

LJMU Research Online

Raya-Castellano, PE, McRobert, AP, Cárdenas, D, Fradua, L and Reeves, MJ

Exploring the ‘teachable moments’ of questioning during training: a work-based coach development programme affecting behaviour change

<http://researchonline.ljmu.ac.uk/id/eprint/18156/>

Article

Citation (please note it is advisable to refer to the publisher’s version if you intend to cite from this work)

Raya-Castellano, PE, McRobert, AP, Cárdenas, D, Fradua, L and Reeves, MJ (2022) Exploring the ‘teachable moments’ of questioning during training: a work-based coach development programme affecting behaviour change. Physical Education and Sport Pedagogy. ISSN 1740-8989

LJMU has developed **LJMU Research Online** for users to access the research output of the University more effectively. Copyright © and Moral Rights for the papers on this site are retained by the individual authors and/or other copyright owners. Users may download and/or print one copy of any article(s) in LJMU Research Online to facilitate their private study or for non-commercial research. You may not engage in further distribution of the material or use it for any profit-making activities or any commercial gain.

The version presented here may differ from the published version or from the version of the record. Please see the repository URL above for details on accessing the published version and note that access may require a subscription.

For more information please contact researchonline@ljmu.ac.uk

Exploring the ‘teachable moments’ of questioning during training: A work-based coach development programme affecting behaviour change

Pablo E. Raya-Castellano^{a, b *}; Allistair P. McRobert^b; David Cárdenas^a; Luis Fradua^a; and Matthew J. Reeves^c

^aDepartment of Physical Education and Sport, University of Granada, Granada, Spain.

^bResearch Institute for Sport and Exercise Sciences, Liverpool John Moores University, Liverpool, UK

^cLancashire Research Centre for Sport, Physical Activity & Performance, University of Central Lancashire, Preston, UK.

*Corresponding author: Pablo E. Raya-Castellano; Department of Physical Education and Sport Sciences; Faculty of Sport Science, University of Granada; Carretera de Alfacar, 21. Granada 18071, Spain; email: prayac@ugr.es

ORCIDS

Pablo E. Raya-Castellano; <https://orcid.org/0000-0001-5483-0104>

Allistair P. McRobert; <https://orcid.org/0000-0002-0964-7199>

David Cárdenas-Vélez; <https://orcid.org/0000-0002-6310-2683>

Luis Fradua-Uriondo; <https://orcid.org/0000-0003-3243-7859>

Matthew J. Reeves; <https://orcid.org/0000-0002-3903-2910>

Abstract

Background: Researchers in the field of sport pedagogy have highlighted questioning as a behaviour that facilitates athletes' high order thinking and problem solving. However, previous studies have suggested that coaches ask a reduced number of questions during training that are typically convergent and lead players to predetermined responses. Formal coach development programmes (CDPs), intended to encourage the use of questioning, have been scrutinised for their limited impact on coaches' practice. These criticisms have been made without consideration of the instances and situations during training that might present a better opportunity for asking different question types.

Purpose: The purpose of this study was to explore coaches' perceptions concerning potential 'teachable moments' to ask convergent and divergent questions during training at three data collection points; and associated changes between knowledge and behaviour after a work-based CDP.

Method: Six Spanish youth football coaches working for an elite academy were recruited to a longitudinal study. The study involved a six-week CDP delivered by a coach developer, in collaboration with the club's Academy Management Team, and an experienced research team. Data collection occurred throughout 24-months interspersed by a workshop and two directed tasks organised in several stages: (1) Pre-systematic observations (Sep-Dec 2018) and (2) pre-interviews (Jan 2019), to identify coaches' baseline behaviours and knowledge; (3) a workshop & directed task 1 (Feb 2019), encouraging coaches to experiment and self-discover how to implement questioning within their training contexts; (4) a directed task 2 (Feb-Mar 2019), facilitating coaches' video-based and dialogic reflections about their questions; (5) post-systematic observations (Mar-May 2019) and (6) post-interviews (May 2019), capturing changes in knowledge and questioning after the intervention; and (7) consolidation interviews (May 2020), recording coaches' knowledge stabilisation and further developments.

Results and findings: Four coaches completed the full CDP, whilst the remaining two coaches did not participate in the second directed task. Qualitative data suggest that all coaches developed their understanding of which moments might be most appropriate to ask convergent or divergent questions. However, only the first group of coaches presented congruent changes between the timing in which they asked questions and their perceptions. This involved higher use of convergent questions (during

practice) and divergent questions (in-between practices and when the coach stops practice). Conversely, coaches in the incomplete CDP, decreased or maintained their questioning values within most instances and suggested organisational and contextual factors hindering their engagement in this work-based CDP. Therefore, real opportunities to implement questioning techniques combined with reflective practice assisted by a coach developer are proposed to translate knowledge gained during CDPs into observable behaviours.

Keywords: coach education, behaviour change, dialogic reflection, question, soccer.

Introduction

Coach development programmes (CDPs) have received substantial interest from researchers and practitioners in recent years, due to their perceived influence on coaches' practice (Allison et al., 2016). Some formal CDPs have attempted to increase coaches' understanding and utilisation of behaviours (e.g., Stodter and Cushion, 2014), expecting that these can lead players to positive outcomes. However, whilst there is some evidence for coaches' improved understanding and philosophy of practice after postgraduate CDPs (Jones, Morgan, and Harris, 2012), formal federative CDPs have been criticised for promoting reduced knowledge development and not affecting changes in coaches' behaviour within their working contexts (Stodter and Cushion, 2019). As such, we propose that work-based CDPs might attenuate these criticisms.

A recent examination of coaches' learning suggests that coaches adopt, adapt, or reject formal CDPs' contents when these match, fit, or mismatch their knowledge structures and coaches perceive the applicability of new knowledge (Stodter and Cushion, 2017). Nevertheless, coaches seem to be provided little opportunities for implementing new concepts within their working environments (Stodter and Cushion, 2016). In addition, formal CDPs' contents have typically been taught through multiple 'fill in' activities, delivered in a rigid order and with defined time parameters regardless of learners' needs (Cushion et al., 2021;

Dempsey et al., 2020). Hence, such approaches are believed to generate reduced transference of knowledge into coaches' action (Stodter and Cushion, 2014, 2019).

Conversely, coaches' engagement in reflective practice, assisted by video-feedback and/or a coach developer's 'dialogical action', have been linked to an enhanced developmental experience and changes in coach behaviour (Partington et al., 2015; Cope et al., 2020). For example, in their 12-week CDP, including one-to-one dialogic conversations, Stodter et al. (2021) found that the coach developer's use of open questioning was perceived by coaches as an empowering tool that enabled more relevant discussions about their practice. Similarly, Partington et al. (2015) engaged five coaches in a longitudinal CDP involving attendance to the FA Youth Award and video-based reflections about their behaviours. Whilst participants suggested video-feedback had enhanced their reflection objectivity and willingness to change; changes in the use of instruction, feedback, silence, and questioning were also attained. Thus, it might be suggested that a CDP involving in-context, video-based, and dialogic reflection assisted by a coach developer could be effective for coaches adopting behaviours such as 'questioning'.

The use of questioning has been encouraged to facilitate players' engagement in cognitive activities (Vickers, 2007). Through questions learners can clarify understanding (Engin, 2013; Hill, 2016), recall information (Caram and Davis, 2005), critically reflect on performance (Forrest, 2014), and engage in dialogues and discussions (McNeil et al., 2008). Indeed, questioning has been broadly classified into: (1) convergent, with limited response options; and (2) divergent, offering unlimited response options (Cushion et al., 2012). Whilst the former might only require fact-seeking knowledge (i.e., recalling); the latter's utilisation has been suggested to prompt learners' higher order thinking skills (i.e., applying, analysing, evaluating, or creating), and its use has been generally recommended (Metzler, 2000).

