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The art of the question: the structure of questions posed by youth soccer coaches during training

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1   **Abstract**

2   *Background:* From a sports perspective, pedagogical researchers have suggested questioning is

3   an effective instructional tool and pedagogical strategy for developing critical thinking, problem-

4   solving and decision-making skills. Questions enable coaches to contextualise athlete learning by

5   encouraging and guiding them to identify and explore solutions to game-based problems. While

6   previous investigations have explored the frequency of questions and provided some

7   understanding of the interactions within a coaching session, there is still limited empirical

8   knowledge related to the structure and profile of coach questioning strategies.

9   *Purpose:* This study aims to explore how youth soccer coaches, implementing the FFA National

10   Curriculum, have used questioning techniques within specific coaching contexts/activities to

11   promote athlete learning.

12   *Method:* Australian youth soccer coaches (i.e., U12 – U16; n = 19) were filmed during regular

13   training sessions. A questioning profile coding system was developed and used to provide a

14   detailed profile of the types of questions asked by the coaches in different coaching situations.

15   The frequency of each coded event (i.e., type, context, who, what, knowledge, proximity,

16   prompts, responses, activity, and effective) was recorded.

17   *Data Analysis:* Descriptive statistics (mean ± standard error) were used to describe all coded

18   information. Association rule models were generated to determine the extent to which questioning

19   profile descriptor (i.e., Question Type, Knowledge, Context, Who, What) occurred in the presence

20   of another.

21   *Results:* Coaches asked on average 71 questions per session (0.88 questions per minute), with

22   slightly greater use of convergent (i.e., closed) questions (52.2%) than divergent (i.e., open)

23   questions (47.8%). Coaches use convergent questions that are instructional and promote lower

1   order thinking. In contrast, divergent questions are generally related to a game tactic or principle

2   and are asked when the team has stopped an activity. The rule models indicated there is a general

3   trend when considering the structure and profile of the type of question (i.e., convergent;

4   divergent) asked in the different training session activity types. During drills and small-sided

5   games, coaches asked convergent questions to the team, which were instructional in nature and

6   required lower level knowledge. For large games, the question was more targeted to the individual

7   while the activity was on-going, but still required lower level knowledge. Divergent questions

8   generally related to game tactics although only 7% of these questions asked players to problem

9   solve.

10   *Conclusion:* The results of the current study indicate that coaches are posing more questions

11   within a coaching session, compared to previous studies, possibly reflecting the emphasis placed

12   on questioning as an athlete learning strategy within the FFA National Curriculum. Association

13   rule models provided greater insights into the distinct 'styles' or profiles typically implemented by

14   coaches during specific types of activity. From a learning perspective, coaches should consider the

15   players needs and wants when determining which type of question best suits the situation and be

16   prepared to move between types of questions depending on player responses. Future research

17   should consider the perspectives of coaches and athletes to determine why questions were asked,

18   and how effective they were in reaching their intended purposes.

19

20   **Keywords:** Coaching; Coaching Pedagogy; Learning; Football; Questioning

21

1   *Summary for practitioners*

2   This study explored the structure and profile of questions used by 19 youth soccer coaches

3   (U12-U16 years teams) within the coaching environment to promote athlete learning. Analysis

4   found coaches asked on average 71 questions per session (0.88 questions per minute), with slightly

5   more closed questions (52%) than open questions (48%). When using closed questions during

6   drills and small-sided games, coaches asked lower order instruction questions to the team. When

7   posing an open question during small and large games, the coach generally asks the players to stop

8   where they are (freeze) and directs a tactical question to an individual player or the group. Open

9   questions were evenly split between lower order and higher order questions although only 2-3 of

10   these questions required players to problem solve. Coaches should consider players capabilities

11   when determining which type of question best suits the situation and be prepared to move between

12   cognitive levels depending on player responses.

1   **The Art of the Question: The structure of questions posed by youth soccer coaches**

2   **during training**

3   Coaches have a significant impact on the learning outcomes and achievements of the

4   athletes they seek to educate (Amorose 2007; Cushion 2010), with the behaviours they use

5   shaping the teaching and learning environment (Partington and Cushion 2013). Therefore, the

6   coach needs to convey important concepts to their athletes, which can be achieved by creating

7   meaningful teaching and learning activities (O'Connor and Larkin 2015). In addition to this,

8   coaches also have to ensure they develop critical thinking athletes who have a deeper

9   understanding of the skills and tactics involved in the sports they play to ensure specific

10   performance-based objectives are achieved (Pearson and Webb 2008). Within this context,

11   researchers have identified a disconnection between evidenced-informed research and the

12   applied coaching environment (Grehaigne, Godbout, and Bouthier 2001; O'Connor, Larkin,

13   and Williams 2017). For example, while researchers have highlighted the benefit associated

14   with more game-based or playing form activities for athlete development (e.g., provides a

15   holistic approach to developing technical and tactical skills in a game-related learning

16   environment; promotes player enjoyment and engagement; O'Connor, Larkin and Höner

17   2020), studies have still demonstrated an over reliance on drill-based or training form activities

18   in youth sport coaching sessions (Ford, Yates and Williams 2010; Partington & Cushion 2013;

19   Partington, Cushion and Harvey 2014).

20   Coach development programs are not always accessible to all coaches or informed by the

21   latest research findings (Eather, Jones, Miller and Morgan 2020). Furthermore, the link

22   between research and coach education programs is complex and generally not a linear

23   relationship when considering course design and dissemination of new policies (Dempsey,

24   Richardson, Cope and Cronin 2020). However, in an attempt to address this, the Australian

25   soccer governing body, Football Federation Australia (FFA), has taken a research informed

1   approach to guide coaches on how to create learning environments to promote technical and

2   tactical athlete development. The National Curriculum (Football Federation Australia, 2013),

3   provides a philosophy on how the game should be played and guides youth coaches to structure

4   training sessions through a holistic approach to development, rather than trying to develop

5   individual components in isolation. To achieve this, the National Curriculum recommends that

6   coaches should create purposeful practice sessions, using the constraints-led approach and

7   manipulating task and environmental constraints provides opportunities for players to adapt to

8   various situations and explore solutions to problems within activities that are representative of

9   the sport context (Renshaw & Chow 2019). For example, activities are designed so players are

10   always perceiving-deciding-executing (one instructional skill-based activity followed by 2-3

11   game-based activities), coupled with quality feedback and questioning techniques. A key

12   element highlighted by the curriculum is for coaches to "Ask smart questions to develop player

13   understanding and enhance learning" (FFA curriculum, 2013; page 192). While this is a key

14   suggestion for coaches to employ, there is limited understanding about how coaches use

15   questioning techniques within a coaching session, and the type and structure of questions they

16   pose to athletes.

