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Creators	Raya-Castellano, Pablo E, Reeves, Matthew, Fradua-Uriondo, Luis and McRobert, Allistair P

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1 **Post-match video-based feedback: A longitudinal work-based coach**
2 **development program stimulating changes in coaches' knowledge and**
3 **understanding**

4 **Abstract**

5 The literature regarding formal coach education and development highlights issues of
6 transference of usable knowledge to the real-world context. This study sought to engage
7 coaches from a Spanish football academy in a longitudinal work-based coach
8 development program (CDP) focused on the delivery of post-match feedback. The CDP
9 was delivered over a 23-month period through collaboration between a sport pedagogue
10 researcher-practitioner, the Academy Management Team, and an experienced research
11 team. The study adopted a case study design, utilizing a multiple method data collection
12 strategy that occurred in several stages: 1) Systematic observations (Sep-Dec 2018) and
13 2) debrief (Jan 2019), where baseline coach behaviors and underpinning knowledge were
14 recorded; 3) a workshop and a directed task (Mar 2019), encouraging coaches to apply
15 new knowledge; 4) a directed task 2 and reflective interview (Apr/May 2019), facilitating
16 coaches' reflection on their past deliveries and rationalization and planning of their
17 forthcoming sessions' delivery and 5) a consolidation interview (Apr 2020), capturing
18 knowledge stabilization. Qualitative data suggest that there was an increased
19 understanding in the adoption of behaviors including corrective feedback, silence,
20 questioning, and player participation throughout the CDP. In addition, coaches' self-
21 reflection found acceptance of their coaching delivery or a disconnect between their
22 desired and actual behaviors during the delivery of video-based feedback. This study
23 provides a preliminary framework for further implementation and exploration in
24 developing coaches' knowledge and understanding of delivering post-match video-based
25 feedback.

26 **Key words:** coach education; coaching behaviors; knowledge development; post-match.

27

28

29 **Introduction**

30 Coach development programs (CDP) have received considerable attention in
31 recent years for their perceived impact on coaching practice.¹ It has been suggested that
32 coaches learn through formal (i.e., accredited courses), non-formal (i.e., workshops, talks,
33 etc.), and informal (i.e., day-to-day coaching, observations or discussions with other
34 practitioners) modalities,² although these rarely occur in isolation.³ Whilst formalized
35 CDPs have been criticized for being too theoretically driven and de-contextualized from
36 practice, the informal mode is suggested to be more effective for coach learning.^{4,5}
37 However, the effectiveness of CDPs has often been claimed by showing behavior change
38 at post-intervention stages.⁶

39 The impact that formal CDPs have on coaches' development has been questioned
40 because these events result in limited changes of knowledge and behavior.^{7,8} For example,
41 Stodter & Cushion⁹ examined the development of two coaches after participating in a
42 National Federation's 'Youth Coaching Module'. Their findings suggested coaches'
43 rejection of new concepts due to incompatibility with previous knowledge or lack of
44 application within their contexts. Similarly, Stodter and Cushion⁶ compared the learning
45 of coaches in a formal coach education group and a group of coaches who did not take
46 part in any CDP. Coaches in the education group demonstrated increased understanding
47 of the use of questioning and whole-part-whole structures, though this translated to
48 minimal changes of behavior. It was suggested that the ineffectiveness of this CDP might
49 be due to coaches' utilization of different approaches without critical consideration of
50 their implications. Therefore, coaches appear to relay on behaviors that have previously
51 worked, not necessarily meeting their players' needs.

52 Reflective practice has been proposed as a helpful mechanism that supports
53 coaches to think more critically about their practice,¹⁰ and brings tacit knowledge from

54 the sub-conscious to conscious level.¹¹ Thus, examination of behavioral data, video-based
55 feedback, and peer conversations have been employed to facilitate reflective practice of
56 youth coaches from different sports.^{12,13,14} Nonetheless, coaches appear to merely
57 describe their plans and intentions without questioning its validity (i.e., single-loop
58 learning)¹⁴ rather than comparing their ideas and reasoning about coaching against their
59 actual behaviors and underlying rationales (i.e., double-loop learning).¹⁵

60 CDP implemented by National Governing Bodies (NGBs) has been compared to
61 a process of indoctrination and control^{4,16}. For example, coach developers working for
62 the NGB and supporting youth coaches in their clubs have been shown to adapt the
63 meaning of ‘player-centered’ in their interest to dominate coaches⁸. In contrast, Cope et
64 al.¹⁷ found that an unaffiliated coach educator empowering coaches and assisting them
65 with reflective conversations enhanced their experience. Furthermore, positive changes
66 (i.e., reduction of technical practices, direct management, feedback and convergent
67 questioning; increase of total questioning) were reported although might not exclusively
68 relate to the intervention due to the multiple variables surrounding applied coaching
69 environments and ‘out of practice’ activities coaches engage in on a daily basis. Hence,
70 it is suggested that in-club visits from independent coach developers empowering and
71 caring for learners might be more appropriate for developing coaches.