In coaching, questions represent a small proportion of training behaviours and coaches have been observed chiefly adopting convergent questions, that often lead players to quicker coach-desired responses (Cope et al., 2016; Harvey et al., 2013). However, training sessions are comprised of activity periods, management states, and stops in-between the same practice (Cushion et al., 2012; O'Connor, Larkin, and Williams, 2017), and little is known about appropriate question types for varying situations. We argue that no question type is more appropriate *per se*, but instead, the context might determine the extent to which a convergent or divergent question might support player learning. Therefore, criticisms to reduced divergent questioning during training might have been made without fully appreciating when there are better opportunities for asking questions involving limited or multiple response options. Only one study has recorded higher divergent questioning during management states (i.e., in-between practices), with some coaches stating these intervals offer the appropriate conditions for interacting with players (Stonebridge and Cushion, 2018).

Recently, O'Connor et al. (2021) assessed the structure (e.g., type and timing) of the questions asked by 19 coaches during their training sessions without exploring their underpinning perceptions. These are relevant to understand because coaches' questions have been shown not to engage players cognitively (Cope et al., 2016) and formal CDPs attempting to influence coaches' knowledge and use of questioning have had a scarce impact (Stodter and Cushion, 2019). Furthermore, there remains a dearth of work-based CDP studies through which changes in coaches' knowledge can be translated into associated behaviours. Therefore, this mixed-method study examined coaches' perceptions regarding the instances within training that involved opportunities for asking question types and the transference of their knowledge into congruent behaviours after a CDP. Specifically, we sought to understand: 1) what situations do coaches perceive as appropriate for using different question types, before and

after a work-based CDP; and 2) how effective a video-based and dialogical reflective work-based CDP might be for coaches translating their knowledge into behaviour.

Method

Research context

This CDP was implemented within the academy of a Spanish La Liga 123 Football Club structured into a 7-a-side phase (under 9-12) and an 11-a-side phase (under 13-19). Excluding the under-19 team staff, all coaches were part-time and generally held both academic and coaching qualifications. The Academy Management Team (AMT) was composed by an Academy Manager, responsible for managing all the academy processes; and a Head of Methodology, who focussed on supervising the learning of players and coaches. Both had been employed at the club for one season, during which time they had developed and began to implement a curriculum with two main areas for coach development: playing style and practice design.

The following season, they aimed to introduce coach communication as another key area of the curriculum. They intended their coaches to become more aware of the influence that their messages' format and style could have on players and desired an increase in the use of behaviours that potentially encouraged players to develop their game knowledge autonomously. Therefore, to support the development of coaches' communication skills, the club employed a coach developer (CD, first author) and engaged an experienced research team.

Previous professional relationships with both members of the AMT and a shared vision on work-based coach development functioning facilitated the CD's access and embedment within the academy. These practitioners were advised by a research team, comprising two higher education staff, with over 10 years' experience each, working in applied football environments and supporting the development of coaches. Moreover, the Academy Manager and Head of

Methodology met regularly with the first author to ensure any decisions regarding the CDP aligned with the club's vision and supported the CD informing coaches of any developmental tasks required.

As communication had become an area of the club's curriculum, all coaches attended a meeting that highlighted its importance and the developmental plan for the season. The CD was introduced as an assistant of the AMT, with extensive experience developing coaches' communication. His main duty was highlighted as working closely with coaches and facilitating their reflection about their approach to communication. He was positioned as another member of staff that would assist coaches and who would share responsibility with coaches for their learning (Bamberger and Schön, 1983).

This balanced positionality was intentionally adopted to avoid the barriers that coach educators from Sport Governing Bodies visiting clubs have previously encountered (Cushion, Griffiths, and Armour, 2017). Thus, the first author was integrated into the academy environment as any other member of staff would be, but with guarantees of full confidentiality between the CD and coaches during their interactions. Furthermore, we drew on the concept of work-based CDPs as posited by Raya-Castellano et al. (2021). Therefore, 'standard' coach education approaches were rejected, and instead, adopted a more informal approach (Cushion and Nelson, 2013; Mesquita et al., 2014) situating coaches' learning within their work environment and aided by a coach developer.

Participants

The Head of Methodology had frequently observed seven lead academy coaches the previous season. He had identified their use of questioning (i.e., high levels of convergent questions and/or not letting players express their thoughts) as an area for improvement. Coaches seemed unaware of their questioning application but appreciated the potential benefit

of reflecting about their questioning techniques. They agreed to participate in this specific work-based CDP providing signed informed consent before involvement. The under 11's coach withdrew from the study after two sessions, expressing discomfort at being recorded. The six remaining coaches remained involved throughout the whole process except the under 15's coach, who left at the end of the first season and missed the second season's interview. Pen pictures of coaches are presented in Table 1.

Table 1. Coaches' profiles, qualifications, and experience.

Pseudonym	Pedro	Pablo	Carlos	Juan	Antonio	Daniel
Age	23	29	31	36	46	31
Age-group coached year 1	U9	U10	U12	U13	U14	U15
Age-group coached year 2	U10	U8	U15	U19	U13	Left
UEFA qualification	A	B	Pro	Pro	Pro	Pro
University education	MSc	BSc	MSc	N/A	BSc	BSc
Years playing professionally	0	0	0	15	0	0
Years coaching	6	12	8	3	20	10
Years coaching youth	6	12	7	3	13	7
Other jobs during year 1	1	0	2	0	1	1
On-going CPD	2 CPDs	0	0	0	0	0

Procedure

Ethical approval was received from a university ethics committee, and coaches were informed about the study's purpose. Data collection occurred throughout 24 months interspersed by a six-week CDP in the following order: 1) Pre-intervention systematic observations (Sep-Dec 2018); 2) Pre-intervention interviews (Jan 2019); 3) Workshop and directed task 1 (Feb 2019); 4) Directed task 2 (Feb-Mar 2019); 5) Post-intervention systematic observations (Mar-May 2019); 6) Post-intervention interviews (May 2019); and 7) Consolidation interviews (May 2020) (Table 2). Pre-intervention, post-intervention, and consolidation interviews enabled the longitudinal monitoring of any changes in coaches' perceptions on the application of questioning, whereas comparisons between pre-intervention and post-intervention systematic observation data evidenced any changes in behaviour.

Table 2. Data collection methods and CDP activities chronologically ordered.

Phase	Method/Stage	Purpose & procedure
Pre-intervention	1) Systematic observations (Sep-Dec 2018)	-To understand coaches' utilisation of questioning before any CDP. -Two training sessions per coach video recorded with habituation purposes (Darst, Zakrajsek, and Mancini, 1989). -Four training sessions per coach video recorded through a ten in-season period. In total: Pedro 298 (M=75) minutes; Pablo 345 (M=86) minutes; Carlos 335 (M=84) minutes; Juan 297 (M=74) minutes; Antonio 283 (M=71) minutes; and Daniel 253 (M=63) minutes. -These four sessions were coded through an adapted version of the CAIS (Cushion et al., 2012) and O'Connor, Larkin, and Williams' (2018) tool that included 8-behavioural categories linking questioning types and timings.
	2) Interviews (Jan 2019)	-To understand coaches' knowledge underpinning the use of questioning before any CDP. - One interview per coach. -Schedule deductively developed and pilot tested.
CDP	3) Workshop & directed task 1 (Feb 2019)	-To locate 'issues' within coaches' knowledge-practice (Stodter et al., 2021) so they explored links between theory and practical application (Jones et al., 2012; Stodter and Cushion, 2016). -Workshop: delivered in the training ground including ideas discussed with research team. Led by Academy Manager with assistance of the Head of Methodology and CD. -Directed task 1: 6 (not recorded) training sessions to enable coaches experimenting with their questioning techniques in-context.
	4) Directed task 2 (Feb-Mar 2019)	-To stimulate coaches' reflection on the situation in which they asked questioning types and its appropriateness. -One training session per coach video recorded every week throughout a 4-week period. -Two video sequences delivered to each coach every week and linked to reflective questions.
Post-intervention	5) Systematic observations (Mar-May 2019)	-To examine changes in the use of questioning after the CDP. -Four training sessions per coach video recorded through a ten in-season period. In total: Pedro 257 (M=64) minutes; Pablo 320 (M=80) minutes; Carlos 242 (M=81) minutes; Juan 321 (M=80); Antonio 268 (M=67) minutes; Daniel 270 (M=67) minutes. -The pre-intervention systematic observation instrument was also employed to analyse post-intervention systematic observation data. -Inter- & intra-observer reliability for frequency and duration (seconds) data with the formula $\frac{\text{agreements}}{\text{agreements} + \text{disagreements}} \times 100$ (Darst, Zakrajsek, and Mancini, 1989).
	6) Interviews (May 2019)	-To examine coaches' knowledge development after the CDP. - One interview per coach. -Schedule deductively developed and pilot tested; but also included some questions for some individual coaches involved in specific events at their post-intervention sessions.
		-To examine stabilisation of coaches' knowledge and further developments after twelve months without contact with the CD.