17   From a learning perspective, pedagogical researchers have found that questioning is an

18   effective instructional tool and pedagogical strategy to enhance learning outcomes in education

19   (Engin 2013; Walsh and Sattes 2016); medicine, (Adams 2015); and sport (Harvey and Light

20   2015; Kidman et al. 2001). Questioning techniques are critical for focusing attention to key

21   concepts, clarifying understanding (Engin 2013; Hill 2016; Tofade, Elsner, and Haines 2013),

22   memory recall (Caram and Davis 2005), stimulating high levels of thinking (Metzler 2000),

23   developing critical thinking (Shim and Walczak 2012), and problem-solving and decision-

24   making skills (Grehaigne et al. 2001; O'Connor, Wardak, Goodyear, Larkin, and Williams

25   2018). When players retrieve knowledge from their memory to answer a question this

1 reinforces the relevant cues and improves long-term retention of that information (Binks 2018;

2 Dirkx, Kester, and Kirschner 2014). Therefore, coaches are encouraged to use questions,

3 prompts, and feedback to contextualise the athletes' learning by encouraging and guiding them

4 to identify and explore solutions to game-based problems), rather than merely telling them what

5 to do (O'Connor et al. 2020; Pill 2015, 2016).

6   While questioning is a key strategy for learning, coaches need to take into account the

7 capabilities of the athlete and the coaching situation, to ensure they are matching questions to

8 the athlete's needs (Long, Blankenburg, and Butani 2015). In the literature, questions are

9 commonly classified as either convergent or divergent. Convergent questions are closed in

10 nature, and offer few response options. They assume a single answer, or a narrow range of

11 'best' answers (Tofade et al. 2013). In contrast, divergent questions are more open in nature,

12 encouraging exploration of diverse perspectives, with multiple response, promoting deeper

13 thinking (O'Connor, Larkin, and Williams 2018; Partington and Cushion 2013; Partington et

14 al. 2014; Tofade et al. 2013). A further classification for questions can be based on the level of

15 cognitive processing required to answer the question. Questions which require lower levels of

16 cognitive processing, such as recall and comprehension, are classified as lower-order questions.

17 In contrast, questions which involve analysis, synthesis and evaluation to generate new

18 knowledge are classified as higher-order questions (Bloom, 1956; Metzler, 2000). While some

19 researchers highlight the benefit associated with asking higher order questions to promote

20 quality educational outcomes (Metzler, 2000; Chambers and Vickers 2006; Harvey, Cushion,

21 and Massa Gonzalez 2010; McNeill et al. 2008; Praxedes et al. 2016), it should be noted that

22 lower order questions also serve an important educational function to monitor understanding

23 and to establish and situate a common understanding for new information or problems (Myhill

24 and Dunkin, 2005). For example, recall questions can be used by coaches to focus athlete's

25 attention on actions or concepts which have previously been explored/learnt (Pearson and

1   Webb, 2008). Therefore, one effective questioning strategy is to start with convergent lower-

2   order questions and progress to divergent higher-order questions, by building from the recall

3   of facts to higher levels of thinking and problem solving (Caram and Davis, 2005; Engin, 2013).

4   Progressing from simple questions to more difficult ones that require reasoning helps students

5   develop cognitive abilities and critical thinking skills, through the formulation of, and

6   reflection on, ideas that are needed for personal sense-making, which players can then test

7   within the game-play environment (Cope et al. 2016; Light et al. 2014).

8   To understand how coaches use questioning within their sessions, researchers have

9   conducted observational studies of the coaching environment. Results have shown that during

10   a session coaches ask few questions to their athletes (between 2.29% and 7.83% of the session;

11   Potrac, Jones, and Armour 2002; Potrac, Jones, and Cushion 2007; Partington and Cushion

12   2013; Partington, Cushion, and Harvey 2014). In addition to this relatively low frequency of

13   questioning, it has also been found that coaches generally ask more convergent than divergent

14   questions. Cope and colleagues (2016) built on prior observational research by exploring

15   coaches' questioning practice and the discursive nature of questioning approaches. They

16   conducted conversational analysis of five youth soccer academy coaches' training sessions.

17   They found three underlying problematic themes: coaches wanting an immediate response

18   from players, the use of leading questions to elicit a desired response, and the monological

19   nature of coach/athlete interactions. The findings show coaches positioning themselves as

20   gatekeepers of knowledge, with athletes cast as passive learners. O'Connor, Larkin and

21   Williams (2017) found coaches asked more questions in their sessions (compared to earlier

22   studies) and were aware of the need to use questions aimed at developing athlete decision-

23   making skills.

24   Previous investigations have explored the use of questions within a coaching session in

25   relation to the type and frequency of questions asked (Cope et al. 2016; O'Connor et al. 2017;

1   Partington et al. 2014). While this provides some understanding of how coaches use questions

2   within a session, there is still limited exploration of the structure and context of questions asked

3   by coaches within the coaching environment. Determining the structure and taxonomy of coach

4   questioning strategies will provide insight in how they are used by coaches to potentially

5   promote athlete learning. Therefore, this study aims to extend the current knowledge of coach

6   questioning by exploring the structure and profile of questions used by youth soccer coaches,

7   who are guided by the FFA National Curriculum, during specific contexts/activities within the

8   coaching environment. This will provide a better understanding of the type of questions asked

9   during specific contexts/activities within the session and how they are used by coaches to

10 potentially promote athlete learning.

11   **Method**

12 **Participants**

13   Participants were selected for this study using a convenience-based sampling method,

14 whereby clubs competing in the New South Wales National Premier League Youth competition

15 (i.e., the highest level of youth participation) were contacted regarding participation. A total of

16 19 coaches who are currently coaching elite youth soccer teams (i.e., U12 – U16) and

17 implementing the FFA National Curriculum volunteered to participate in the study. Of the 19

18 participants, 10 were coaching teams within the Skill Acquisition Phase of the FFA National

19 Curriculum (i.e., U12 – U13), and nine participants were coaching within the Game Training

20 Phase (i.e., U14 – U16). All teams played in 11 v 11 competitive matches, apart from the five

21 Under 12 teams who play competitive 9 v 9 games. On average, coaches had been coaching

22 for 9.76 (SD = 5.67) years. All participants were qualified youth coaches, with one coach

23 holding a grassroots football certificate (i.e., Level 1), nine coaches had a Football Federation

24 Australia (FFA) / Asian Football Confederation (AFC) C license (i.e., Level 2), and nine had

25 an FFA/AFC B license (i.e., Level 3). Ethical approval was obtained from the lead institution's

1   research ethics committee with informed consent provided by the participants. In addition, the

2   parents and/or guardians of all the players within the teams provided informed consent prior to

3   data collection.

4   **Instruments**

5   **Questioning Profile System**. A questioning profile coding system was developed to

6   provide an understanding of how coaches use questioning in training sessions. The questioning

7   profiling system was an extension to the Coach Analysis Intervention System (CAIS) (Cushion

8   et al. 2012; Partington and Cushion 2013) used to measure coach behaviour. The questioning

9   profile coding system was used to provide a detailed profile of the questions asked by the

10 coaches during the coaching session. As indicated in Table 1, the coding system outlined the

11 type of questions (i.e., convergent; divergent) and the context in which they were asked (i.e.,

12 freeze in position; player huddle; activity ongoing). Further, information relating to who the

13 question was asked to (i.e., individual or team); what the question was about (i.e., instructional;

14 tactics/principles; technique; problem solving; general) and whether the question required

15 higher or lower order knowledge was also coded. To establish the content validity of the

16 questioning profile system, definitions and content were examined by leading learning

17 scientists and participants in two international coaching workshops. The questioning profile

18 coding system measured the frequency and structure of questioning used by coaches.