72 Most systematic observations of youth football coaches^{18,19} and CDPs¹⁷ have been
73 delivered within pitch-based scenarios. Although contemporary learning frameworks
74 (i.e., ecological dynamics, skill acquisition, and constructivist learning theory) advocate
75 for less prescriptive approaches,^{20,21,22} studies have continually identified coaches’
76 frequent use of ‘instruction’ and ‘feedback’.^{23,24,25} Video-based feedback (VBF) sessions
77 have typically been studied qualitatively to understand perceptions of factors influencing
78 its delivery,^{26,27} with a growing preference for balanced positive and negative sequences

79 of video,²⁶ active participation of players²⁸ and cautious use of individual feedback.²⁹
80 Only one study has systematically observed team-based VBF sessions at a youth academy
81 with coaches most utilized behavior being feedback²⁵, and no examples were identified
82 of studies that have attempted to develop coaches in the delivery of post-match VBF
83 sessions. Therefore, combining objective and subjective data³⁰, the current study aimed
84 to investigate changes in coaches' knowledge and understanding during a longitudinal
85 CDP, developed and delivered by a sport pedagogue researcher-practitioner.

86

87 **Method**

88 *Research context*

89 This study was conducted at the academy of a club competing at the Spanish La
90 Liga 123. The academy comprised eleven teams (under 9 to under 19) all playing in
91 competitive leagues. The Academy Manager and Head of Methodology were responsible
92 for the development of coaches and the coaching curriculum, which did not include
93 content regarding VBF sessions. They identified coach communication as an important
94 developmental area amongst their coaches and welcomed a sport pedagogue (henceforth
95 referred to as A1) and research team in assisting the club.

96 To encourage coaches to embrace this new department, the sport pedagogue was
97 invited to several events and meetings and was introduced to all academy staff, with
98 reference to his experience working at other European academies. The Academy Manager
99 continually highlighted the importance of communication in coaching and the CDP
100 actions A1 would be undertaking. It was emphasized that all interactions between
101 participants and the sport pedagogue would be confidential.

102

103 *Participants*

104 Three male Spanish football coaches consented to participate. The under 15 coach
105 withdrew, expressing difficulties in communicating whilst being recorded. This coach's
106 team had experienced a poor run of form and faced relegation; something that within the
107 Spanish academy system would have been detrimental to the who academy. As a result,
108 only two coaches participated in this study. Both Pedro and Juan (pseudonyms), who
109 worked with the under 9 and 13 age-groups, completed the full CDP. Their pen pictures
110 are presented below (Table 1).

111 [INSERT TABLE 1 HERE]

112 *Procedure*

113 Prior to data collection, ethical approval was received from a university ethics
114 committee; coaches were informed about the purpose of the study and provided signed
115 informed consent before the study commenced.

116 All competitive fixtures were filmed by volunteers, and coaches prepared VBF to
117 be delivered in the dressing room before the subsequent training session. The sport
118 pedagogue took field notes after each session that enabled engagement in reflective and
119 reflexive dialogue³¹ with the research team.

120 Coaches in this small-scale, in-depth case study CDP were purposively sampled
121 based on 1) their limited experience delivering VBF sessions, 2) plenty opportunities for
122 observation, and 3) the AMT's perceived positive attitude towards their development.
123 The CDP, and associated data collection, occurred in several stages: 1) Systematic
124 observations (Sep-Dec 2018); 2) debrief (Jan 2019); 3) workshop and directed task (Mar
125 2019); 4) directed task two and reflective interview (Apr/May 2019); and 5) consolidation
126 interview (Apr 2020).