Consolidation	7) Interviews (May 2020)	-One interview per coach. -Schedule contained post-intervention interview schedule and stimulated recall examples.
----------------------	-----------------------------	---

Pre- and post-intervention systematic observations

All participants' training sessions were recorded with a digital video camera (Sony HDR-CX900E, China), mounted on a tripod, and positioned to capture the practice space, the players, and the coach. Coaches wore a wireless headset microphone and radio transmitter (AKG PT40 Pro, China) that transferred their communication into a radio receiver (AKG UHF PR40, China) connected to the camera.

The Head of Methodology, CD, and the research team met to confer their views on questioning and the importance of its timing. and agreed to develop an instrument with enhanced face validity regarding behaviour temporality. We followed procedures adopted elsewhere (Raya-Castellano et al., 2020), and the CD pilot coded the initial two habituation sessions of each coach (not included for analysis) to adapt previous' instruments containing training periods where players are active and inactive. Instances where questions occurred during training were discussed and classified until no discrepancies between the temporal categories and their definitions emerged during additional pilot coding.

Four 'training moments' were identified: 1) During the practice, 2) In-between practices, 3) Coach stops the practice and 4) Ball out of play. In-between practices contained three secondary moments (i.e., player huddle, drinking break, and transition) (Table 3). The training moments and question types were combined which resulted in an eight-category system: convergent/divergent during practice, in-between practices, when coach stops practice, and when ball is out of play. The four pre-intervention sessions for each coach were coded using this system with Sportscod© Gamebreaker (version 10).

Table 3. Type and timing of questions, definitions, and examples.

Category	Sub-category	Definition
Type of question	Convergent	Limited number of correct answers/options – closed responses. E.g. ‘Where does he wants it, to his feet or into the space?’, ‘Should you’ve pressed in this situation?’, ‘Who is the free man?’.
	Divergent	Multiple responses/options – open to various responses. E.g. ‘What would you do in this game scenario and why?’, ‘Tell me aspects for consideration when defending wide crosses?’, Within this 2 vs 1 situation, what options do you have?
Timing of question	During practice	Time of the training session when a practice is being played or the ball is rolling. Excluding when the ball is out of play.
	In-between practices	<u>Player huddle</u> : moment of a training session prior to a following practice when the coach gathers all players in a huddle for explanation/discussion within a certain area (<i>Adapted from O’Connor et al., 2018</i>).
		<u>Drinking break</u> : time within training prior or subsequent to a practice when players are walking on their way to hydrate, drinking or returning from drinking into a player huddle or practice positioning (<i>Adapted from O’Connor et al., 2018</i>)
		<u>Transition</u> : time within training prior or subsequent to a practice when players are: 1) Moving from a player huddle into practice positioning or vice versa, 2) moving from a circuit exercise to a following exercise, 3) awaiting coach indication to start the practice (<i>Cushion et al., 2012</i>), 4) Told to collect the equipment.
	Coach stops practice	Instance at training in which the coach asks players to stop and: 1) Freeze in their current position (<i>O’Connor et al., 2018</i>), 2) come for a player huddle, 3) rearranges the structure/rules of the practice; but the same practice-format continues after the break.
	Ball out of play	Moment of a training session when the ball goes out of play (e.g. outside, goal, offside) or the coach acts as a referee to indicate a type of re-start. The coach can or cannot use that time to intervene/stop the practice.
	Uncodable	Any other question or training moment not fitting the previous categories.

Post-intervention systematic observation data were collected following procedures described in pre-intervention and enabled comparisons between question types at the two time points over a matched number of sessions and player groups coached.

Pre-intervention, post-intervention, and consolidation interviews

After meetings to develop the pre-intervention interview schedule and undertaking pilot testing, the interview schedules finally included: 1) biographical and demographical questions, 2) questions examining rationales for providing augmented information (i.e., instruction and feedback) or asking questions, 3) questions regarding their utilisation of coach behaviours during training with a focus on their questions and their perceived appropriate timing. Post-intervention interviews were equally prepared and explored: 1) consideration of coaches' learning throughout their careers; 2) exploring rationales and preferred instances for using different question types; 3) stimulated recall questions regarding their utilisation of questioning; and 4) their perception of the CDP process and the challenges experienced (Table 4). Pre-intervention and post-intervention interviews were conducted in a private office within the academy setting to avoid any disruptions and lasted between 24.4 and 30.7 minutes (mean = 28.2 ± 2.4), and 31.7 and 45.4 minutes (mean = 41.3 ± 5.2), respectively.

The following season, coaches were encouraged to adapt what they had learnt with their new age-groups, with no input about their use or timing of questions. Consolidation interviews were conducted via Zoom due to the covid-19 lockdown and lasted between 48.9 and 72.3 minutes (mean = 59.7 ± 8.6). The focus of consolidation interviews was to determine changes in knowledge and its stabilisation. Stimulated recall examples for each instance were prepared alongside the post-intervention interview schedule (Figure 1). The six coaches completed all interviews except Daniel who missed the consolidation interview.

Table 4. Pre- and post- intervention interviews' themes.

Pre-intervention Interview		Post-intervention Interview		
Higher-order themes	Second-order themes	Higher-order themes	Second- and first-order themes	
0) Preferred coaching styles	-Concept -Rationale	1) Questioning rationales	-Reasons underpinning use -Questioning vs direct information	
1) Questioning rationales	-Reasons underpinning use -Questioning vs direct information	2) Adoption of question types	-Convergent & divergent questions conceptions -Combination of convergent & divergent questions	
2) Concepts of question types	-Conceptions -Dis/advantages	3) Timing & rationales of question types	Introduction	To check players' understanding of concepts already worked on
			During: Convergent	To avoid losing practice time Players have a low attention state
			In-between: Divergent	To think how performing subsequently Players are in a more reflexive state
3) Timing of question types	-During practice - Closed -In between - Open -Limited understanding of rationale		When coach stops	Because an emerging situation Giving immediate feedback or correct Flashback: link training action to match Intentionally so players can improve second bout
			Far zone intervention	To avoid stopping More individual intervention
			Ball out of play	To slow down or increase the practice's tempo Practice stops itself

First-order themes	Second-order themes
Questions not requiring players' answers Rhetorical or instructional questions	During the practice
Providing clear initial information Progress from divergent to convergent questions	In-between practices
Reinforce positive play Correct improvable aspects Highlight a particular action Avoid frequent stops Alternative is approaching far zone players	When coach stops practice
Quick ball: increase tempo or be game-specific Game stops itself: congratulate or correct	Ball out of play

Figure 1. Consolidation interviews' new emerging first-order themes.

Coach Development Programme

Stage 1: Workshop and directed task 1

As the communication curriculum was on its infancy at the academy, an introduction of the CAIS' behaviours (Cushion et al., 2012) was made. This instrument was selected as a tool for supporting the development of communication within the curriculum, because its previous utilisation to measure question types adopted by coaches (Partington, Cushion, and Harvey, 2014) and formal CDPs' impact (Stodter and Cushion, 2019).