19   **<<<INSERT TABLE 1 HERE>>>**

20 **Procedures**

21   Participants were filmed on two separate occasions at their regular ground using a digital

22 video camera (Sony HDR PJ540E, Japan) in an elevated position to the side of the coaching

23 area. Participants were instructed to conduct a regular training session, with the research team

24 providing no additional information in relation to effective coaching/questioning strategies or

25 the specific aims of the project. During the sessions, participants wore a lapel microphone and

1   hip mounted radio transmitter (Sennheiser EW112P, Germany), which transmitted the audio

2   signal to a radio receiver connected to the camera (Sony HDR PJ540E, Japan). This process

3   ensured both voice and video data were captured simultaneously. Due to logistical reasons,

4   three participants were only filmed on the one occasion (Skill Acquisition, $n = 1$; Game

5   Training, $n = 2$), resulting in a total of 35 recorded sessions, with an average duration of 81.0

6   (SD = 11.9) minutes per session. In total, over 47 hours (47:15:51; Hr:min:sec) of coaching

7   footage was coded for analysis purposes.

8   Following the coaching sessions, the video footage was analysed using Dartfish 7

9   (Dartfish, France). The questioning profile coding system was used to provide a detailed profile

10   of the questions asked by the coaches during the coaching session. The frequency of each coded

11   event (i.e., type; context; who; what; knowledge; and activity) was recorded. One independent

12   and trained coder coded each session; with an intra-coder agreement of 96%, indicating a high

13   level of agreement (Nunnally 1978).

14   **Practice Activity**. To assess the structure of the questions used in different coaching

15   session activities, the soccer practice activity coding system developed by O'Connor, Larkin

16   and Williams (2017) was employed. Therefore, the analysis considered the structure of

17   questions within five soccer-specific activities: session introduction; individual activity; drills;

18   small sided games (i.e., 2 v 2 to 4 v 4); and large games (i.e., 5 v 5 or greater) (see Table 1).

19   **Data analysis**

20   Data were coded and quantified for each questioning profile descriptor. Descriptive

21   statistics (mean ± standard error) were used to describe all coded information. A significant

22   alpha was set at 0.05, with effect size denoted as small ($r = 0.1 – 0.29$), medium ($r = 0.3 – 0.49$)

23   or large ($r = 0.5 – 1$) (Cohen 1992).

24   Association rule models were generated to determine the extent to which one

25   questioning profile descriptor (i.e., Question Type, Knowledge, Context, Who, What) occurred

1   in the presence of another. Association rules are algorithms which can identify underlying and

2   frequent non-linear patterns in a large dataset. The '*Arules*' package was used to apply the

3   *Apriori* algorithm (Hahsler et al., 2019) to measure the levels of association between the five

4   types of questioning profile descriptor. Six separate models were constructed; one for each

5   session type (i.e., session introduction; individual activity; drill, small-sided game, large-sided

6   game) and one including All. For each model, a minimum support of 10% (i.e., any rules that

7   constituted less than 10% of total occurrences were not analysed) and confidence of 90% were

8   required in order for a rule to be constructed. All analyses were undertaken in the R computing

9   environment (version 3.6.1, Vienna, Austria).

10   **Results**

11   In total, 2495 questions were coded for the analysis. The descriptive statistics (i.e., mean;

12   standard deviation; minimum; maximum) from the questioning profile coding system are

13   presented in Table 2. In addition, the percentage of each coded descriptor is provided - relative

14   to the total number of questions asked per session. Descriptive statistics for the profile of

15   specific questions (i.e., divergent and convergent) are presented in Table 3. Table 4 shows the

16   distribution of time across different types of activities. It shows that the largest proportion of

17   coaching time was allocated to larger and small sided games.

18   **<<<INSERT TABLE 2 HERE>>>**

19   **<<<INSERT TABLE 3 HERE>>>**

20   **<<<INSERT TABLE 4 HERE>>>**

21   Results from each of the six rule models are reported below. For each model, two rules

22   are presented. These rules (a) meet each of the selection criteria reported for each model and

23   (b) have practical relevance from a coaching perspective. In combination, they illustrate the

24   utility of the analysis with respect to the aims of the study. To provide further context relating

25   to the rules, examples from the data are also presented.

1 **Overall Session**

2 A total of 2495 questions were asked during the whole session model. Among the most notable

3 patterns was one captured by 'Rule 8', which consisted of: Type of

4 Question=**Convergent/Closed Question** Context=Freeze Who=Team What=instructional 253

5 ==> Knowledge=Lower Order 253 <confidence:(1)>. This rule indicates, with 100%

6 confidence, for the 253 occasions when a convergent question is posed, that it is instructional,

7 to the team, during a freeze and only requires lower order knowledge.

8 Rule 25. Context=Freeze What=Tactics/Principle Knowledge=Higher Order 392 ==> Type of

9 Question=**Divergent/Open Questions** 380 <confidence:(0.97)>. This rule indicates, with 97%

10 confidence, for 392 occasions when the coach asks the players to freeze, and asks a

11 tactics/principle and higher order question, most of these are divergent questions (380

12 instances).

13 **Session Introduction**

14 A total of 109 questions were asked in the session introduction model. Among the most notable

15 was 'Rule 11' which consisted of: Type of Question=**Convergent/Closed Question**

16 Who=Team Knowledge=Lower Order 39 ==> Context=Player Huddle 39 <confidence:(1)>.

17 This rule indicates, with 100% confidence, for the 39 occasions when a lower order convergent

18 question is posed to the team, it occurs in a player huddle.

19 At the start of the session, for the coach to determine the physical condition of the players (as

20 this may influence the structure of the session), coaches would bring the players into a huddle,

21 and ask convergent questions to the team related to the previous day's session or game (external

22 to the coaches session; school game), for example, "How did you all go yesterday? Any

23 injuries?" (Coach 7).

24 Rule 37. Type of Question=**Divergent/Open Questions** Who=Team What=Tactics/Principle

25 23 ==> Context=Player Huddle 23 <confidence:(1)>. The rule indicates, with 100%

1 confidence, for the 23 occasions when the coach asks a divergent question to the team related

2 to tactics/principles, it occurs in a player huddle.

3 At the start of a session the coach would introduce the session aim and then clarify what the

4 players knew in relation to this aim, for example with the players in a huddle the coach would

5 ask a question such as "what do we know about running with the ball and protecting it?" (Coach

6 11) or "why do we want to have good first touch into space?" (Coach 19).

7 **Individual Activity**

8 A total of 57 questions were asked in the Individual Model. Of the 30 rules output, Rule 6

9 consisted of Type of Question=**Convergent/Closed Question** Who=Team What=instructional

10 28 ==> Knowledge=Lower Order 28 <confidence:(1)>. This rule indicates, with 100%

11 confidence, for the 28 occasions when a convergent question is posed to the team and is

12 instructional, it involved lower order thinking.

13 During an individual activity, such as the session warm-up, coaches would provide instruction

14 questions to the players such as, "Can we slow down the jog coming back please - it is too fast"

15 (Coach 10).

16 Due to the small number of divergent open questions asked (n = 9), no rules met the 10%

17 minimum support and therefore no rules were created.