127

128 *Data collection and analysis*

129 *Systematic Observations*

130 The lead coach and players met in the changing room up to three days after the
131 previous game and delivered VBF sessions with post-match purposes. Twelve sessions
132 were filmed using a digital video camera (Sony HDR-CX900E, China) mounted on a
133 tripod, and ensuring the projector screen and all players were visible. The first session for
134 each coach was used to familiarize coaches and players³² and was omitted from final
135 analyses. Each coach was then filmed over an 11-week period (1st of October to 17th of
136 December 2018), with a total of ten post-match team-based VBF sessions analyzed. Thus,
137 five sessions for each coach (average duration: Pedro, 11.33 ± 2.60 minutes; and Juan,
138 25.13 ± 4.79 minutes) were used to define coaches' baseline behaviors.

139 As there are no validated systematic observation tools to analyze coach behavior
140 within this context, we followed procedures adopted elsewhere²⁵. To ensure
141 appropriateness of the instrument for this specific study, continuous consultation occurred
142 between A1 and the research team. A familiarization session for each coach was pilot
143 coded to explore the coaches' behaviors using the modified instrument. This enabled the
144 research team to identify the behaviors across each session prior to inclusion/exclusion
145 from the final behavior categories (Table 2).

146 [INSERT TABLE 2 HERE]

147 All sessions were coded with Sportscode© Gamebreaker (version 10) and
148 exported to Microsoft Excel 2010. This generated a frequency count and duration for
149 every behavior within each session. Mean frequency count and percentage time were
150 calculated by dividing the sum of every behavior's count within each session by the five
151 sessions delivered by each coach. Duration data were converted into seconds, and mean
152 durations for every behavior were calculated dividing the sum duration of every behavior

153 by the five sessions. Mean percentage times were calculated dividing the mean duration
154 of each independent behavior by the sum duration of behaviors and multiplied by 100.

155 Intra- and inter-observer reliability for frequency data were calculated with the
156 formula (agreements/ agreements + disagreements) x 100. Duration data were converted
157 into seconds before utilizing the formula. Intra-observer reliability was checked by A1
158 who coded the same session twice after bouts of five sessions. Verification achieved 92%
159 and 90% agreement for frequency and duration data, respectively. Inter-observer
160 reliability was calculated comparing A1 and a trained observer's same session codes.
161 Agreement achieved was 88% and 87% for frequency and duration data, respectively.
162 Both reliability checks obtained lower scores (between 2 and 11%) than the achieved by
163 Ford et al²⁴, but still exceeded the accepted 85% reliability threshold.³³

164

165 *Debrief*

166 Debrief interviews were conducted with participants to explore their thoughts and
167 experiences of their sessions without knowing their behavioral profiles. These were
168 intended to elucidate Pedro and Juan's beliefs, knowledge, and understanding on the
169 influence of coach behaviors on player learning and development. In particular, we were
170 keen to examine their use of questioning and silence as pedagogical tools in this specific
171 context and how this might transfer into training sessions (Table 3). These behaviors have
172 been highlighted for facilitating players' cognitive engagement^{24,25}.

173

[INSERT TABLE 3 HERE]

174 *Workshop & directed task*

175 On the 4th of March 2019, both coaches attended a workshop within an office in
176 the club's training ground, where research findings applied to coaching were presented.
177 This was prepared between A1 and the Academy Management Team and led by A1

178 who encouraged frequent input from coaches about the specific aspects addressed. The
179 Head of Methodology was present during the entire 50-minute workshop and assisted A1
180 by asking him questions regarding the theoretical frameworks presented or emphasizing
181 A1 points. Both A1 and the Head of Methodology remained neutral without providing
182 practical guidelines regarding how to behave during post-match VBF sessions.

183 Firstly, the workshop introduced the behaviors observed during the post-match
184 VBF sessions and presented the ideas from Williams and Hodges,²¹ regarding the utility
185 of prescriptive frequent and immediate feedback, compared to reduced and delayed
186 feedback, whilst exploring additional contributory factors (i.e., bandwidth feedback and
187 questioning). Questioning was then discussed as a behavior for stimulating implicit
188 learning and linked to the use of silence for enabling players thinking and answering.³⁴
189 Likewise, convergent and divergent questions were defined as questions restricting or
190 broadening the possible response options,³⁵ without suggestion of which one is more
191 beneficial or when to adopt them within VBF sessions. The workshop concluded by
192 asking coaches to consider when, where, and how they incorporated questions into their
193 feedback process during VBF. Coaches then delivered two VBF sessions after the
194 workshop which provided an opportunity for implementing ideas.

