to coaches who possess different certification levels having similar representations about the importance attributed to variable knowledge sources. In respect to the coaching experience, since it is a complex variable its characterization as the number of years of active involvement could be limiting (Côté and Gilbert, 2009). As this study included a large sample, it would be difficult to include several criteria to define coaching experience. This means that, due to its problematic nature, perhaps this variable should not be analyzed using extensive samples. Consequently, an open debate in the literature to discuss what is explicitly meant by the terms experience is needed, so that more explicit criteria can be used in further research.

Nonetheless, the findings related to the variable *academic education level* should be considered both in further research and in designing future coach education

curricula**.** The results showed that coaches with Higher Education in Physical Education and Sport attributed more importance to the some informal and non-formal sources (*working with expert coaches, attending seminars/clinics outside the formal systems, reading books/magazines and watching videos of coaching education and learning by doing*) and to the *academic background*, than the coaches with a degree Below Higher Education. As Jones (2006) states, coaching is seen increasingly as an intellectual endeavour requiring practitioners who are capable of engaging in complex cultural processes similar to that of an educator. Within Higher Education in Portugal, the study of coaching takes two years; one year inclusive of following a classroom curriculum, and a second of supervised practice field.

In the United Kingdom the coach education from academic setting has been showing some advantages as Cushion et al. (2010, pp. 51) stated "This situation [sport coaching from academic courses] has allowed coaching scholars to experiment with delivery approaches, and to present alternative frameworks, that might be utilised to enhance the future provision of coach education". So, Higher Education in Physical Education and Sport could be a valuable resource on the construction of coaching knowledge and must be acknowledged as a formal coaching education agency if it is linked with the curriculum structure of national sport system of coaching education (Duffy, 2008; Demers et al., 2006), namely in Portugal.

The findings of this study suggest that wide range of sources could be promoted in coach education programs, making such programs into authentic and contextualized learning contexts. This is in line with the thinking of many others who claim that a more balanced approach is needed as coaches gain valuable knowledge through the inclusion and the interaction of different learning situations within a robust conceptual framework (formal, non-formal; mediated-unmediated and internal; participation/acquisition) (Erickson et al., 2008; Wright et al., 2007). Therefore, where courses remain overly prescriptive and de-contextualized (e.g., Portugal) thus lacking the diversity of learning situations required to improve the development of coaching knowledge (Mesquita, 2010), a new approach is needed where experiential sources such as *mentoring*, *working with expert coaches* and *interactions with peer coaches* can be applied in practical contexts.

Moreover, as coaching knowledge varies according to the different stages of an athlete's development (Côté and Gilbert, 2009), learning sources must be analyzed as such and subsequently considered by coach educators. Such an approach was recognized by the *Development Model for Sport Participation* (DMSP) proposed by Côté et al. (2003), which considered four levels of coaching contexts. These levels include participation coaches for children, participation coaches for adolescents and adults, performance coaches for young adolescents, and finally, performance coaches for older adolescents and adults. The authors suggest that coaches should meet athletes' needs and help them fulfill their goals as defined by the specific coaching context (Côté and Gilbert, 2009). In Portugal, there is currently no defined structure in terms of providing education within participation as opposed to performance level coaching. Hence, it is difficult to define which coaching knowledge and associated learning sources are more appropriate for the differing contexts. Therefore, a new developmental approach to coach education based on coaching contexts should be built and implemented, in order that both coaches and athletes are exposed to relevant and optimum learning experiences.

Conclusion

A broad range of sources were emphasized by coaches as important to develop coaching knowledge somewhat corroborating the findings of previous research. However, coaches attributed more importance to experiential guided sources, for instance *working with experts*, despite these sources not being considered on coach education programs in Portugal. Such a finding emphasizes coaches' awareness for experiential learning despite not being familiar with such opportunities in the Portuguese system. Moreover, while coaching experience and coach certification level did not differentiate coaches' perceptions of, and preferences for, knowledge sources, the academic education level allowed coaches to ascribe different importance to informal and non-formal learning sources. These findings highlight the potential of the academic setting (in physical education and sport) for to be considered as a formal coach education agency, namely in Portugal.

As an overview, the findings from this study suggest that new pedagogical ways could or should be found to engage with the real needs of Portuguese coaching education reality. For example, programs could be built under a conceptual framework that considers the diversity of learning sources (formal, non-formal; mediated-unmediated and internal; participation/acquisition) to allow a better systematization of the coaching education curriculum. To expand the knowledge of coaches, it is fundamental that coaching education curriculum includes all of these sources in a mixed and holistic approach as required by the complex nature of coaching context.

Concerning further research it will be important to evaluate coach education beyond perceptions and opinions, and particularly in terms of the impact such programs have on the coach learning in practice. In addition, research should examine the combination and the orchestration of coaches' knowledge sources in field situations in order to realize how they can aid and inform coaches' decision making in their every day practice.

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Key points

- Coaches recognized that learning is obtained from a broad range of sources of coaching knowledge and each source has a particular role in the development of a coach.
- Experiential guided sources reached more importance to coaches as *working with experts, learning by doing, attending seminars/clinics outside of the formal system* and *interaction with peers* were the most acknowledged.
- The only source that is related to formal learning, *national certification programs*, was recognized as the less importance than all informal and non-formal learning situations.
- The profile of the source of coaching knowledge showed to be stable among coaches as only the *academic education level* differentiated the coaches' perceptions.

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