18 **Drill**

19 A total of 622 questions were asked in the Drill model. Among the most salient rules, 'Rule 9'

20 consisted of: Type of Question=**Convergent/Closed Question** Context=Freeze Who=Team

21 What=instructional 103 ==> Knowledge=Lower Order 103 <confidence:(1)>. This rule

22 indicates, with 100% confidence, for the 103 occasions when a convergent question is posed

23 to the team during a freeze and is instructional, it involves lower order thinking.

1   During an activity, the coach stops the drill and checks what the players were doing wrong.

2   Following another demonstration, the coach then makes sure the players understand the task

3   properly – "Everybody understand what we are doing then?" (Coach 17).

4   Rule 24. Context=Freeze What=Tactics/Principle Knowledge=Higher Order 101 ==> Type of

5   Question=**Divergent/Open Questions** 98 <confidence:(0.97)>. The rule indicates, with 97%

6   confidence, for 101 occasions when the coach asks a question during a freeze about

7   tactics/principles of a higher order, the majority of the time it was a divergent question (98

8   instances).

9   During a drill, the coach stops the activity and gets the players to freeze in position. They then

10 ask a question related to the tactical principle they were highlighting in the activity – "If you

11 come in to receive, can you hit Player 1? Why were you sitting so far away and what happened

12 as soon as you came out here?" (Coach 5).

13 **Small sided Games**

14 The small-sided game Model included 872 questions. One notable example of the 30 rules

15 output was Rule 8. Type of Question=**Convergent/Closed Question** Context=Freeze

16 Who=Team 117 ==> Knowledge=Lower Order 115 <confidence:(0.98)>. This rule indicates,

17 with 98% confidence, for the 117 occasions when a convergent question is posed to the team

18 during a freeze, the majority of times it involved lower order knowledge (115 instances).

19 After briefly observing a small sided game, coaches will generally stop the activity and get the

20 players to freeze in position and then ask convergent questions to the group in relation to the

21 focus of the activity, for instance, "Do you understand the shape with how you will defend?

22 One goes, one stays?" – (Coach 12) and "now can you see all the passing lanes you've got?"

23 (Coach 2).

24 Rule 24. Type of Question=**Divergent/Open Questions** Who=individual or group but others

25 are waiting What=Tactics/Principle 139 ==> Context=Freeze 131 <confidence:(0.94)>. The

1   rule indicates, with 94% confidence, for 139 occasions when the coach asks a divergent

2   question about tactics/principles, to a player or group and the other players are waiting, this

3   generally occurs in a freeze (131 instances).

4   During a small sided game, coaches generally have the players freeze in position and then ask

5   questions to an individual player while the group waits for the response. For instance, "When

6   XX has the ball and the defenders are like that, where could you go to receive the ball?" (Coach

7   14); or "XX after you made that pass you looked to see where the reds were – where were

8   they?" [player responds]; "and where did you go?" [player responds]; and where is there no

9   one? [player responds] (Coach 1).

10 **Large Games**

11 For the large games, 835 questions were considered in the rule model. Rule 6 - Type of

12 Question=**Convergent/Closed Question** Who=Individual Player other keep going 114 ==>

13 Knowledge=Lower Order 114 <confidence:(1)>. This rule indicates, with 100% confidence,

14 for the 114 occasions when a convergent question is posed to an individual player while the

15 other players keep playing, it involves lower order thinking.

16 During a large sided game, coaches generally asked questions on the go, for instance, they

17 would enter the playing area and speak to a player off the ball and ask them a question, such

18 as "XX was your first touch into space??" (Coach 9) or "Can we create opportunities to get one

19 of our players into midfield in control possession?" – (coach 16).

20 Rule 29. Type of Question=**Divergent/Open Questions** Who=individual or group but others

21 are waiting What=Tactics/Principle 143 ==> Context=Freeze 132 <confidence:(0.92)>. The

22 rule indicates, with 92% confidence, for 143 occasions when the coach asks a divergent

23 question about tactics/principles, to a player or group and the other players are waiting, this

24 mainly occurs in a freeze (132 instances).

1   During a large sided game, coaches generally asked tactical/principle divergent questions to an

2   individual player within a freeze situation. For example, "It was a 3v1, what led you to decide

3   to dribble out of that situation?" (Coach 17) or "XXX how are you helping your teammates

4   there?"; "what could you have done better here?" and "XXX where do you need to be" (Coach

5   11).

6   **Discussion**

7   Researchers have explored questioning in a sports coaching context in relation to

8   frequency of questions and athlete-coach interactions (Cope et al. 2016; Ford et al. 2010;

9   O'Connor et al. 2017; Partington and Cushion 2013; Partington et al. 2014). However, little is

10 known about the structure and taxonomy of coach questioning strategies. The results of the

11 current study highlight how youth soccer coaches, implementing the FFA National Curriculum,

12 have used questioning techniques within specific coaching contexts/activities to potentially

13 promote athlete learning. From a descriptive perspective, coaches asked on average 71

14 questions per session (0.88 questions per minute), with slightly more use of convergent (i.e.,

15 closed) questions (52.2%) than divergent (i.e., open) questions (47.8%). From a structural

16 perspective, generally coaches use convergent (i.e., closed) questions that are instructional and

17 involve lower order thinking. In contrast, divergent (i.e., open) questions are generally related

18 to a game tactic or principle and are asked when the team has stopped an activity. Ideally,

19 coaches should move between types of questions based on the needs of their athletes and the

20 nature of the situation. For example, coaches may start with questions of recall and

21 understanding and get players to build on this knowledge by progressing to asking players to

22 interpret cues, analyse the situation, develop solutions/actions and then evaluate their previous

23 decisions and actions in determining what worked and what didn't. If players struggle to find

24 answers, then coaches can rephrase the question, provide players more time to respond, or let

25 them work together to come up with solutions (Hill 2016; Long et al 2015).

1   In comparison to previously published findings (Harvey et al., 2010; Partington and

2   Cushion 2013; Partington et al. 2014), the descriptive results from the current study would

3   suggest coaches pose more questions to their athletes within a coaching session. This

4   potentially reflects the emphasis placed on questioning as an athlete learning strategy within

5   the FFA National Curriculum. In addition, the current results indicate coaches ask a higher

6   proportion of divergent questions during a session than previously reported (Harvey et al. 2010;

7   Partington and Cushion 2013; Partington et al. 2014). However, it should be noted the large

8   SD (34 ± 25) recorded indicates considerable variation between coaches in their use of this

9   questioning technique. This finding could be due to several factors, including the confidence

10   of the coach to ask divergent questions, coach understanding of their athletes' needs and

11   capabilities (Long et al. 2015; Caram and Davis, 2005), or the belief that divergent questions

12   develop decision-making skills (O'Connor et al. 2017; O'Connor et al. 2018). While this was

13   not specifically an aim of the current paper, further research should consider elaborating on

14   this by asking coaches to recall why they have posed a certain question, and at that specific

15   time in the session.

