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1 An Exploration of Coaching Practice; How do High-Level Adventure
2 Sports Coaches Develop Independence in Learners?

3 **Abstract**

4 An increasing body of evidence has demonstrated that high-level adventure
5 sports coaches are developing their learners towards a personalised conception of
6 independence in their activities. However, how coaches do this has yet to receive much
7 attention. This investigation draws on a thematic analysis of ten semi-structured
8 interviews that followed coaching sessions with an explicit focus on developing
9 independence. Three themes emerged: developing a cognitive performer; an attuned
10 coaching process that fosters independence; and developing the individual's capacity to
11 learn.

12 The findings suggest that learners have an explicit comprehension of the 'what
13 and why' of the performance and coaches develop the learner's ability to learn both
14 how and where to continue their development post-coaching. The coaches achieve these
15 two objectives by developing a long-term independent performance in their coaching
16 practice. Coaches are not trying to develop fully independent performances during
17 coaching, but instead to prepare learners to continue their development with adaptable
18 performances within the practicalities of learning in adventurous environments.

19

20 **Keywords:** comprehension of performance; developing independence; heutagogy;
21 thematic analysis

22

23 **An Exploration of Coaching Practice; How do High-Level Adventure Sports**
24 **Coaches Develop Independence in Learners?**

25 High-level adventure sports coaches have an explicit desire to teach for
26 independence (Christian et al., 2017; Collins et al., 2015). However, there is no clarity
27 of what is meant by independence in this context nor how it might be developed. This
28 desire is against the backdrop of a rise in participation in adventure sports in the UK
29 over the last five years. Sport England (2020) reports that, in 2019, 3.4 million adults
30 took part in an adventure sport twice in the 28 days before the survey. The Office of
31 National Statistics reports that the adventure sports sector contributed £1.8 billion to the
32 UK economy in 2019 (Davies & Dutton, 2021), a contribution that has been rising since
33 2011. Unsurprisingly, there is an academic and market interest in investigating and
34 reporting on adventure sports coaching practice. Specifically, Eastabrook and Collins
35 (2020) report that an important part of the coaching experience learners seeks is to
36 develop their independence and ability to undertake their own adventure. Given the
37 differences in how independence may be interpreted by individuals, climbing for
38 example can be a competitive, action or adventure sport depending on a participant's
39 motivation or as a requirement of challenge and performance. This aspect of coaching
40 practice is not well understood (Collins and Brymer 2020). Therefore, we seek to
41 investigate how independence is perceived and developed by the coach of adventure
42 sports

43 Consequently, we aim to identify the coach's role in developing adventure
44 independence and to inform adventure sports coach development by providing insight
45 into this complex task. This study reports the findings from a group of high-level
46 adventure sports coaches whose stated aim is to develop performer independence. A

47 reflexive thematic analysis was conducted on the transcripts of ten semi-structured
48 interviews following observed adventure sports coaching sessions by those coaches.

49 **Review of Relevant Literature**

50 To provide suitable context and background, a brief review of the literature is
51 offered in two sections: first, the nature of independence in adventure and second, an
52 overview of adventure sports coaching practice.

53 **The Nature of Independence in Adventure**

54 Increasingly, the authors view adventure as a personalised construction that
55 accommodates several key factors; a connection to wild environments, a social
56 engagement and a challenge (Collins & Brymer, 2020; Ewert et al., 2013; Sugerman,
57 2001; Varley & Semple, 2015). Each individual places a different emphasis on these
58 elements to satisfy their own motivation. As a consequence, the learners may have
59 different expectations from the coaching relationship with their coach. For example, a
60 group may seek low levels of challenge to permit greater socialising during a sea
61 kayaking trip while others might seek the aid of manmade protection (bolts) to increase
62 their level of challenge while climbing. Eastabrook & Collins (2020) found
63 independence to be a small but important aspect of what learners sought from their
64 coaching experience because of a link to confidence. Independence did not necessarily
65 mean independence from the coach. Independence may be in the activity with an expert
66 alongside providing a margin of security, for others it may mean learning a set of skills
67 to enable the person to journey on their own in a remote setting, to undertake their own
68 expedition. Independence appears linked to adventure and is also an aspect of a personal
69 construct of adventure.