The workshop was designed following principles of Collaborative Developmental Action Inquiry (Torbert, 2013) and aimed to expand the information on questioning upon which practitioners act (Voldby and Klein-Døssing, 2020). Coaches were enabled to share their opinions concerning the use of instruction/feedback or questioning, with coaches considering

questions an effective behaviour for some situations. However, when the CD asked participants to give examples of questions they typically asked in their sessions and express their perceived player learning rationale, two main positionings emerged: 1) using as much divergent questioning as possible, and 2) divergent questions being difficult to use during training. Subsequently, individual or group questions asked by the coach were distinguished, and classified into convergent or divergent, so coaches differentiated between questions requiring un/limited or lower/higher-order thinking (Harvey and Light, 2015).

Finally, the four ‘training moments’ were presented, and coaches were encouraged to experiment with instances in which their question types could be employed more effectively during their own coaching sessions (Stodter and Cushion, 2016). It was intended that participants explored links between questioning theory and application (Jones et al., 2012). No suggestion of the most beneficial question type or timing was provided. Each coach was given six of their normal training sessions to self-discover how questioning could be adopted within the ‘training moments’ of their sessions, before beginning directed task 2.

Stage 2: Directed task 2

Coaches were emailed video-based sequences (i.e., clips) from directed task 2 recorded sessions, where they had asked questions to their players. These served as a stimulus for virtual reflective conversations (via email) with CD to be framed on coaches’ observable actions (Stodter et al., 2021). Indeed, video clips were combined with a dialogic learning approach that started with a divergent question (e.g., what are your thoughts on your intervention-questions used in this clip?), and aimed to encourage coaches to develop their understanding, cognitions, and reflections about their practice (Stodter et al., 2021).

If responses contained information not understood or superficial, the CD sent coaches a second re-formulated probing question intended to promote clarification or deeper reflection

(Cope et al., 2020). This typically attempted to elicit further elucidation about their previous answer (e.g., what do you mean by players' being in a non-attentional state?); refine participants' thoughts (e.g., what specifically is what you do not like from interrupting practices to ask questions); probe the effectiveness of employed approaches (e.g., how and why do you think stopping the practice and questioning contributed to your objectives?); or suggest alternative approaches and their rationale (e.g., what could you do within a future similar situation and why?).

Directed task 2 was disseminated before coaches' first training session of the week and expected to be completed before their last session. All participants answered most questions of this task, except Carlos and Daniel (Table 5). These coaches had attended the workshop and completed the directed task 1, however, when reflective questions and video-based sequences of their questioning techniques were disseminated; Carlos never responded, and Daniel only answered one bout of questions.

Table 5. Coaches' commitment to directed task 2.

Tasks	Pedro	Pablo	Carlos	Juan	Antonio	Daniel
No. of clips & questions initially disseminated	8	8	6	8	8	6
Reflective answers	8	8	0	8	6	2
2 nd questions disseminated	6	4	0	2	2	0
2 nd reflective answers	6	4	0	2	0*	0

*Antonio was disseminated two 2nd questions that were not responded.

Analysis

The eight training sessions for each coach (4 pre-intervention and 4 post-intervention) were coded by the CD and exported to Microsoft Excel (version 16.48). This generated count and duration for convergent and divergent questions within each moment. With these data, the mean frequency count of question types within each moment at pre- and post-intervention phases for each coach was estimated. Standard deviations were calculated to indicate variability

of mean values. Intra-observer reliability was determined by comparing the CD's codes of the same session six times and agreements between the these ranged between 90% to 95% and 86% to 89% for frequency and duration data. Inter-observer reliability was tested between CD and a trained research team member who coded the same six sessions. Agreement levels reached 90% and 87% for frequency and duration data.

Pre-, post-, and consolidation interviews were transcribed verbatim immediately after their conclusion. These data yielded 128 pages of single-line-spaced text read several times during the analysis. In-depth analysis was performed for each interview phase, independently, using a six-step thematic analysis approach (Braun, Clark, and Weate, 2016) that categorised raw data into meaningful higher- and second-order themes (Hanton and Jones, 1999). This process commenced deductively, continued inductively (Scanlan, Ravizza, and Stein, 1989), and grouped questioning concepts according to similarities and differences between coaches. Furthermore, changes in themes' meaning between interviews were compared within a bespoke matrix that included the coded categories for each coach within the three time-points. These categories were deemed modified when more frequently used or qualitatively different (Saldaña, 2003). Indeed, concepts that matched with the previous interview data were included within those themes to add further depth, whereas a new theme was created for non-aligned concepts (Reeves et al., 2018). To enhance the data's trustworthiness, co-authors acted as critical friends in understanding and critically appraising data. Specifically, the third and last authors met with the CD on a weekly basis throughout the analysis phase and supported the lead researchers' analysis through discussion that addressed their isolation within the process and data overload (Foulger, 2009). Although time consuming, this approach was necessary to strengthen, refine, and support the CD's analytical decisions.

Results, findings, and discussion

Convergent questions decreased from pre- to post-intervention for all coaches except Antonio. Total and divergent questioning only increased for coaches who undertook the complete work-based CDP (Table 6). Regarding convergent and divergent questions within the practice moments, pre- and post-intervention comparisons exhibited the highest increases in convergent questions during the practice and divergent questions in-between practices for this group of coaches. Smaller increases were detected for divergent questions when the coach stopped practice. Only Pablo exhibited a higher rise of divergent questions within this situation compared to in-between activities (Table 7).

Pre-, post-, and consolidation interviews suggest changes in all coaches' perceptions about the application of questioning within training sessions after the CDP. These perceptions were grouped into three main higher-order themes: 1) questioning rationales, 2) concepts/adoption of question types, and (3) timing and rationales of question types. Moreover, congruent changes between perceptions (i.e., knowledge) and behaviour only occurred for coaches who completed the full work-based CDP. To further examine this, the following sections are structured into: 1) coaches' perceptions on questioning application and 2) transference of knowledge to behaviour.

Table 6. Number of questions asked at pre- and post- sessions per coach.

Work-based CDP	Coach	Convergent questioning		Divergent questioning		Total questioning	
		Pre	Post	Pre	Post	Pre	Post
Complete	Pedro	88	72	11	76	99	148
	Pablo	46	38	25	38	71	76
	Juan	46	37	9	53	55	90
	Antonio	18	37	5	44	23	81
Incomplete	Carlos	56	31	12	5	68	36
	Daniel	30	16	20	19	50	35
Total		284	231	82	235	366	466

Table 7. Mean (M) frequency and standard deviation (SD) of question types within the practice-moments at pre- and post-intervention phases.