16   From a model perspective, rule-based solutions are particularly useful when multiple

17   features exist in large datasets, as analytical approaches like this are able to help identify

18   meaningful patterns in situations where researchers are overwhelmed by the data and unable to

19   recognise such patterns without such an aide. They do so not only by identifying complex

20   interactions between features, but also identifying the frequency of these interactions within a

21   data set. In this paper, they have the benefit of describing questioning behaviour/profiles of

22   coaches during certain sections of a training session in enhanced detail. This can lead to greater

23   insights into the efficacy of such approaches, or to help better define the distinct 'styles' or

24   profiles typically implemented by a coach or in a particular activity. As access to more data

25   types continues to grow in these environments, the benefit of these analytical approaches over

1 human observations will only become more pronounced. The rule models indicated some clear

2 patterns when considering the structure and profile of the type of question (i.e., convergent;

3 divergent) asked in the different training session activity types. For convergent questions, the

4 rule based analysis indicated that across individual, drills and small-sided games, coaches

5 asked questions to the team, which were instructional in nature and required lower level

6 knowledge. This may be an example of a naïve form of constructivism whereby coaches' use

7 instructional questions and believe they are effective (as they are questioning rather than telling

8 them what to do), however, they may actually be limiting the players knowledge, as they are

9 not able to construct new knowledge (Cope and Cushion, 2020; Cushion, 2013). As such, the

10 'power' of learning is still with the coach who is making the decisions and determining the

11 subsequent player actions (i.e., how the game may be played – 3 touches etc…).

12   For large games, the convergent question was more targeted to the individual while the

13 activity was on-going, but still required lower level knowledge. While lower order questioning

14 requires only lower levels of cognition and positions the athletes as responders, a coach may

15 use this type of questioning to assess athlete understanding (i.e., "which passing option is best

16 from here, forward or backwards?"), recall of key cues (i.e., "when you see the defence step

17 up, what should you do?"), comprehending the activity (i.e., "does everyone understand what

18 we are doing in the activity then?"), and direct the athlete's attention toward specific aspects

19 of the game environment and potential outcomes (Raab and Johnson 2007). Further, the

20 responses players provide to questions posed may assist the coach in deciding when and how

21 to progress the activity or session (Mitchell, Oslin and Griffin 2006).

22   With respect to divergent questioning there is a greater focus on higher order thinking,

23 through the formulation and reflection of ideas. It also stimulates critical thinking and problem

24 solving which players can then test within the game-play environment (Chambers and Vickers

25 2006; Cope et al. 2016; McNeill et al. 2008; Partington and Cushion 2013; Praxedes et al.

1 2016). The divergent questioning rule models for each type of activity indicate coaches

2 generally ask the question to the whole group, with the question having an emphasis on a key

3 game tactic or principle. The potential benefit associated with divergent questions is they

4 promote deeper level thinking: stimulating the athletes to go beneath the surface appearance of

5 the problem (Kracl 2012). However, it should be noted that while divergent questions should

6 provide more opportunities for higher order thinking, in the current study, approximately 50%

7 of the divergent questions asked by coaches only required lower order thinking - that is,

8 questions which assess an individual's ability to recall and understand a single fact about the

9 sport-specific problem. Further evidence of this was that only 7% of divergent questions asked

10 players to problem solve. This potentially reduces athletes' opportunities to evaluate a situation

11 and formulate their next decision or action. This finding supports education-based research

12 which indicates that, despite evidence to suggest the benefit to learning from the use of

13 divergent higher-order questions, this is not reflected in practice, with teachers predominantly

14 using lower-order, recall questions (Jiang 2014; Tan 2007). However, using limited problem-

15 solving questions may reflect the capability of the athletes, within the specific context, to

16 respond to such questions. Asking unrealistically challenging questions may lead athletes to

17 lose self-confidence and becoming disengaged from the task (Long et al. 2015). Therefore, as

18 researchers highlight the relationship between the complexity/type of question posed and the

19 level of athlete thinking required for depth of learning (Chambers and Vickers 2006; Cope et

20 al. 2016; McNeill et al. 2008; Praxedes et al. 2016), coaches should consider when it is

21 appropriate to use higher order problem solving divergent questions to promote athlete

22 development.

23   While the results may suggest coaches are attempting to ask more questions to their

24 athletes in comparison to previous studies (Potrac et al. 2002; Potrac et al. 2007; Partington

25 and Cushion 2013; Partington et al. 2014), more attention needs to be paid to who they are

1   posing the question to. The results suggest the coaches predominately pose divergent questions

2   to the whole group. However, whole group questioning has been shown to be less effective for

3   athlete understanding compared to inductive questioning scaffolded for an individual or small

4   group (Cope et al. 2016; McNeill et al. 2008). A potential issue with posing whole group

5   questions is some athletes will not answer a question while others may dominate the responses.

6   This may be influenced by the confidence of the athlete in their ability to articulate their

7   thoughts. Coaches could address this issue by giving everyone time to think of an answer before

8   asking one or more players to share their answers. Further, coaches need to be aware of whether

9   the question relates to the whole team or specific athletes. If they believe the question is

10 important for the whole group, then they need to ensure everyone is fully engaged (i.e. all

11 athletes can hear and potentially respond). However, if the question is only relevant for one or

12 several players, they could consider whether questioning on the run is more effective. Harvey

13 and Light (2015) recommend the 'debate of ideas' as a strategy coaches can employ to achieve

14 greater athlete engagement and discussion during several 'tactical time-outs'. Based on

15 Grehaigne, Richard and Griffin's (2005) framework of four generic tactical questions, the

16 coach pre-plans the questions for small groups of players to discuss while the coach moves

17 from group to group listening and adding probing questions if required. The scaffolded

18 questions encourage players to reflect, analyse and debate amongst themselves, providing a

19 better understanding of each other's perspectives (Harvey and Light 2015; Hill, 2016).

20 Therefore, while coaches may be encouraged to use questioning within the learning

21 environment to promote student/athlete learning (Butler 2005; Cope et al. 2016; Football

22 Federation Australia, 2013) there is still limited empirical evidence to demonstrate their

23 practical effectiveness as an athlete teaching and learning strategy.

24   While researchers promote the benefits associated with effective questioning techniques

25 (Chambers and Vickers 2006; Cope et al. 2016; McNeill et al. 2008; Praxedes et al. 2016),

1   when exploring questioning techniques and performance, interventions tend to couple

2   questioning techniques with other pedagogical tools, such as instruction or feedback

3   behaviours (Chambers and Vickers 2006; Garcia-Gonzalez, et al. 2014). The lack of studies

4   which have focused on questioning as a learning strategy within interventions impacts the

5   ability to establish causal relationships between teacher questioning and student learning

6   outcomes. While we acknowledge it would be challenging for researchers to develop

7   interventions to isolate questions as a pedagogical technique (e.g. 'test' questions providing

8   retrieval practice; Binks 2018 Dirkx et al. 2014), researchers should consider taking an

9   ecological research approach by examining the combination of learning environment,

10   questioning strategies, and learner preparation that makes for success.

11   This is one of the first studies to explore the nature and structure of coach questioning

12   within real coaching environments. Findings are limited by some aspects of the study design

13   and further research is needed to pursue some of the following matters more deeply. First, while

14   the data provides an overview of the number of questions asked during certain activities, the

15   time engaged in each kind of activity was not equal and therefore direct comparisons between

16   the number and type of questions asked during each kind of activity is not straightforward.