70 The desire to develop independence is not unique to adventure sports. Indeed,
71 many sporting performances require an athlete to independently recall and execute a
72 skill (Carson & Collins, 2011). However, in adventure sports independence appears to
73 mean a great deal more. This may be due in part to the naturally hyper-dynamic
74 environment of adventure sports with its inherent risk. (Christian et al., 2020; Collins &
75 Collins, 2016). A combination of the dynamic environment, personalised constructs for
76 adventure and independence means that no situation is duplicated, and performance has
77 to be highly adaptable and flexible as a response to the changing situational demands.
78 This contrasts with sports that take place in manufactured or managed environments in
79 which the dynamic aspect aspects of the environment are reduced often towards
80 external regulation to ensure a literal and figurative level playing field (Collins and
81 Carson 2021).

82 Reflecting the need for adaptability, many authors have reported significant
83 cognitive effort associated with adventure sports experiences (Collins & Brymer, 2020;
84 Ellmer & Rynne, 2016; Frühauf et al., 2017; Jones et al., 2017). The complexity and
85 uniqueness of the environment for each performance are both cognitive and physically
86 demanding. These authors characterised these demands as emanating from the need to
87 learn from experiences, the ability to manage the demands of decision-making,
88 developing a comprehension of their environment via a high level of situational
89 awareness, and maintaining and developing confidence. Therefore, it seems logical that
90 these cognitive or meta-cognitive aspects be considered part of independence in
91 adventure sports.

92 **Adventure Sports Coaching Practice**

93 Adventure sports coaches have been reported as individualising their teaching to
94 align with their learners' notions of adventure (Eastabrook & Collins, 2021), this
95 incorporates independence. Logically then, effective coaching will also need the coach
96 to understand the individual's conceptualisation of independence. In short, what kind of
97 independence the learner wants while being coached and also post-coaching if any.
98 These situational demands frame the coach's decision-making around the session at the
99 micro-, meso- and macro- levels; for example, the desired level of performance, levels
100 of participation and decisions regarding content, goals, direction, venue and pace of a
101 given session (Eastabrook and Collins, 2020).

102 Underpinning an adventure sports coaching practice is the coach's Professional
103 Judgement and Decision-Making (PJDM) (Collins & Collins, 2016), which is
104 underpinned by a sophisticated epistemological belief (Christian et al., 2017; Collins et
105 al., 2015). Unsurprisingly, the adventure sports coach's epistemological beliefs place a
106 value on adventure, independence, reflective practice, adaptability and flexibility
107 (Copper & Allen, 2017). As Mees et al. (2020) identify adventure sports coaches are
108 adaptive experts. The coach's epistemology is manifest via their PJDM as it determines
109 their actions in delivering suitably judged levels of and progressions towards
110 independence and adventure. In common with a lot of coaching, the coach manipulates
111 individual, task and environmental constraints to achieve these coaching goals.

112 PJDM proposes an intuitive, naturalistic decision-making process synergised
113 and nested within a classic, slower, rational process that checks for errors (Collins et al.,
114 2016). These are reflective processes, pre-action, in-action, on-action while still in
115 context and on-action that influences execution, and the coach's learning (Copper &

116 Allen, 2017). Mees et al. (2020) characterise this as an essential aspect of the adaptive
117 expertise cited earlier reflecting the complex interaction of the environment. It would
118 seem logical that the personal constructs of adventure and independence are also
119 situational demands. Combined with the highly individualised characteristics of
120 coaching in adventure sports it is unsurprising that authors also report a high cognitive
121 load for the coach (Collins & Collins, 2019; Mees et al. 2020).