Moment	Question	COMPLETE WORK-BASED CDP								INCOMPLETE WORK-BASED CDP			
		Pedro		Pablo		Juan		Antonio		Carlos		Daniel	
		Pre M (SD)	Post M (SD)	Pre M (SD)	Post M (SD)	Pre M (SD)	Post M (SD)	Pre M (SD)	Post M (SD)	Pre M (SD)	Post M (SD)	Pre M (SD)	Post M (SD)
During practices	Convergent	5.00 (3.56)	10.25 (5.97)	1.25 (0.96)	7.25 (1.26)	4.00 (2.58)	7.00 (2.71)	0.75 (0.50)	7.00 (2.71)	3.75 (1.89)	3.00 (1.73)	1.25 (0.96)	1.00 (0.00)
	Divergent	0.25 (0.50)	1.25 (1.26)	0.00 (0.00)	1.75 (0.96)	0.00 (0.00)	0.00 (0.00)	0.25 (0.50)	0.00 (0.00)	0.75 (0.96)	0.00 (0.00)	0.00 (0.00)	0.50 (1.00)
In-between practices	Convergent	6.25 (5.12)	3.25 (3.86)	2.75 (3.10)	0.25 (0.50)	4.50 (2.38)	1.75 (1.26)	1.00 (1.15)	1.75 (1.26)	6.75 (4.57)	3.67 (3.51)	0.00 (0.00)	1.00 (1.41)
	Divergent	1.25 (1.26)	11.25 (6.40)	0.25 (0.50)	1.75 (0.96)	0.75 (0.96)	10.75 (9.22)	0.25 (0.50)	10.75 (9.22)	1.75 (0.50)	1.00 (1.73)	1.25 (0.96)	1.75 (1.71)
Coach stop practice	Convergent	5.5 (5.20)	3.25 (1.26)	1.50 (2.38)	1.75 (2.36)	2.50 (3.11)	0.50 (1.00)	1.75 (1.71)	0.50 (1.00)	2.50 (2.65)	2.33 (3.21)	5.00 (6.38)	1.25 (0.96)
	Divergent	0.25 (0.50)	6.25 (5.91)	1.00 (2.00)	4.75 (4.35)	1.50 (1)	2.25 (2.22)	0.25 (0.50)	2.25 (2.22)	0.25 (0.50)	0.00 (0.00)	2.75 (3.77)	1.25 (1.50)
Ball out of play	Convergent	2.25 (1.89)	1.25 (1.26)	0.00 (0.00)	0.25 (0.50)	0.50 (0.58)	0.00 (0.00)	1.00 (1.41)	0.00 (0.00)	1.00 (2.00)	1.33 (1.53)	1.25 (1.26)	0.75 (0.96)
	Divergent	0.25 (0.50)	0.25 (0.50)	0.00 (0.00)	1.25 (1.26)	0.00 (0.00)	0.25 (0.50)	0.50 (0.00)	0.25 (0.50)	0.25 (0.50)	0.67 (1.15)	1.00 (1.41)	1.25 (1.50)

Coaches' perceptions on questioning application

Pre-intervention interviews

When asked about their preferred behaviours to facilitate player learning, one participant mentioned 'positive feedback reinforcing player behaviours', whereas the rest indicated 'asking questions'. At pre-intervention, coaches asked 366 questions in total and affirmed using them for encouraging 'thinking', 'reflection' and 'understanding'. However, following O'Connor et al. (2021) who associated divergent questioning to game tactics, Pedro, Pablo, and Juan linked divergent and convergent questioning to in-possession and out-of-possession themes; suggesting that the former aspects require more 'creativity' and 'cognitive processing':

...when pressing, the striker gets somewhere and the midfielder somewhere else. These are patterns of our game that always happen, and I direct them more...On the other hand, if the opposition comes to press our build-up play with one, two, or three, I want them to be able to interpret if we can play or where the space is... (Pedro)

Another factor that seemed to influence participants' utilisation of questions was the moment of the session in which the coach intervened. Questions asked before or after a practice are believed to have less influence on players' game sense (McNeill et al., 2008). Nonetheless, at pre-intervention, most participants asked a greater number of questions in-between practices and Juan stated that he asked questions before beginning training to check players' understanding of the session's focus, and provided feedback later while players performed. Pablo, who exhibited one of the lowest rates of questioning when practice stopped at pre-intervention, further explained this indicating that although he aimed to develop active-thinking players, a balance between asking questions and practice continuity was desirable:

I also think it's very difficult delivering this type of training. You should constantly be stopping for asking questions. Thus, we try to make them reflect while ensuring practice continuity...

Because coaches use constant stoppages in their practices that can restrict players' problem-solving opportunities (O'Connor, Larkin, and Williams, 2017), 'to observe more' and direct less has been recommended by some researchers (Cushion, 2013, p. 66). Indeed, O'Connor, Larkin, and Höner (2020) have proposed the notion of practice continuity, so players discover solutions by themselves, interspersed with occasional interruptions involving questions. At this stage, coaches distinguished between convergent and divergent questions (i.e., with few or multiple response options) without referring to the thinking skills each questioning type can promote. Furthermore, demonstrating awareness of their pre-intervention quantitative data, Antonio indicated that most of his questions were convergent and directed to his expected answers. Likewise, Juan and Daniel stated that their convergent questions while players were practising aimed to avoid reducing the tempo of the activity. Only Daniel and Pedro outlined 'before the following practice' as an appropriate moment to ask more divergent questions, although justifications for this strategy were limited:

...if you come out to press there, what are you generating? If you want to force the play one way, how should you press? I believe that all or most of the questions I ask are closed...and you want them to tell you what you want, but that it's them who find the solutions. (Antonio)

During practices, more direct questions seeking quick answers. Because we don't want to stop the tempo, dynamic...and in-between you can open a bit more the questions, so they reason a little more. (Daniel)

Previous studies have discouraged the use of questions requiring low order knowledge (i.e., recalling or understanding) or convergent thinking (i.e., with limited response options) (Cope et al., 2016). In addition, game-based approaches have suggested that questions can be mostly asked 'between bouts of game play' (Harvey and Light, 2015, p. 178). However, these claims have been made without consideration of why these circumstances might be more appropriate, or when and why coaches perceive better opportunities for asking convergent and divergent

questions to enhance players' learning. Only O'Connor (2021) identified that during drill- and game-based practices, both types of questions are typically asked by freezing players into their current positions with exception of convergent questions within large-sided games. Thus, participants appeared to possess limited understanding about why certain moments might involve better opportunities for asking players different question types.

Post-intervention interviews

During the post-intervention phase, participants asked 466 questions in total. Although only coaches in the complete work-based CDP increased convergent questions during practice, all participants demonstrated awareness of this approach arguing that simpler questions enabled quicker answers and the practice to continue. Conversely, all coaches in the complete CDP increased divergent questioning in-between practice and when stopping practice at post-intervention, suggesting that players required meaningful opportunities and time to engage in higher-order thinking. This concurs with graduate coaches' perceptions of intervals between practices constituting an opportunity for dialoguing with players (Stonebridge and Cushion, 2018). Indeed, Pablo and Juan maintained their preference for asking more divergent questions before the first activity and all coaches considered the use of divergent questioning in-between practices appropriate, due to players being in a 'more reflexive state':

...when the game is happening, you can throw the divergent question but the attention during those instances can be lower due to the time. In-between practices, there is that little moment for disconnection in which they go to drink water or they're resting. (Carlos)

Furthermore, participants stated that they stopped practices when 'meaningful' or 'clear actions of improvement' occurred. These interruptions aimed to rearrange activities not working or 'to make immediate corrections'. Antonio and Juan perceived stopping the practice and highlighting aspects of improvement as a more suitable guided discovery strategy than

overextending information before the following practice. Pablo, who had the highest increase in divergent questions when stopping compared to in-between practices, indicated he deliberately used this approach to give ‘usable feedback’ that players could utilise in the subsequent bout of play (Cazden, 2001). Contrary to Caram and Davis (2005), who developed learners’ knowledge progressing from lower- to higher-order questions, he preferred to guide players starting with divergent questions and moving toward more convergent questions that inquired his desired responses. This approach appears to share similarities with the Initiation Response Evaluation/Feedback questioning structure (Harvey and Light, 2015) where coaches do not enable further exploration of players’ ideas (Forrest, 2014); and therefore, positioning themselves as gatekeepers of knowledge (Potrac and Cassidy, 2006):

When the practice is stopped. It’s immediate feedback. Something has just happened. Later, this same action must be very meaningful for him to remember... (Carlos)

... during a 15-minute practice, stopping it in the middle and refresh the things you’ve seen or haven’t come out. So, in the last part, you see if they do it better. (Juan)

I often start more divergent and if they don’t answer well, you make them more convergent...So you can see what they think, and you then guide them towards what you want. (Pablo)

To avoid stopping the whole group when asking small-group questions during team-based practices, Cazden (2001) proposed calling one individual from each team ‘off the pitch’. In this study, a similar approach not contemplated as a subcategory of ‘during the practice’ moment emerged from interview data. This commonly occurred during large games and consisted of approaching a player, not intervening immediately. O’Connor et al. (2021) reported that questions posed under these circumstances typically involved low-order thinking. Participants described this as ‘the opposite to interrupting practice’, enabling practice continuity, and being ideal for facilitating individual corrections:

That boy, as a centre back, tended to dribble and lost many balls. I used that time...it's more individual and if it's a mistake is good because the boy does not see himself harassed in front of the group. (Pedro)

Consolidation interviews

Post-intervention interview themes remained consistent, suggesting knowledge consolidation had occurred. Only minor changes in the meaning of some first-order themes were noted (see figure 1). For instance, although the use of 'rhetorical' questions has been discouraged for their limited value in facilitating higher-order thinking (McNeill et al., 2008), participants recognised that some of their stimulated recall questions during practice 'could have been substituted by instructions'. Similarly, they acknowledged having asked questions during practices that did not expect a player response with the primary objective of directing players to knowledge they already possessed but were not implementing:

I asked that question many times [and now what?] so they assimilate that as soon they lose the ball, they have to press...Practically, there isn't much difference because if I say 'press', players in the near zone have to press... (Juan)

When I ask a question and go it's because I consider that the player already knows the concept...We talk about convergent questions. That one is super mega convergent. (Antonio)

Pablo and Antonio expressed that a divergent question could lose divergence (i.e., response options) and become more convergent if about previously explained concepts. Pablo stated that after time working with the same age-group, 'when you ask a question, you know what the boy is going to answer, and he knows what you want him to answer'. This process has been described as players engaging in a 'guessing game' of what their coach is thinking (Myhill and Dunkin, 2005); and suggests that player's existing knowledge might decrease the complexity of a divergent question because similarities between current and previous contents asked. Therefore, albeit players' perceptions were not examined, it appears that question types might

limit or expand the possible response options or encourage higher or lower thinking skills depending on the recipients' (i.e., players) levels of understanding.

Further, all coaches became more conscious about stoppages reducing practice continuity and proposed clear initial information to avoid later interruptions. Nonetheless, coaches have been observed stopping practice and directing considerable tactical divergent questions to a player or small group while the rest were waiting (O'Connor et al., 2021). Antonio rationalised that some situations require stopping and asking individual or small-group questions, so all players become aware of certain information. Indeed, stepping into the practice to make individual corrections was the favoured approach of participants unless the player's mistake was relevant to the whole group, or a player required bandwidth feedback (Williams and Hodges, 2005):

If the defensive midfielder wanted to get forward, he could do it. But if our fullback were also high, they would leave space in behind...I stopped and asked because I didn't want that this action occurred under any circumstances, and they all needed to be aware. (Pedro)

Finally, participants increased their understanding of how to use ball out of play time. Most coaches expressed they could 'kick a ball in' to maintain continuity or delay the restart to 'congratulate or correct' a recent action. Pablo noted the benefit of this approach:

...The practice has stopped itself, and we're gonna give quick instructions to continue. Players feel you haven't stopped it. The play has stopped itself, and we have talked.

O'Connor's et al. (2021) data, provide some evidence about the timing in which coaches ask questions during training. The previous findings advance our understanding about what coaches perceive to be more appropriate opportunities for asking convergent or divergent questions. Specifically, coaches expressed their preference for asking convergent questions during the practice delivery, and divergent questions during stoppages of play because of a higher time to engage players in higher-order thinking. Moreover, although coaches were

aware of the benefit that stopping practice and asking questions could entail, they contemplated approaching individuals not immediately intervening in the practice to avoid frequent or group interruptions. In addition, this CDP led to changes in coaches' perceptions (i.e., knowledge) about their sense of use and timing of questioning techniques. In combination, the workshop and the experimentation and reflection tasks resulted in all participants' increased understanding, albeit the research design employed could not guarantee exclusive causal effects between the work-based CDP and coaches' knowledge outcomes.

Transference of knowledge to behaviour

Although all participants appeared to develop their knowledge about the use of question types within the various moments of practice, only coaches who undertook the complete CPD transferred it into behaviour changes at post-intervention. These changes involved increased convergent questions (during practice) and divergent questions (in-between and when the coach stops practice); and constitute initial evidence of knowledge transfer to behaviour. Conversely, coaches who did not undertake video-based reflections presented inconsistent knowledge and behaviours (see table 7). Therefore, it is argued that congruence between knowledge and behaviour might specifically relate to participants' engagement in directed task 2.

As coaches' knowledge can become tacit/unconscious over time (Watts and Cushion, 2016; Cushion, 2016), it has been suggested that expert coaches utilise their cognitive structures despite not necessarily being able to articulate their knowledge declaratively (Nash and Collins, 2006). Indeed, empowering coaches to critically reflect and compare the alignment between their ideas of practice, and their observable actions and underpinning knowledge (Putnam, 2014) has been recommended for increasing coaches' knowledge consciousness (Cushion, 2016). Further, Jones et al. (2012) reported enhanced knowledge and 'philosophy' of practice

when coaches engaged in group reflection about the application of theory while being given opportunities to implement knowledge in-context. Thus, setting unresolved issues in coaches' knowledge-practice, and facilitating awareness of the employed behaviours and reflection about their suitability (Jones et al., 2012), might lead to behaviour acceptance or willingness to change (Raya-Castellano et al., 2021).

In this study, whilst the interviews did not specifically explore why changes in convergent and divergent questions occurred, coaches in the complete work-based CDP displayed their satisfaction with the balanced positionality that the CD had adopted. Supporting findings from Stodter et al. (2021), participants provided considerable value to the reflective process that combined video-based and dialogic reflections. They suggested that the CD's questions asked in combination with reviewing their own videos had enabled them 'to think about the situations surrounding their questions in more depth' while 'identifying good and improvable aspects' of their delivery. In fact, two coaches recalled training situations in which they had noticed employing questioning approaches that contradicted their plans generated during directed task 2. For example:

Antonio: *...before I was unable to talk to a player while the practice was going on. Now, I see it appropriate because I am giving the information required and I haven't stopped the practice.*

CD: *What do you think of the questions you've asked?*

Antonio: *...the problem is that I've answered the second question myself. I'm comfortable with the first one but I've self-answered the second one.*

CD: *Is there anything wrong with that?*

Antonio: *Well, I know where he's made the mistake. It's him who must think about where he is wrong and why. Thus, it's better if it's him who answers the question...Actually, I remember being in that situation thinking 'why have you just done it again' [self-answering a question for the player]?*

Behavioural 'discoveries' or 'disturbances' contradicting coaches' intentions have been highlighted as potential opportunities for changing coaching practice (Voldby and Klein-

Døssing, 2020). This extract from Antonio's post-intervention interview not only reflects increased awareness of a past 'discovery', but also intention of not self-answering his questions. Although the above situation represents an example of unconscious processes still guiding coaching action, this also involved real-time consciousness of a contradictory behaviour. It is suggested that the concept of 'not self-answering questions' matched Antonio's cognitive structures during directed task 2 and had become more available for its application (Stodter and Cushion, 2017), constituting an initial stimulus for behaviour change.

For coaches implementing conscious knowledge about the application of questioning within the practice moments, reflection increasing the availability of coaches' conscious knowledge and intentions might not suffice. Because coaches have been shown to reflect through a sequence of strategy generation, experimentation, and evaluation of their coaching approaches (Gilbert and Trudel, 2001), reflective practice might have to be combined with several opportunities to implement and adjust knowledge about the application of questioning in-context. Stodter and Cushion (2017) refer to this process as the reflective feedback loop cycle, where continuous experimentation, adaptation, and refinement of behaviours occur until effective adoption of knowledge into practice. Therefore, it is argued that the video-based and dialogic reflective practice concerning the use of questioning, integrated within coaches' training sessions, might have resulted in congruent changes between questioning-related knowledge and behaviour exclusively for the complete work-based CPD.