17   Future studies exploring the structure of coaches' questions may control for the time invested

18   in certain activities to provide clear comparisons between the structures of questions within

19   these different practice activities. Second, the data collected provide a descriptive account of

20   the type of question, when it was asked and to whom. However, the data do not allow

21   exploration of why the question was asked - the specific purpose for the question. Further, we

22   acknowledge the lack of player voice in the study, which may also limit the understanding of

23   the outcome of the intended question. Future studies should consider the perspectives of

24   coaches and athletes to determine why questions were asked, and how effective they were in

25   reaching their intended purposes. Finally, the data collected does not consider the effect of the

1   questioning on the athletes performance. While questioning has been proposed as an effective

2   pedagogical tool (Harvey and Light 2015; Kidman et al. 2001; O'Connor et al. 2018), the

3   current findings do not indicate how the question may have effected athlete performance of a

4   skill, either positively or negatively. Future studies may consider implementing an intervention

5   program which measures the impact of a certain questioning technique or style and the potential

6   benefits they may have on athlete performance.

7   **Conclusion**

8   In summary, our findings show that youth soccer coaches use an array of questioning

9   types to potentially promote athlete learning. In comparison to previous research, coaches pose

10   more questions (Harvey et al., 2010; Partington and Cushion 2013; Partington et al. 2014), of

11   which a higher proportion are divergent questions (with these evenly split between lower order

12   and higher order questions), which possibly reflects the FFA National Curriculum's emphasis

13   on questioning as an athlete learning strategy. The rule models extends current knowledge by

14   revealing clear patterns when considering the structure and profile of questions, for example,

15   when divergent questions are asked during small-sided games and large games, the coach

16   generally asks the players to stop where they are (freeze) and directs a tactical question to an

17   individual player or the group. Convergent questions on the other hand, were predominantly

18   instructional, involving lower order thinking. While lower order questioning requires only

19   lower levels of cognition to assess athlete understanding, recall, comprehension, and direct

20   attention toward specific information, coaches should consider players capabilities when

21   determining which type of question best suits the situation and be prepared to move between

22   cognitive levels depending on player responses.

23   This research provides an understanding of current coach questioning practice, and by

24   knowing what we currently do we can modify practice to create better opportunities for athlete

25   learning. A key application for coaches is taking the time to specifically plan questions to

1   ensure they guide and promote particular athlete knowledge and behavioural actions (Pill,

2   2016). To achieve this coaches may consider scaffolding questions within the session to ensure

3   an appropriate sequence of questions addressing athlete learning needs while building towards

4   more complex understanding and applications (Pill, 2016). Overall, the findings from the study

5   provide an initial exploration of the type of questions asked by coaches within the coaching

6   environment, to provide insight in how they are used by to potentially promote athlete learning.

7   To develop further understanding, future research should consider coaches and athletes

8   perspectives to determine the purpose of questions asked and how effective they were in

9   reaching their intended purpose. Although the current study is unable to determine the explicit

10   impact of FFA's focus of questioning techniques to promote athlete learning, researchers may

11   now consider implementing intervention programs which examine how questioning techniques

12   impact athlete learning.

13

References

Adams, N.E. (2015) Asking a Great Question: A Librarian Teaches Questioning Skills to First-Year Medical Students, *Medical Reference Services Quarterly* 34(4), 418-427.

Amorose, Anthony J. 2007. "Coaching effectiveness: Exploring the relationship between coaching behavior and self-determined motivation." In M. S. Hagger, & N. L. D. Chatzisarantis (Eds.). *Self-determination Theory in Exercise and Sport*: p.p 209-227. Champaign, IL: Human Kinetics

Binks, Sally. 2018. "Testing enhances learning: A review of the literature". *Journal of Professional Nursing*, 24: 205-210.

Bloom, B.B. 1956. Taxonomy of Educational Objectives: The Classification of Educational Goals, *Handbook 1: Cognitive Domain*. New York, NY: David McKay Company Inc.

Butler, Joy I. 2005. "TGfU pet-agogy: old dogs, new tricks and puppy school." *Physical Education and Sport Pedagogy* 10(3): 225-240.

Caram, Chris, and Patsy Davis. 2005. "Inviting student engagement with questioning". *Kappa Delta Pi Record* 42(1): 19-23.

Chambers, Kristine L., and Joan N. Vickers. 2006. "Effects of bandwidth feedback and questioning on the performance of competitive swimmers." *Sport Psychologist* 20(2): 184-197.

Cohen, Jacob. 1992. "A power primer." *Psychological Bulletin* 112(1): 115-159.

Cope, Ed, and Chris Cushion. 2020. "A move towards reconceptualising direct instruction in sport coaching pedagogy." *Impact: Journal of the Chartered College of Teaching* 18: Chapter 19.

Cope, Ed, Mark Partington, Christopher J. Cushion, and Stephen Harvey. 2016. "An investigation of professional top-level youth football coaches' questioning practice." *Qualitative Research in Sport, Exercise and Health* 8(4): 380-393.

1   Cushion, Christopher. 2010. "Coach behaviour." In. *Sports coaching professionalization and*

2   *practice* edited by J. Lyle and C. J. Cushion, 43-62. London, England: Elsevier.

3   Cushion, Christopher. 2013. "Applying game centered approaches in coaching: A critical

4   analysis of the 'dilemmas of practice' impacting change." *Sports Coaching Review* 2(1):

5   61–76.

6   Cushion, Christopher, Stephen Harvey, Bob Muir, and Lee Nelson. 2012. "Developing the

7   Coach Analysis and Intervention System (CAIS): Establishing validity and reliability of

8   a computerised systematic observation instrument." *Journal of Sports Sciences* 30(2):

9   201-216.

10   Dempsey, Noel, David Richardson, Ed Cope and Colum Cronin. 2020. "Creating and

11   disseminating coach education policy: a case of formal coach education in grassroots

12   football." *Sport, Education and Society*

13   Dirkx, Kim, Liesbeth Kester and Paul A. Kirschner. 2014. "The Testing Effect for Learning

14   Principles and Procedures from Texts". *The Journal of Educational Research* 107(5)*:*

15   357-364.

16   Eather, Narelle, Brad Jones, Andrew Miller, and Phillip J Morgan. 2020. Evaluating the impact

17   of a coach development intervention for improving coaching practices in junior football

18   (soccer): The "MASTER" pilot study, *Journal of Sports Sciences* 38(11-12): 1441-1453.

19   Engin, Marion. (2013). "Questioning to scaffold: an exploration of questions in pre-service

20   teacher training feedback sessions", *European Journal of Teacher Education* 36(1): 39-

21   54.

22   Football Federation Australia. 2013. *The national football curriculum: The roadmap to*

23   *international success*. Sydney, Australia: Football Federation Australia.

1 Ford, Paul R., Ian Yates, and A. Mark Williams. 2010. "An analysis of practice activities and

2   instructional behaviours used by youth soccer coaches during practice: Exploring the link

3   between science and application." *Journal of Sports Sciences* 28(5): 483-495.

4 García-González, Luis, Alberto Moreno, Alexander Gil, M. Perla Moreno, and Fernando Del

5   Villar. 2014. "Effects of decision training on decision making and performance in young

6   tennis players: An applied research." *Journal of Applied Sport Psychology* 26(4): 426-

7   440.