122 For the adventure sports coach to make effective and safe judgements and
123 decisions regarding their practice, they clearly require an understanding of student
124 motivation, their construct of adventure and specifically for this paper the nature of
125 independence sought by the student if they are to successfully individualise the
126 coaching process (Eastabrook & Collins, 2020). Independence is clearly highly sought
127 in any athletic endeavour. However, independence can be to a greater or lesser degree,
128 within adventure sports this is highly contextual and responsive to the situational
129 demands brought to the coaching process by the individual. The coach has to navigate
130 significant safety and performance implications making complex judgements that rely
131 on a clear capacity to project both the environment and the individual's performance
132 given a set of coaching interventions. Navigating this complexity, balancing suitably
133 safe participation with and without a coach, making judgments on the level of
134 independence and the commensurate risk an individual may be safely exposed to when
135 independent. Consequently, we explore the coach's role in developing independence
136 and how that might inform adventure sports coach development.

137 **Methodology**

138 A sample group of five high-level adventure coaches was observed for two,
139 typically day-long adventure sports coaching sessions. Semi-structured interviews were
140 conducted following each session, yielding ten interviews. Interviews explored the

141 coach's practice with a particular focus on the strategies employed to develop the
142 learner's independence. The interviews were subsequently thematically analysed.

143 **Researchers' Positioning**

144 Removing all potential bias from qualitative research is improbable and in this
145 case undesirable. Attempts should be made to be transparent about potential biases to
146 safeguard the findings. In alignment with good practice, a short background of the first
147 and second authors is offered. They are white males with a combined experience of
148 coaching adventure sports of over 50 years, both holding high-level NGB coaching
149 awards in a range of adventure activities. They have worked professionally as adventure
150 sports coaches and coach developers in the UK for over 30 years. Their research interest
151 is in better understanding coaching practice and they have been active researchers over
152 the last 10 years. They take a primarily post-positive research stance that draws on
153 pragmatism as an underpinning philosophical position (Morgan, 2014). Whilst
154 acknowledging author bias aids the transparency of the findings, there is also an
155 advantage in the experiences and standings of the authors in interpreting the findings.
156 Indeed, we subscribe to Olive's (2020) view that research is through the author. From
157 an ontological perspective, the authors take a position that multiple realities exist where
158 we are aiming to find the most probable narrative for a given circumstance.
159 Epistemologically, meaning is constructed from the interplay between subject and
160 object where the authors' backgrounds and experiences are ideally placed to make sense
161 of this interplay, characterised as social constructivism (Palincsar, 1998).

162 **Participants**

163 A purposive sample of 12 coaches was invited to take part in the study. All met
164 the inclusion criteria: holding at least one high-level activity-specific coaching award

165 from their relevant NGB; having over ten years; coaching experience since senior
166 accreditation; an explicit and stated desire to teach for independence; and an openness
167 and willingness to engage in research. Such criteria have been used in previous research
168 investigating high-level adventure sports coaching practice and are used here for
169 consistency (Collins et al., 2016; Copper & Allen, 2017). A further screening process
170 was used to ensure the suitability of the sample and to aid trustworthiness that would
171 safeguard the findings.

172 Seven coaches were removed due to self-declared lack of currency as a high-
173 level coach (n=1); potential for bias, referencing the authors as influential in their
174 coaching practice (n=2); lack of availability (n=2); and a predominant focus on
175 curriculum-driven courses such a coach education or with young people in an education
176 context (n=2). The remaining five (See Table 1) represent a heterogeneous, purposeful
177 sample of three men and two women. Pseudonyms have been used to preserve
178 participant anonymity.

179 INSERT TABLE 1 CLOSE TO HERE

180 **Procedure**

181 The procedure is broken down into three subsections for clarity, pre-session
182 interview, practical observations and post-session interview. Ethics approval was gained
183 before the start of the study from the University of Central Lancashire BAHSS ethics
184 committee.