195

196 *Directed task 2 & reflective interview*

197 Coaches were given a breakdown of their behaviors three days before the
198 reflective interview. To facilitate that coaches could identify consistencies or
199 inconsistencies between their actual and desired behaviors, previous self-reflection on
200 their data was allowed. The reflective interview schedule explored: 1) recall of behaviors
201 and its definitions; 2) biographical and demographic questions; 3) coaches' perceptions
202 of their behavioral data; 4) questions examining the alignment between current and

203 desired behaviors; and 5) questions to ascertain their intended behaviors' organization
204 within particular clips. If required, video clip examples (i.e., stimulated recall) were
205 shown, followed by a general open question and a subsequent question aiming that
206 coaches rationalized their actions.³⁶

207

208 *Consolidation interview*

209 After reflective interviews, there was no contact with the coaches regarding their
210 VBF sessions. The second season, coaches were encouraged to implement what they had
211 learnt within their new contexts (see table 1 for group and role details). To determine the
212 extent to which participants' knowledge and understanding had stabilized and changed, a
213 final consolidation interview was conducted with each coach.

214 Debrief, reflective, and consolidation interviews of coaches averaged 21 minutes
215 24 seconds \pm 1.37, 44 minutes 20.5 seconds \pm 5.5, and 70 minutes 25.5 seconds \pm 2.9;
216 and yielded 6, 16 and 23 single-line-spaced pages of text, respectively. Interviews were
217 transcribed verbatim and A1 read transcripts several times during the analysis phase to
218 ensure familiarity with the data.³⁷ In-depth analysis was conducted using thematic
219 analysis procedures.³⁸ This process started deductively with inspection of the
220 predetermined themes followed by line-by-line examination of each transcript to identify
221 further emerging themes.³⁹ To consider changes between interviews, a matrix of concepts
222 was generated that included initial concepts, categories, and subcategories. Concepts
223 were deemed to have been modified when qualitatively different or more frequently
224 used.⁴⁰ Rigor in the process was maintained through frequent discussions amongst the
225 research team who critiqued the analytic decisions of A1 until agreement on thematic
226 structure, names, descriptions, and meaning of themes was achieved (Figure 1).

227

[INSERT FIGURE 1 HERE]

228 ***Results, findings and discussion***

229 ***Phase 1: Systematic observation & debrief***

230 Systematic observations and debrief suggested varied initial patterns of behavior
231 (table 4) and levels of knowledge and awareness during coaches' VBF sessions.

232 [INSERT TABLE 4]

233 Pedro's most employed behavior was 'feedback'; normally positive, though
234 corrective statements lasted longer. These were interspersed with shorter bouts of silence
235 and a marginally greater number of divergent questions; which might suggest why players
236 contributed to discussion for almost the same amount of time that Pedro provided
237 feedback. Furthermore, qualitative data reflected Pedro's intention to use as much
238 positive feedback as possible, and his preference for open questioning as a mechanism to
239 extend the response options, and to encourage player engagement in higher-order
240 thinking. However, he seemed unsure about how and why his questioning was more
241 convergent during training compared to during VBF sessions. Moreover, Pedro used
242 silence for 17.9 % of the session, though he was not conscious of why and when he was
243 being silent:

244 Pedro: *"... I think during training I do more closed questions compared to video*
245 *sessions.*

246 A1: *Why do you think you do that?*

247 Pedro: *Eh...good question [smiling]...It's a different coach's attitude. The video is more*
248 *relaxed and the other [training] you want to rise up the tempo. So that there aren't*
249 *many stops and maybe you give more direct feedback.*

250 A1: *When does it make sense being silent within video sessions?*

251 Pedro: *I have never thought about that...I believe silence doesn't make sense within a*
252 *video session. You are showing something and if you don't give any feedback or*
253 *if they answer and you don't tell them anything, it doesn't make sense".*

254

255 In contrast, Juan spent 53.2 % of the VBF session providing feedback, with almost
256 half (25.4 %) being corrective. He demonstrated frequent, but short, spells of silence and
257 a dominant use of convergent questions, that appeared to facilitate limited player
258 participation. In his debrief interview Juan's awareness of utilizing these behaviors was
259 ascribed this to his players adapting to a new game format. Conversely, when asked about
260 his use of questioning types alongside his silence, he demonstrated a lack of awareness
261 of his observed behaviors:

262 *"I use more open questions, I think...It's trying to get them to see and assess the*
263 *possibilities or choose other options such as the other side, switch it, turn, etcetera. I*
264 *would try more open, to see if they're able to interpret the different options they have in*
265 *that play...During video sessions, I don't normally do silence. I always try to explain with*
266 *images a little bit more. As I have the opportunity to show and they watch themselves on*
267 *video, I prefer not to..."*