8 Gréhaigne, Jean-Francis, Paul Godbout, and Daniel Bouthier. 2001. "The teaching and learning

9   of decision making in team sports." *Quest* 53(1): 59-76.

10 Gréhaigne, Jean-Francis, Richard, Jean-François, and Griffin, Linda. 2005. *Teaching and*

11   *learning team sports and games*. New York, NY: Routledge.

12 Harvey, Stephen, Christopher Cushion, and Ada N. Massa-Gonzalez. 2010. "Learning a new

13   method: Teaching Games for Understanding in the coaches' eyes." *Physical Education*

14   *and Sport Pedagogy* 15(4): 361-382.

15 Harvey, Stephen. and Richard Light. 2015. "Questioning for learning in game-based

16   approaches to teaching and coaching". *Asia-Pacific Journal of Health, Sport & Physical*

17   *Education* 6(2): 175-190.

18 Hill, Joan. 2016. "Questioning techniques: A study of instructional practice." *Peabody Journal*

19   *of Education* 91(5): 660-671.

20 Hahsler, Michael, Christian Buchta, Bettina Gruen, Kurt Hornik, Ian Johnson, Christian

21   Borgelt, and Maintainer Michael Hahsler. 2019. "Package 'arules'."

22 Jiang, Yan. 2014. "Exploring teacher questioning as a formative assessment strategy." *RELC*

23   *Journal* 45(3): 287-304.

24 Kidman, Lynn, Rod Thorpe, Robyn L. Jones, and Craig Lewis. 2001. *Developing decision*

25   *makers: An empowerment approach to coaching*. IPC Print Resources.

1   Kracl, Carrie L. 2012. "Review or true? Using higher-level thinking questions in social studies

2   instruction." *The Social Studies* 103(2): 57-60.

3   Light, Richard L., Stephen Harvey, and Alain Mouchet. 2014. "Improving 'at-action'decision-

4   making in team sports through a holistic coaching approach." *Sport, Education and*

5   *Society* 19(3): 258-275.

6   Long, Michele, Rebecca Blankenburg, and Lavjay Butani. 2015. "Questioning as a Teaching

7   Tool". *Pediatrics* 135(3): 406-408.

8   McNeill, Michael C., Joan M. Fry, Steven C. Wright, Clara WK Tan, and Tony Rossi. 2008.

9   "Structuring time and questioning to achieve tactical awareness in games lessons."

10   *Physical Education and Sport Pedagogy* 13(3): 231-249.

11   Metzler, Michael. 2000. *Instructional models for physical education*, Boston, MA: Allyn &

12   Bacon.

13   Mitchell, S., J. Oslin, and L. Griffin 2006. *Teaching sport concepts and skills: A tactical games*

14   *approach* (2nd ed.). Champaign, IL: Human Kinetics.

15   Myhill, M. and Dunkin, F. 2005. "Questioning learning", *Language and Education* 19(5): 415-

16   427.

17   Nunnally, Jum. C. 1978. "Psychometric theory." New York: McGraw-Hill.

18   O'Connor, Donna and Paul Larkin. 2015. Decision-making and tactical knowledge, an

19   Australian perspective to their development in youth players. In *International Research*

20   *in Science and Soccer II.* edited by Terrence. Favero, Barry. Drust, and Brian. Dawson

21   (Eds). London, UK: Routledge.

22   O'Connor, Donna, Paul Larkin, and Oliver Höner. 2020. Coaches' use of game-based

23   approaches in team sports. In *Perspectives on Game-Based Coaching.* edited by Shane

24   Pill. London, UK: Routledge

O'Connor, Donna, Paul Larkin, and A. Mark Williams. 2018. "Observations of youth football training: How do coaches structure training sessions for player development?." *Journal of Sports Sciences* 36(1): 39-47.

O'Connor, Donna, Paul Larkin, and A. Mark 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, Donna, Dewa Wardak, Peter Goodyear, Paul Larkin, and A. Mark Williams. 2018. "Conceptualising decision-making and its development: a phenomenographic analysis." *Science and Medicine in Football* 2(4): 261-271.

Partington, Mark, and C. Cushion. 2013. "An investigation of the practice activities and coaching behaviors of professional top-level youth soccer coaches." *Scandinavian Journal of Medicine and Science in Sports* 23(3): 374-382.

Partington, Mark, Christopher Cushion, and Stephen 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.

Pearson, Philip., & Paul Webb. Developing effective questioning in teaching games for understanding (TGfU). (2008). 1st Asia Pacific Sport in Education Conference: Ngunyawaiendi Yerthoappendi Play to Educate, Adelaide, 21 January.

Pill, Shane. 2016. Making learning visible – The pedagogy of questioning in a game sense approach. In 2015 Game Sense for Teachers and Coaches Conference: Proceedings. Edited by J. Bruce and C. North (pp, 143-155), Christchurch, New Zealand.

Pill, Shane. 2015. "Using appreciative inquiry to explore Australian football coaches' experience with game sense coaching." *Sport, Education and Society* 20(6):799-818.

1 Potrac, Paul, Robyn Jones, and Kathleen Armour. 2002. "It's All About Getting Respect': The
2   Coaching Behaviors of an Expert English Soccer Coach." *Sport, Education and*
3   *Society* 7(2): 183-202.

4 Potrac, Paul, Robyn Jones, and Christopher Cushion. 2007. "Understanding power and the
5   coach's role in professional English soccer: A preliminary investigation of coach
6   behaviour." *Soccer and Society* 8(1): 33-49.

7 Práxedes, Alba, Alberto Moreno, Javier Sevil, Luis García-González, and Fernando Del Villar.
8   2016. "A Preliminary Study of the Effects of a Comprehensive Teaching Program, Based
9   on Questioning, to Improve Tactical Actions in Young Footballers." *Perceptual and*
10   *Motor Skills* 122(3): 742-756.

11 R Core Team. (2016). *R: A language and environment for statistical computing*. *R Foundation*
12   *for Statistical Computing,* Vienna, Austria.

13 Raab, Markus, and Joseph G. Johnson. 2007. "Expertise-based differences in search and
14   option-generation strategies." *Journal of Experimental Psychology: Applied* 13(3): 158.

15 Renshaw, Ian, and Jia-Yi Chow. 2019. "A constraint-led approach to sport and physical
16   education pedagogy." *Physical Education and Sport Pedagogy* 24 (2): 103-116.

17 Shim, Woo-jeong, and Kelley Walczak. 2012. "The Impact of Faculty Teaching Practices on
18   the Development of Students' Critical Thinking Skills." *International Journal of*
19   *Teaching and Learning in Higher Education* 24(1): 16-30.

20 Tan, Zhi. 2007. "Questioning in Chinese university EL classrooms: What lies beyond it?."
21   *RELC Journal* 38(1): 87-103.

22 Tofade, Toyin, Jamie Elsner, and Stuart T. Haines. 2013. "Best practice strategies for effective
23   use of questions as a teaching tool." *American Journal of Pharmaceutical Education*
24   77(7): 155.

1   Walsh, Jackie A, and Beth D Sattes. 2016. *Quality questioning: Research-based practice to*

2   *engage every learner*. Thousand Oaks, California: Corwin.