185 ***Pre-session Interview***

186 Following written consent, the participating coach and author met before the
187 observed session to continue rapport building and explore the coach's practice and goals

188 for the session that provides a clear contextual grounding (Morrow, (2005, p. 253).
189 Interviews were conducted by the first author at locations agreed with the coach which
190 was the venue for the day's coaching activity. The mean duration was 25 minutes. The
191 notes from these interviews were used as a reflexive aid during the analysis of the
192 subsequent post-session interview to ensure accurate meanings, thus improving the
193 richness and depth of findings Sparkes & Smith (2009). The pre-interview transcripts
194 did not contribute to the thematic analysis as that set of interviews grounded and
195 contextualised the observations described next.

196 INSERT TABLE 2 CLOSE TO HERE

197 *Practical Session Observations*

198 The first author adopted the peripheral member research approach (Angrosino,
199 2007, p. 167); being present in the setting to gain an insider perspective and
200 understanding of the context but not participating directly in the activity. The author
201 captured video footage of the coaching sessions using a discrete, body-mounted camera
202 (a GoPro Session) so as not to unduly alter the coach's behaviour (Sparman, 2005).
203 The participating coaches reported feeling comfortable with video due to the prevalence
204 of such cameras and frequent use by their students to record their own experiences
205 however, the coaches' knowledge of the focus of observations should be cited as a
206 limitation of the methods used. Field notes were taken throughout the observation,
207 constructing a narrative of the activity with an in-action reflective commentary
208 (Montgomery & Bailey, 2007). The field notes and video were used in the post-session
209 interview to ensure accuracy of recall (Rosenstein, 2017) and later in grouping codified
210 units. Notes were made against an operational definition of coaching actions that

211 seemed to have a direct effect on the learner's degree of independence, either enhancing
212 or reducing it.

213 ***Post-Session Interviews***

214 The post-session semi-structured interview guide was drafted and then refined
215 using two cognitive interviews following the guidance of Beatty and Wills (2007) and
216 Drennan (2003), with two representative coaches. Changes were made to the style,
217 structure and presentation of questions to aid the quality of the interview (see Table 3).

218 INSERT TABLE 3 CLOSE TO HERE

219 Interviews were conducted once the learners had finished for the day. We
220 acknowledge the potential for post hoc rationalisation, however, we felt this was
221 balanced against the cognitively depleting demands of the coaching process and the
222 interview. The coaches needed a chance to decompress. These post-session interviews
223 were conducted in comfortable, convenient locations. Questions from field notes and
224 video clips were selected before the interview based on the observation and notes in
225 which independence had been a key factor. As suggested by Rosenstein (2017), these
226 clips and notes were used to delve into the coach's responses during the interview and
227 thereby increase richness and depth. For the video clips, the coaches were shown a clip
228 and then asked to explain the development of independence using the secondary
229 questions as prompts. The mean interview time was 72 minutes. Interviews were
230 digitally recorded using a digital recorder for later transcription.

231 **Data Analysis**

232 Following the procedures developed by Braun et al. (2018) and noting the
233 reflections of Braun and Clarke (2019), a six-step reflexive thematic analysis was

234 conducted on the post-session interviews. The post-session interviews were transcribed
235 and codified by the first author to ensure a single coherent data set. The transcripts were
236 read and reread, listening to the audio to enable correction and immersion in the data
237 and improve understanding. Codified units were identified by significance as indicated
238 by the interviewee or by the authors reflecting the research aims and focus participant,
239 selected from the transcripts in a semantic reading. Field notes were used reflexively to
240 aid comprehension and to assist with coding and labelling of subsequent themes (Ruck
241 & Mannion, 2019). Post-session transcripts were read and reread several times
242 developing the themes and their meanings which were checked against the reflexive
243 tools: the pre-session interview transcript, field notes, and video and interview notes.
244 This coding was performed in NVivo 11, facilitating good visualisation of the coding.