Finally, coaches in the incomplete CDP group (i.e., Carlos and Daniel) highlighted other contextual or organisational factors that hindered their involvement in this work-based CDP. As the rest, they worked for the club part-time and undertook coaching in the evenings alongside other jobs. Both attributed not being able to dedicate more time to the directed video-based reflections due to their other jobs. Moreover, Daniel, whose under 15 players competed in an under 16-league, was struggling against relegation. This could result in the academy

losing this age-group's category status and potential difficulties for recruiting under 15 players the following season:

If you are more hours in the club, the salary will increase at the end of the month and it wouldn't be necessary to be multi-employed. (Carlos)

I have been myself with these circumstances. It's true that the needs of competition have slowed down the learning processes. This is the last year of development. However, due to the urgencies, this year has transformed into a year of competition and the learning process has slowed down quite a lot. (Daniel)

Limitations and future research

Although this work-based CDP included incomplete and complete interventions, the absence of a group receiving no education did not guarantee a causal relationship between the CDP activities and coaches' outcomes. Second, coaches were free to participate and engage in this CDP; but the topic (i.e., questioning) and the four 'training moments' framework were decided by the AMT and research team, which might have influenced coaches' commitment (Cope et al., 2020). Furthermore, whilst participants were interviewed about their perceptions on how the video-based and dialogic reflection had supported them, the specific reasons of coaches in the complete CDP for changing their questioning utilisation were not explored. Therefore, future studies could include appropriate study designs to measure the extent to which video-based and dialogic reflection, and self-discovery activities might lead to associated changes in knowledge and behaviour.

Conclusion

This six-week work-based CDP consisted of a workshop and two directed tasks that required coaches to experiment and reflect on their questioning techniques during training. All coaches developed and consolidated their knowledge; though only those that completed all CDP tasks transferred their knowledge into congruent convergent questions (during practice) and

divergent questions (in-between practices and when the coach stops practice). It is believed that reflection, supported by video-feedback and reflective conversations (i.e., directed task 2), apart from enhancing coaches' developmental experience (Stodter et al., 2021), might have originated changes in coaches' use of questioning when combined to the experimentation opportunities provided. The argument is that while reflection might have brought coaches' knowledge about questioning techniques to a conscious level, for adopting knowledge, several opportunities of adapting knowledge might also be required. Therefore, an appropriate integration of both tasks could be an effective approach for attaining coaches' transformation of their knowledge into congruent behaviours.

Throughout the CDP, the knowledge developed by coaches provides some practical considerations underpinning their use of convergent and divergent questioning. These are intended to describe participants' rationales for using question types within the moments of training rather than providing one-size-fits-all prescriptions of their use. First, although previous research has advocated the use of divergent questions for facilitating players' learning (Harvey and Light, 2015); as the CDP progressed, coaches considered convergent questions during the practice to enable thinking and practice continuity. Similarly, all participants suggested that for divergent questions to be effective, more appropriate circumstances are typically found when the practice is not being played. They ascribed this to the players' attentional state and time for thinking and answering. Furthermore, the use of stoppages involving questions was linked to enable players utilising knowledge discussed in the subsequent bout of practice. However, to avoid constant or whole group stoppages correcting individual aspects, coaches contemplated approaching individual players that did not require immediate involvement in the game while the practice continued.

To conclude, the multiple methods employed enabled a longitudinal supervision of coaches' knowledge and behaviour throughout the work-based CDP. Qualitative data served to

understand participants' perceived opportunities for using question types during training sessions while monitoring changes in their knowledge over the 24 months. Findings highlight the importance of integrating reflection on personal coaching approaches combined with their experimentation. The integration of these activities seems relevant for attaining congruent changes between coaches' knowledge and behaviour during work-based CDPs.

Acknowledgements

This work was supported by the Spanish Ministry of Universities under Grant [FPU16/04651].

Declaration of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

References

- Bamberger, J., and D.A. Schön. 1983. Learning as reflective conversation with materials: notes from work in progress. *Art Education* 36 (2): 68-73. doi: 10.2307/3192667
- Braun, V., V. Clarke, and P. Weate. 2016. "Using thematic analysis in sport and exercise research". In *Routledge handbook of qualitative research in sport and exercise*, edited by B. Smith and A.C. Sparkes, 191-205. London: Routledge.
- Caram, C., and P. Davids. 2005. "Inviting student engagement with questioning". *Kappa Delta Pi Record* 42 (1): 19-23. doi: 10.1080/00228958.2005.10532080
- Cazden, C.B. 2001. *Classroom discourse: the language of teaching and learning*. 2nd ed. Portsmouth: NH Heinemann.
- Cope E., C.J. Cushion, S. Harvey, and M. Partington. 2020. "Investigating the impact of a Freirean informed coach education programme". *Physical Education & Sport Pedagogy* 26 (1): 65-78. doi: 10.1080/17408989.2020.1800619

- Cope, E., M. Partington, C.J. Cushion, and S. Harvey. 2016. "An investigation of professional top-level youth football coaches' questioning practice". *Qualitative Research in Sport Exercise and Health* 8 (4): 380-393. doi: 10.1080/2159676X.2016.1157829
- Cushion, C.J., A. Stodter, and N.J. Clarke (2021). 2021. "'It's an experiential thing': the discursive construction of learning in high-performance coach education". *Sport, Education and Society*. doi: 10.1080/13573322.2021.1924143
- Cushion, C.J., M. Griffiths, and K. Armour (2017). "Professional coach educators in-situ: a social analysis of practice". *Sport, Education, and Society* 24 (5): 533-546. doi: 10.1080/13573322.2017.1411795
- Cushion, C.J., S. Harvey, B. Muir, and L. Nelson. 2012. "Developing the coach analysis and intervention system (CAIS): Establishing validity and reliability of a computerised systematic observation instrument". *Journal of Sports Sciences* 30 (2): 201–216. doi: 10.1080/02640414.2011.635310
- Cushion, C.J. 2013. "Applying game centered approaches in coaching: A critical analysis of the 'dilemmas of practice' impacting change". *Sports Coaching Review* 2 (1): 61-76. doi: 10.1080/21640629.2013.861312
- Cushion, C.J. 2016. "Reflection and reflective practice discourses in coaching: a critical analysis". *Sport, Education and Society* 23 (1): 82-94. doi: 10.1080/13573322.2016.1142961
- Darst, P.W., D.B. Zakrajsek., and V.H. Mancini. 1989. *Analysing physical education and sport instruction*. 2nd ed. Champaign, IL: Human Kinetics.
- Davis, B., and D. Sumara. 1997. Cognition, complexity, and teacher education. *Harvard Educational Review* 67 (1): 105-126. doi: 10.17763/haer.67.1.160w00j113t78042

- Dempsey, N., D. Richardson, E. Cope, and C. Cronin. 2020. "Less may be more: how do coach developers reproduce "learner-centred" policy in practice?". *Sport Coaching Review*. Advance online publication. doi: 10.1080/21640629.2020.1866851
- Engin, M. 2013. "Questioning to Scaffold: An exploration of questions in Pre-service Teacher Training Feedback Sessions". *European Journal of Teacher Education* 36 (1): 39-54. doi: 10.1080/02619768.2012.678485
- Forrest, G. 2014. "Questions and answers: Understanding the connection between questioning and knowledge in game-centred approaches". In *Contemporary developments in games teaching*, edited by R. Light, J. Ouay, S. Harvey, and A. Mooney, 167-177. London: Routledge.
- Foulger, T.S. 2009. "External conversations: An unexpected discovery about the critical friend in action research inquiries". *Action Research* 8(2): 135-152. doi: 10.1177/1476750309351354
- Gilbert, W. and P. Trudel. 2001. Learning to coach through experience: Reflection in model youth sport coaches. *Journal of Teaching Physical Education* 21 (1): 16-34. doi: 10.1123/jtpee.21.1.16
- Hanton, S., and G. Jones. 1999. "The acquisition and development of cognitive skills and strategies: I. Making the butterflies fly in formation". *The Sport Psychologist* 13 (1): 1-21. doi: 10.1123/tsp.13.1.1
- Harvey, S., C.J. Cushion, E. Cope, and B. Muir. 2013. "A season long investigation into coaching behaviours as a function of practice state: The case of three collegiate coaches". *Sports Coaching Review* 2 (1): 13-32. doi: 10.1080/21640629.2013.837238
- Harvey, S., and R. Light. 2015. "Questioning for learning in game-based approaches to teaching and coaching". *Asia-Pacific Journal of Health, Sport and Physical Education* 6 (2): 175-190. doi: 10.1080/18377122.2015.1051268