268

269 Further, when asked about his approach when players could not answer a
270 particular question, he suggested:

271 *"If it's an open question, I would directly tell them the different options...because*
272 *perhaps there are situations they cannot interpret, and I can"*

273

274 Studies concerned with VBF have tended to be qualitative,^{26,27} and have not
275 focused on the effects that specific coach behaviors have upon players. While individual
276 VBF sessions include more positive feedback than negative,⁴¹ data from this study
277 highlighted preferences toward positive and corrective feedback approaches. Previous
278 studies have found that combinations of negative and corrective feedback can facilitate
279 learners' correction of errors when their task performance is not appropriate.⁴² Thus, VBF
280 sessions have the opportunity to enhance players' confidence²⁶ whilst also identifying
281 areas for further development. However, a recipient's openness to receive feedback in

282 front of their peers should be considered, especially if highlighting specific improvable
283 aspects of the game.²⁹

284 Coach questioning practices have, typically, been shown to stimulate players' low
285 order thinking, and often answered by the coach.^{18,34} Divergent questions are suggested
286 to encourage individuals to engage in higher order thinking and, thus, generate more
287 sophisticated responses and new knowledge.³⁵ Pedro exhibited a tendency toward
288 divergent questions, whereas Juan demonstrated higher propensity for convergent
289 questioning. Interestingly, in a similar study Raya-Castellano et al.,²⁵ found that all
290 coaches utilized greater convergent questions. However, Mason, Farrow and Hattie⁴¹
291 reported higher levels of divergent questioning being employed by elite Australian
292 Football coaches during individual post-match VBF sessions, though this might be
293 attributable to the age and phase of development differences between the two samples.

294 In this study, coaches' actual and desired feedback were in agreement, though
295 participants demonstrated limited knowledge and awareness surrounding their use of
296 questioning or silence. This supports the epistemological gap reported in literature
297 between behavior and underpinning knowledge.⁴³ In Juan's case, there appeared to be a
298 difference between his ideas of what, when, and how to use questioning and his actual
299 use of questioning.¹⁵ Furthermore, both coaches were not aware of why they chose to be
300 silent when they did during their VBF sessions. This might reflect their limited experience
301 delivering VBF sessions, or a broader lack of understanding around pedagogic principles.

302

303 ***Phase 2: Reflective interview***

304 *Feedback*

305 Pedro maintained his preference for being positive to avoid potential negative
306 influence upon player confidence, although he also explained that this depended on

307 players' previous performance and the difficulty of the upcoming fixture. In addition, he
308 believed corrective feedback was more effective than negative feedback and this could
309 be used either within positive or negative clips:

310 *"I think the corrective...is the most useful because you're providing the boy with solutions*
311 *to his problems... and even to things they do well, you're giving them a wider variety of*
312 *alternatives. As an example, he has done well because he got passed a rival, but within*
313 *another game, he had a teammate, and the defender is gonna be better. He's gonna*
314 *continue trying dribbling and he's not gonna win the duel. And maybe he could have done*
315 *a 2 v 1. So he knows he has other alternatives".*
316

317 Juan was appreciative of his balanced positive and negative feedback and
318 appeared more considered in the use of the latter not being as constructive as corrective
319 feedback:

320 *"...I don't like dedicating much to this is wrong, don't do that, no. I'd tell him that the*
321 *best option was the other. I wouldn't tell him not to do it...I prefer showing him another*
322 *alternative that I think is better... That without emphasizing whether is good or bad".*
323

324 A balance between positive and negative sequences has been proposed to avoid
325 deteriorating players' confidence.⁴⁴ Participants suggested that inclusion of corrective
326 feedback can manipulate the message provided by a positive or negative video clip and
327 feedback. For both coaches, corrective feedback was more constructive than negative
328 feedback. Pedro suggested that this could be used within positive or negative clips to
329 either propose further alternatives or make corrections. Nonetheless, it is yet to be
330 examined the extent to which players develop their knowledge and/or retain feedback
331 when receiving different combinations of game sequences and feedback. Only Mason et
332 al⁴¹ have examined player recall of coaches' feedback one week after an individual post-
333 match VBF session and there is a dearth of quasi-experimental studies in this area.
334 Therefore, providing alternatives to positive and negative game situations might expand

335 players' knowledge, though consideration must be given to the time and type of
336 information, ensuring it is congruent with their learning and playing ability.