245 Coded units were exported into Excel for ease of data manipulation. This
246 allowed the development of rich low-order themes through a ‘thought-out adventure’
247 approach (Braun & Clarke, 2019, p. 591). The codified units were grouped and
248 regrouped to reach a convergence of lower-order themes that gave an emerging
249 narrative of the coaches’ practice concerning their stated aim of developing independent
250 performance. Mid- and higher-order themes were subsequently developed and regularly
251 reviewed against the field and interview notes, low-order themes allowed grouping of
252 the volume of themes and units and significance emphasised in the transcripts (Krane et
253 al., 1997). At this grouping stage, consideration was given to possible, linked, latent
254 concepts. To aid trustworthiness, peer debriefings were conducted between the first and
255 second author and then again between the first and the third and fourth to reduce bias
256 and improve the narrative of the findings, where the mid- and higher-order grouping
257 process was repeated each time (Sparks, 1998). This allowed for the assessment of the
258 degree of convergence and refinement of the names and therefore meanings of the mid

259 and high-order themes. Peer debriefing acts as an audit of the data, improving the
260 reliability of the analysis (Shenton, 2004), reflecting the backgrounds of the authors
261 who acted as critical friends who bring knowingness and relevance to the analysis
262 (Braun et al., 2018).

263 **Results and Discussion**

264 Braun and Clark (2019) suggest that results and discussions can be treated
265 separately, as is common in research, or can be combined. We have combined to
266 explore the meanings of each theme fully and their relationships to the existing
267 literature. The thematic analysis developed three higher-order themes: developing a
268 cognitive performer, an attuned coaching process that fosters independence; and
269 developing the individual's capacity to learn. The first is formed of two mid-order
270 themes, 11 lower-order themes and 198 codified units. The second, three mid-order, 34
271 lower-order and 490 codified units, and the third, three mid-order, 28 lower-order and
272 398 codified units. Table 4 provides a breakdown of the construction of the higher-order
273 themes with mid-order themes and exemplar quotes. Each mid-order theme is in turn
274 discussed against the literature, within each higher-order theme subheading.

275 INSERT TABLE 4 CLOSE TO HERE

276 **Developing a Cognitive Performer**

277 The higher-order theme; developing a cognitive performer, is comprised of two
278 mid-order themes: teaching for comprehension of performance and developing an
279 adaptive performance.

280 *Teaching for Comprehension*

281 All the participating coaches identified that learners need to understand their
282 own performance and its context to allow adaptability, fostering a capacity to learn and
283 to become independent. Carol elaborates, 'understanding helps when they are trying to
284 figure things out for themselves'. Equally Tony stresses that it's 'pretty fundamental for
285 me with a lot of learning, particularly when it comes to independence, again that there's
286 a depth of understanding to whatever it is they're doing' while Steve highlights
287 '[learners] have the brain space to be able to cope with that to go, "oh, yeah, this is
288 better than that's why, I see why now" it's, a 'comprehension'.

289 Comprehension is identified as a feature of long-term learning that supports
290 retention and skill transfer (Soderstrom & Bjork, 2015). A typical strategy reported by
291 the participants was to support comprehension via discussion of the pros and cons of
292 different aspects of the technique with the learners. James exemplifies, 'by verbalising
293 what's going on and giving the pros and cons, they get an insight into that
294 [complexity]'.

295 However, improvement in performance does not necessarily translate to
296 improved long-term learning or vice versa (Soderstrom & Bjork, 2015). This difference
297 is essential for the adventure sports coach because independence requires long-term
298 learning, whereas an adventurous experience may only require a single one-off
299 performance; the passenger, participant, performer continuum (Brown, 2000). Consider
300 an individual the services of a mountain guide to ascent a specific peak against, another
301 seeking coaching to move from indoor climbing to outdoor climbing and climbing
302 coaching for competition. The coach selects a pedagogic approach that suits the

303 learner's construct of independence; they may want long-term skill development or a
304 single one-off under the supervision of the coach.

305 The coaches reported teaching a loose set of adaptable and flexible skills that
306 can be applied and reapplied in many different contexts or environments, necessitating
307 an understanding of the technique, environment and interaction. It is this understanding
308 of constraints and their effects that differentiates this constraint manipulation from a
309 cognitive rather than ecological perspective. As Collins et al. (2016) opine, the
310 suitability of any teaching strategy depends on the individual, the context and the
311 desired outcome. Thus, the learner's understanding extends beyond just how to perform
312 and into what and why they are doing it, the tactical aspects of performance (Berry et
313 al., 2015). This creates a performance that is the application rather than the replication
314 of technique.