- Hill, J. 2016. "Questioning Techniques: A study of instructional practice". *Peabody Journal of Education* 91 (5): 660-671. doi: 10.1080/0161956X.2016.1227190
- Jones, R., K. Morgan, and K. Harris. 2012. "Developing coaching pedagogy: seeking a better integration of theory and practice". *Sport Education and Society* 17 (3): 313-329.
- Light, R. 2008. "Complex learning theory – Its epistemology and its assumptions about learning: Implications for physical education". *Journal of Teaching in Physical Education* 27 (1): 21–37. doi: 10.1123/jtpe.27.1.21
- McNeill, M.C., J.M. Fry, S.C. Wright, C.W. Tan, and T. Rossi. 2008. "Structuring time and questioning to achieve tactical awareness in games lessons". *Physical Education & Sport Pedagogy* 13 (3): doi: 10.1080/17408980701345766
- Mesquita, I., J. Ribeiro, S. Santos, and K. Morgan. 2014. "Coach learning and coach education: Portuguese expert coaches' perspective". *The Sport Psychologist* 28 (2): 124–136. doi: 10.1123/tsp.2011-0117
- Metzler, M. 2000. *Instructional Models for Physical Education*. Boston, MA: Allyn & Bacon.
- Myhill, D., and F. Dunkin. 2005. "Questioning Learning". *Language and Education* 19 (5): 415-427. doi: 10.1080/09500780508668694
- Nash, C., and D. Collins. 2006. "Tacit knowledge in Expert Coaching: Science or Art?". *Quest* 58 (4): 465-477. doi: 10.1080/00336297.2006.10491894
- Nelson, L., and C.J. Cushion. 2012. "Coach education and learning: developing the field". *Routledge handbook of sports coaching*, edited by P. Potrac, W. Gilbert, and J. Denison. Oxon: Routledge.
- O'Connor, D., P. Larkin, and O. Höner. 2020. "Coaches use of GBA's in team sport". In *Perspectives on Game-based coaching*, edited by S. Pill. London: Routledge.

- O'Connor, D., P. Larkin, and A.M. Williams. 2017. "What learning environments help improve decision-making?". *Physical Education and Sport Pedagogy* 22 (6): 647-660. doi: 10.1080/17408989.2017.1294678
- O'Connor, D., P. Larkin, and A.M Williams. 2018. "Observations of youth football training: How do coaches structure training sessions for player development?". *Journal of Sports Sciences* 36 (1): 39-47. doi: 10.1080/02640414.2016.1277034
- O'Connor, D., P. Larkin, S. Robertson, and P. Goodyear. 2021. "The art of the question: the structure of questions posed by youth soccer coaches during training". *Physical Education and Sport Pedagogy*. Advance online publication. doi: 10.1080/17408989.2021.1877270
- Partington, M., C.J. Cushion, and S. Harvey. 2014. "An investigation of the effect of athletes' age on the coaching behaviours of professional top-level youth soccer coaches". *Journal of Sports Sciences* 32 (5): 403-414. doi: 10.1080/02640414.2013.835063
- Partington, M., C.J. Cushion, E. Cope, and S. Harvey. 2015. "The impact of video feedback on professional youth football coaches' reflection and practice behaviour: A longitudinal investigation of behaviour change". *Reflective Practice* 16 (5): 700–716. doi: 10.1080/14623943.2015.1071707
- Potrac, P., and T. Cassidy. 2006. "The Coach as a 'More Capable Other'". *The Sports Coach as Educator: Re-Conceptualising Sports Coaching*, edited by R.L. Jones, 39-50. London: Routledge.
- Putnam, R. 2014. "On 'Theories of Action'". In *The Sage Encyclopedia of Action Research*, edited by D. Coghlan and M. Miller, 128. London: SAGE Publications.
- Scanlan, T.K., K. Ravizza, and G.L. Stein (1989). "An in-depth study of former elite figure skaters: I. Introduction to the project". *Journal of Sport & Exercise Psychology* 11 (1): 54-64. doi: 10.1123/jsep.11.1.54

- Raya-Castellano, P.E., M. Reeves, M. Littlewood, and A. McRobert. 2020. "An exploratory investigation of junior-elite football coaches' behaviours during video-based feedback sessions". *International Journal of Performance Analysis in Sport* 20 (4): 729-746. doi: 10.1080/24748668.2020.1782717
- Raya-Castellano, P.E., M. Reeves, L. Fradua, and A. McRobert. 2021. "Post-match video-based feedback: A longitudinal work-based coach development program stimulating changes in coaches' knowledge and understanding". *International Journal of Sports Science & Coaching*. doi: 10.1177/17479541211017276
- Reeves, M.J., S.J. Roberts, A.P. McRobert, and M.A. Littlewood (2018). "Factors affecting the identification of talented junior-elite footballers: a case study". *Soccer & Society* 19 (8): 1106-1121. doi: 10.1080/14660970.2018.1432383
- Stodter, A., and C.J. Cushion. 2014. "Coaches' learning and education: a case study of cultures in conflict". *Sports Coaching Review* 3 (1): 63-79. doi: 10.1080/21640629.2014.958306
- Stodter, A., and C.J. Cushion. 2016. "Effective coach learning and processes of coaches' knowledge development: what works?". *The Psychology of effective coaching and management*, edited by P.A. Davis, 35-53. New York: Nova Science Publishers.
- Stodter, A., and C.J. Cushion. 2017. "What works in coach learning, how, and for whom? A grounded process of soccer coaches' professional learning". *Qualitative Research in Sport, Exercise and Health* 9 (3): 321-338. doi: 10.1080/2159676X.2017.1283358
- Stodter, A., and C.J. Cushion. 2019. "Evidencing the impact of coaches' learning: changes in coaching knowledge and practice over time". *Journal of Sports Sciences* 37 (18): 2086-2093. doi: 10.1080/02640414.2019.1621045
- Stodter, A., E., Cope, and R.C. Townsend. 2021. "Reflective conversations as a basis for sport coaches' learning: a theory-informed pedagogic design for educating reflective

- practitioners”. *Professional Development in Education*. doi: 10.1080/19415257.2021.1902836
- Stonebridge, I., and C. Cushion. 2018. “An exploration of the relationship between educational background and the coaching behaviours and practice activities of professional youth soccer coaches”. *Physical Education and Sport Pedagogy* 23 (6): 636-656. doi: 10.1080/17408989.2018.1485143
- Torner, W.R. 2013. Listening into the Dark: An essay testing the validity and efficacy of collaborative developmental Action Inquiry for describing and encouraging transformations on self, society, and scientific inquiry. *Integral Review* 9 (2): 264-299.
- van der Mars, H. 1989. “Observer reliability: Issues and procedures”. In *Analysing physical education and sport instruction*, edited by P. Darst, D. Zakrajsek and V. Mancini, 53-80. Champaign, IL: Human Kinetics.
- Vickers, J.N. 2007. *Perception, cognition and decision training: The quiet eye in action*. Champaign, IL: Human Kinetics.
- Voldby, C.R., and R. Klein-Døssing. 2019. “‘I thought we were supposed to learn how to become better coaches’: developing coach education through action research”. *Educational Action Research* 28 (3): 534-553. doi: 10.1080/09650792.2019.1605920
- Watts, D.W., and C. Cushion. 2016. “Coaching journeys: longitudinal experiences from professional football in Great Britain”. *Sports Coaching Review* 6 (1): 76-93. doi: 10.1080/21640629.2016.1238135
- Williams, A. M., and N.J. Hodges. 2005. “Practice, instruction and skill acquisition in soccer: Challenging tradition”. *Journal of Sports Sciences* 23 (6): 637–650. doi: 10.1080/02640410400021328