337

338 *Silence*

339 Coaches have previously shown lack of understanding of their silence during
340 training.^{18,43} However, long periods of silence used deliberately can empower players to
341 engage in the problem-solving process.¹⁹ After this CDP, Pedro demonstrated increased
342 awareness in his use of silence and outlined two main instances within his VBF sessions
343 where he did so for the benefit of players. He expressed the rationale for silence after
344 questioning but doubted if his silence while players observed clips was the most effective
345 approach for maintaining under nine players' concentration on the footage:

346 *"Regarding silence after my questions, you've got to leave them to be protagonist. So,*
347 *they get to the solution and are able to see, in that play, what is happening...Perhaps,*
348 *while we're watching the video, I've got to give less silence because it's twenty seconds.*
349 *So none gets distracted, to keep their attention...in the play, in what is happening".*

350

351 Similarly, contradictions between his actual and desired silence values seemed to
352 be encouraging Juan to explore his strategical use of this behavior to fulfil his session
353 objectives. Apart from being more aware of its application, he contemplated silence as an
354 alternative to maintain concentration on the footage with a potential question to be
355 answered after:

356 *"...maybe I should use [silence] a bit more...Telling them to watch this play or watch*
357 *these three plays and after we'll discuss them...I think seeing that I am gonna ask them a*
358 *question...I think that it helps focus their concentration more and so they see where they*
359 *might have failed".*

360

361 Juan presented more periods of silence, though these accounted for a smaller total
362 percentage duration compared to Pedro (table 4). To maintain player observation of the

363 clips; Juan was considering longer silences prior to questions, whereas Pedro seemed
364 willing to reduce his silence as an alternative. This could be due to the attention span and
365 cognitive capacity of the under nine's, which might be a factor influencing the delivery
366 of VBF sessions.²⁷

367 Further, at this stage only Pedro was conscious of silence after questions being
368 important to allow players to think and answer. In their analysis of coach questioning
369 practices during training sessions, Cope et al³⁴ found no more than two seconds of post-
370 question silence and after these frames, responses were provided by the coach. Therefore,
371 future studies specific to the VBF context could monitor coaches' silences after their
372 questions and/or the impact that shorter and larger silences might have on the quality of
373 learners' cognitions, responses and knowledge development.

374

375 *Questioning and player participation*

376 Pedro proposed questioning as a potential tool for encouraging his under nine's
377 player thinking, curiosity, and participation. When shown a sequence of his sessions
378 where he was re-questioning a player's response with a second question, he stated:

379 Pedro: *"It's the same question, isn't? Don't know what I'd be thinking...but maybe I*
380 *have formulated the question and that's why he has answered to something I*
381 *didn't want him to respond. Then, I formulate it [the question] again differently.*

382 A1: *What is your objective for doing this?*

383 Pedro: *In order to get into what I want them to see in the video. To concrete the final*
384 *response, but that this is given by them.*

385 A1: *Could the coach give the information after a wrong response from the player?*

386 Pedro: *Yes, I could but at these ages within these video sessions, I prefer that they get to*
387 *the result or the solutions instead of me telling them".*

388

389 Re-questioning was a potential mechanism to direct players through a mixture of
390 convergent and divergent questions to the coach's desired response options:

391 *“Regarding convergent and divergent, as age increases, maybe the divergent need to*
392 *increase and convergent decrease. With my group, maybe I need to guide them myself*
393 *with more concrete questions”.*

394

395 Juan also believed questioning and player participation were useful for
396 encouraging players’ autonomous thinking. When players were unable to answer a
397 question, a second question could be formulated to ensure the players generated the
398 response. Additionally, Juan was able to define the concepts of convergent and divergent
399 questioning, but unable to articulate how to combine them within sessions. When shown
400 a session clip, he described his approach of stopping the footage and divergently asking
401 players to explore the existing alternatives at that instance.