1

2   Table 1.

3   *The category, sub-category, definitions, and associated examples of the questioning profile system.*

Category	Sub-Category	Definition
Type of Question	**Convergent**	Any question to player(s) that have a limited number of responses/options (i.e., yes/no; one word answers; closed questions). e.g., "Which is the best passing option from here, forward or back?" Which team has possession of the ball?"
	Divergent	Any question to player(s) that have a the potential for multiple responses/options (i.e., why questions; open ended questions) e.g., "What options do you have available for you in this situation?" "when do you think it might be a good option to close the player down?" what can you do to help the player in possession of the ball?"
Context	**Freeze in Position**	Coach stops the activity to talk to the players and the players remain in their current position during the activity. e.g., "stop and hold there…" "ok just stop in your position"
	Player Huddle	Coach stops the activity and gets the players to come together for a group discussion lead by either the coach or a player. e.g., "stop and bring it in…"
	Activity On-going	The coach has not stopped the activity, with the players still actively engaged in the activity e.g., players are actively participating in an activity
Who	**Individual player; Others Continue Activity**	A question is asked by the coach to an individual player while the rest of the team continue in the activity e.g., coach shadows a players during the activity and speaks to them while they are still playing the game

	Group; Others Continue Activity	A question is asked to more than one player, however the rest of the team continue to participate in the activity
		e.g., coach pulls a small group of players from the game and asks a question
	Individual or Group but Others are Waiting	A question is asked to one or more players, however the rest of the team are not actively participating in an activity and waiting for direction from the coach
		e.g., coach singles out one player to answer the question
	Team	A question is posed to the whole team
		e.g., coach asks a question to the team and anyone can respond
What	**Instructional**	The question is about the specific activity the group are doing
		e.g., how many touches are we focussing on in this activity? ,
	Tactics/principles	The question is related to the tactics or principles of the game
		e.g., how can we slow the momentum of the game?
	Technique	The question is related to the performance of a technical skill, such as a pass
		e.g., what determines the direction the ball will go?
	Problem-solving	The question relates players understanding what to do, when to do it and why
		e.g., How can you stop that player receiving the ball?
	General	A question not related to a sport-specific learning or performance
		e.g., "did anyone see John today?"; "did you watch the game last night?"
Knowledge	**Higher order**	Questions which require the player to comprehend the topic, situation or solution to a sport-specific problem

		e.g., how and when can we use this move in a game?
	Lower order	Questions which only assess players ability to recall a single fact about the sport-specific problem
		e.g., what went wrong then?
Activity	**Session Introduction**	The introduction to the training session which is general and not related to a specific training session activity
		e.g., introducing the training sessions main content, discussing the previous game
	Individual	Activities during training whereby the player is working on skills by oneself.
		e.g., juggling, running a lap with the ball
	Drills	Activities during training whereby the player is performing predetermined actions or movements. There is a set sequence to the activity with minimal options available to the player.
		e.g., passing from cone to cone, dribbling around cones, sequence passing (i.e., players have to pass to a specific person next)
	Small-Sided-Activities	Activities whereby players work in small teams of between 2 and 4 players in a game or activity situation.
		e.g., 4 v 3 end zone game, 2 v 2 possession activity
	Larger Activities	Activities during training where players work in teams of 5 or more players in a game or activity situation.
		e.g., 8 v 8 large size game, 5 v 7 offence v defence
	Transitions	Periods of time were the players are moving (or transitioning) between activities or inactivity periods
		e.g., players moving back into position following a player huddle or drink break

1

2

1   Table 2.

2   *Descriptive statistics of the coded questions asked during a youth soccer coaching session.*

Category	Sub-Category	Mean	SD	Minimum	Maximum	Percentage of Total Questions
Type	Convergent	37.20	12.04	15	62	52.18
	Divergent	34.09	25.41	1	98	47.82
Context	Huddle	13.94	9.03	0	38	19.55
	Activity Ongoing	18.66	12.21	1	43	26.17
	Freeze	38.69	19.25	2	99	54.27
Who	Team	36.91	15.70	9	74	51.78
	Individual or group but others are waiting	19.20	14.15	2	74	26.93
	Group - others keep going	4.57	7.13	0	32	6.41
	Individual - others keep going	10.60	8.23	1	35	14.87
What	Technique	4.26	5.18	0	28	5.97
	Instructional	20.94	9.84	5	45	29.38
	General Questions	4.60	3.73	0	13	6.45
	Tactics/principles	38.86	24.38	1	104	54.51
	Problem Solving	2.63	3.49	0	18	3.69
Knowledge	Lower order	53.89	17.81	17	88	75.59
	Higher order	17.40	13.36	0	50	24.41
Practice Activity	Session Introduction	3.11	4.45	0	16	4.37
	Individual	1.63	3.88	0	19	2.28
	Drills	17.77	16.86	0	79	24.93
	Small-Sided Games	24.91	22.81	0	85	34.95
	Large Games	23.86	20.44	0	67	33.47

3

4 Table 3.

5 *The percentage of divergent (M = 34.09) and convergent (M = 37.20) questions relative to the specific coded sub-category.*

		Divergent Questions (Mean = 34.09)			Convergent Questions (Mean = 37.20)		
		Mean	SD	%	Mean	SD	%
Context	Huddle	6.40	6.34	18.79	7.54	4.40	20.26
	Activity Ongoing	5.11	7.24	15.02	13.54	8.95	36.38
	Freeze	22.54	17.50	66.19	16.14	7.71	43.36
Who	Team	16.71	13.21	49.07	20.20	8.73	54.26
	Individual or group but others are waiting	11.37	10.95	33.39	7.83	5.82	21.03
	Group - others keep going	2.66	4.55	7.80	1.91	3.30	5.14
	Individual - others keep going	3.31	5.66	9.74	7.29	4.66	19.57
What	Technique	1.69	2.42	4.95	2.57	3.55	6.91
	Instructional	1.57	2.39	4.62	19.37	9.54	52.03
	General Questions	0.46	0.95	1.34	4.14	3.46	11.13
	Tactics/principles	27.71	22.69	81.37	11.14	6.49	29.93
	Problem Solving	2.63	3.49	7.72	0.00	0.00	0.00
Knowledge	Lower order	17.17	13.82	50.42	36.71	12.00	98.62
	Higher order	16.89	13.22	49.58	0.51	0.95	1.38
Practice Activity	Session Introduction	1.37	2.13	4.04	1.74	2.80	4.68
	Individual	0.26	0.70	0.75	1.37	3.36	3.68
	Drills	7.46	9.80	21.89	10.31	10.15	27.71
	Small-Sided Games	13.60	17.22	39.93	11.31	8.34	30.39
	Large Games	11.37	12.99	33.39	12.49	9.95	33.54

6   Table 4.

7   *The average time (seconds) and percentage of the training session spent in each coded activity type.*

	Average Time (Seconds)		Percentage of Training Time	
	Mean	SD	Mean	SD
Individual Activity	304.91	310.59	6.32	6.92
Drills	711.37	535.88	14.59	11.37
SSG	865.00	617.92	18.44	14.09
Larger Games	1169.11	840.52	23.52	17.02
Transitions	306.09	197.19	6.15	3.80
Huddle	465.34	263.78	9.41	4.98
Freeze	799.00	413.40	16.53	8.13
Drink Break	252.14	128.45	5.04	2.47

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