402 *“...I would try to turn it around to simplify a bit the response or if I see they’re not able*
403 *to [respond]; trying to turn it around to see if from other side, they find the solution and*
404 *not give it myself straight away. Obviously, if there isn’t a way for them to get the*
405 *response, then maybe I tell them, but I would ask it differently first...Perhaps, before the*
406 *action happens, stop the play and ask the player involved the options he sees. With the*
407 *convergent, ...it’s much simpler for them to answer if I stop the clip”.*

408

409 Further, when asked about his player participation scores, Juan linked them to his
410 higher use of convergent questions requiring short answers:

411 *“Most times they’ve got to speak is to say yes or no, outside...I imagine the level of*
412 *participation is lower due to them not having to develop. They aren’t questions like if he*
413 *came what would you do? No, it’s simply, who’s the free man?”*

414

415 Both coaches expressed their desire to use divergent questions to enable players’
416 discovering and generating responses during their post-match VBF sessions. However,
417 Juan’s data reflects greater use of convergent questioning that he linked to his reduced
418 player participation. Furthermore, coaches declared that combinations of questions could
419 be used to tease out their own desired responses from the players, which suggest that they

420 positioned themselves as knowledge gatekeepers.⁴⁵ Questions can be probing, stimulating
421 the recall of knowledge and the development of new understandings; or guiding, which
422 can direct players towards responses.⁴⁶ Open-ended questions combined with VBF have
423 been shown to develop greater tactical knowledge (i.e., number of self-regulatory
424 concepts and a more sophisticated concept structure) for youth players in an experimental
425 group compared to a control group.⁴⁷ When not well formulated or cueing the desired
426 response, questions might encourage players' convergent thinking, which constraints the
427 exploration of further possibilities of response not predetermined by the coach. This is
428 not to say that coaches should avoid the use of convergent questions. As Pedro suggested,
429 if players do not possess sufficient knowledge to answer a divergent question, a more
430 convergent question could reduce the challenge initially posed. Thus, divergent and
431 convergent questions might be combined to encourage players to generate answers;
432 drawing on existing knowledge whilst enabling new knowledge development.

433

434 *Behavior acceptance or rejection*

435 Coaches described the same order in which they planned to sequence their
436 behaviors to favor players' learning. This consisted of silence for player observation being
437 ensued by a divergent question, player participation and coach feedback or a convergent
438 question if player responses had not concreated the coach's pursued response. When asked
439 about his opinion on his current data and whether he was willing to make any future
440 behavior modifications, Pedro indicated:

441 *"...I believe the percentages that came up are not bad because the boy takes part*
442 *enough...The more the player participates, the better. Because I do a good number of*
443 *divergent and I use convergent when the boys don't respond to what I am looking for."*
444

445 In contrast, Juan was rejecting his delivery and aimed to increase his silence,
446 player participation and re-arranging the order in which his behaviors occurred during
447 particular clips:

448 *“Thinking what I said about silence, it seems to me a very good idea...telling them to*
449 *watch in silence. They would concentrate more and think about the options. But here*
450 *[feedback], I would have to reduce the time compared to what I wished...First that they*
451 *become aware whether what they’ve done is wrong or what other options they had. It*
452 *would have to come out from them. And afterwards, I can reinforce what they’ve said”.*
453

454 Reflection on their own behavior data provoked different responses for coaches.
455 Pedro was satisfied with his behavior profile, whereas Juan had found behavioral
456 ‘disturbances’¹⁴ that contradicted his desired behaviors. Because of these discoveries, he
457 was planning to reduce his feedback and redistribute the sequence of behaviors within
458 clips.⁴⁸ Therefore, behavioral statistics from coaches’ post-match VBF either confirmed
459 or encouraged changes to their desired delivery approach and can be employed with
460 monitoring purposes so coaches self-assess the alignment between their intentions and
461 actual behaviors.

462 This CDP comprised a workshop and two directed tasks intending to stimulate
463 reflection about coaches’ previous sessions and how they might implement content from
464 the workshop within their post-match VBF. This appeared to assist coaches in deciding
465 how to approach future sessions and determine clear expectations that their sessions
466 should include that are better tailored to player benefit. Nevertheless, the mixed-method
467 design of this study does not demonstrate causality between the CDP activities employed
468 (i.e., workshop and directed tasks) and the outcomes achieved in terms of coaches’
469 knowledge development.

470

471 ***Phase 3: Consolidation interview***

472 *Pedro*

473 His knowledge seemed stabilized eleven months after the reflective interview took
474 place with minor changes in the meaning of a few themes. When asked about his behavior
475 profile, he maintained his satisfaction, albeit showed a will to reduce negative feedback
476 even more due to its disadvantages for players. Moreover, Pedro was considering the
477 player as an active cognitive agent much more. Although he seemed willing to interrupt
478 silence with cues, so players concentrated on the footage at the reflective interview; he
479 was now more conscious of enabling players' observing the game without directing
480 players' attention to certain aspects:

481 *"I think you don't have to give negative. Use corrective instead. Because maybe in this*
482 *game it doesn't work but it might do it in the following game. If from such an early age*
483 *you constrain them, they will play with fear to do. Therefore, you've got to try they don't*
484 *feel the pressure of I'm not doing this because he said that is bad".*

485 *"During the clip, because I don't want to condition them on that particular player. I*
486 *wanted them to be self-sufficient and focus on what they thought".*

487

488 Similarly, when asked about re-questioning, Pedro was now intending to explore
489 player comments that differed to his clip's objective, if these 'fitted' his understanding:

490 *"...what do you see in this play? The boys see things that you hadn't seen. If I see it's*
491 *interesting, I guide them and explore where do we get with their responses and my*
492 *questions...But if they answer useless responses for their learning, I use more convergent*
493 *to facilitate and guide them to what I was looking for within that clip".*

494

495 *Juan*

496 Comparisons between Juan's reflective and consolidation interviews revealed
497 very little changes in themes' meaning. Juan maintained his belief of divergent
498 questioning facilitating player thinking and proposed planning starting divergent
499 questions for clips to avoid improvisation. Moreover, he seemed more aware of the

500 difficulties under thirteen players could have generating elaborated responses in front of
501 teammates and had decided further options if players were unable to answer a question:

502 Juan: *“...at these ages, although questions are divergent, the boys don't always reason*
503 *enough or are too shy many times. A question that requires a longer response,*
504 *they shorten it a lot...It's difficult.*

505 A1: *What could you do to overcome this difficulty?*

506 Juan: *...Maybe continue asking questions towards where I want to get. Try to guide*
507 *them with two or three more convergent questions to where I want to get...or*
508 *even the participation of a third player to encourage him to take part or to see if*
509 *they get into any kind of agreement”.*

510

511 Finally, opposed to the reflective phase, Juan had found alternative approaches to
512 combine divergent and convergent questions during his VBF sessions:

513 *“Perhaps asking the options he has at that instance and once he has seen the clip, asking*
514 *a convergent where he gives his opinion on whether is right or wrong and propose other*
515 *alternatives... there are questions that need more thinking. Often what you want is right,*
516 *you've given me the response, but now I want you to identify the why. So they think a little*
517 *bit more”.*

518

519 Coaches' knowledge seemed stabilized and enhanced from reflective to
520 consolidation interview. Stodter and Cushion⁴⁹ argue that realistic opportunities are
521 required to transfer new knowledge into behaviors within their contexts because concepts
522 are linked to the situations where they are learnt. Thereby, it could be argued that coaches'
523 knowledge settled after eleven months of no contact with A1 and the Academy
524 Management Team due to having reflected and attempted to implement knowledge within
525 their particular post-match VBF sessions. Hence, CDPs focused on a particular situation-
526 specific coaching task involving self-reflection and application of CDP content might aid
527 coaches to consolidate their knowledge in the medium term. Nevertheless, future quasi-
528 experimental studies could corroborate this assumption.

529

530 **Limitations**

531 While this research extends literature in the areas of coach behaviour and coach
532 education, it also presented some limitations. Firstly, it is difficult to establish causal
533 relationships between the CDP activities and their impact on coaches, because of the
534 absence of a control group not undertaking any education. Moreover, the quality of
535 coaches' reflection during the second directed task could have been enhanced by
536 incorporating players' anonymous perceptions about their coaches' delivery.

537

538 **Conclusion**

539 This bespoke longitudinal work-based CDP constitutes an in-depth exploration of
540 changes in knowledge and understanding achieved by two coaches with varied
541 backgrounds⁵⁰ and working with different age-groups. Their varied baseline levels of
542 knowledge appeared to increase and stabilize as the CDP progressed. In addition, this
543 study extends our understanding of the delivery of VBF in junior-elite football and how
544 behaviours can be utilised to fulfil the post-match session objectives.

545 This research also provides various practical considerations for coaches and coach
546 development practice. In particular, a broad framework for structuring a long-term
547 approach to developing coaches, in relation to a specific issue to bring about positive
548 change in coaches' practice. Indeed, coaches in this study appeared to develop knowledge
549 and awareness during the CDP; particularly due to the clear opportunities to implement
550 ideas and reflect on their delivery. The examination of behavior data either reinforced
551 coaches' delivery or enhanced their willingness to change. This suggests that a bespoke
552 CDP, comprising multiple learning mechanisms and integrated opportunities for
553 reflection; delivered and supported longitudinally can be an effective approach for coach
554 development in an applied football environment.

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