315 *Teaching for Adaptability*

316 The coaches emphasised the need to develop adaptability. Adaptability allows
317 the learner to perform by modifying what they do without the coach being present,
318 improving independence and confidence (see Collins & Collins, 2020). A point also
319 made by Greenburg and Culver (2020) and Ellmer et al. (2020) in their studies of
320 learning in action sports. Natasha explains that the development of technical
321 performance into adaptable performance must start early. She acknowledged that she is
322 no longer teaching the learner how to spin but giving her different ways of experiencing
323 the sensations of the spin, allowing and encouraging her student to become adaptable.
324 The coach recognises the need for adaptability as a response because of the hyper-
325 dynamic environment in which no two instances are identical (Christian et al., 2020).
326 Adaptability via independent learning ability (Claxton, 2002) and independence are

327 seen as synergetic by the coaches. Carol states 'we will get to the point where they
328 [learners] can do it themselves'.

329 Linked to adaptability is the need for situational awareness. The coaches
330 implicitly encouraged a high level of situational awareness (Endsley, 1997), though this
331 was not an explicit aim. Tony breaks down the possible options and encourages the
332 development of principles rather than rules that underpin the technique and highlights
333 aspects of the situation that may dictate different courses of action. The coaches are
334 aiming, implicitly, for a projection level of awareness in which adaptation can be
335 anticipated (see Mees et al., 2020). Further discussion on the suitability of situational
336 awareness in an adventure sports coach would require a further, more specific,
337 investigation.

338 As a part of teaching for adaptive performances, all coaches in this study were
339 developing the learner's ability to make decisions that affect the nature of their
340 performance. Carol explains that the first step is often to encourage the learners to
341 recognise the need for a decision because a particular technique is unsuitable. She
342 reports telling her learners, 'I need you guys to make a decision'. However, Carol
343 continues, 'it takes quite a long time even when you are used to doing it... you have to
344 persevere'. Tony also highlights the difficulty of making decisions in adventure sports
345 to their learners by having to 'encourage them to make a decision'. Reluctance to make
346 decisions has not been previously reported in adventure sports learners, but has been in
347 adventure sports coaches; Collins et al. (2016) reported that coaches need to develop
348 confidence in their decision-making 'over time and practice' (p. 7), which would seem
349 to be equally true of learners. The consequences of a poor decision have the potential to
350 be disastrous and confidence in that skill is a key factor. Carol and Tony are developing
351 confident learners via decisions and adaptation to performance. James echoes this;

352 '[learners] start to understand that there's a lot of complexity within [adventure]',
353 suggesting that embracing this complexity would help the learners develop adaptability.
354 Tony observes that over time, the learner's decisions become, 'more generalisable to
355 different situations and different environments, which starts by gaining confidence in
356 specific places'. The decision-making process becomes transportable between contexts
357 as part of a problem-solving strategy. Tony's example highlights the interrelated nature
358 of the higher-order themes, where a specific focus on confidence has a positive effect on
359 the learner's development.

360 This higher-order theme reveals a narrative that the coaches are framing
361 performance in terms of the construction of a valid solution to the problem of their
362 desire to participate, the level of skills needed and the environmental impact, rather than
363 a replication of specific performance. The coaches sampled here are encouraging their
364 learners to take ownership of their decisions and embrace the complexity of adventure
365 sports performances.

366 **Attuned Coaching Process that Fosters Independence**

367 This higher-order theme consists of three mid-order themes; a specific focus on
368 developing confidence, sophistication in feedback and structuring activity to facilitate
369 in-session independence.

370 ***Specific Focus on Developing Confidence***

371 In all the practical sessions, confidence is a stated focus. Tony offers an
372 example, 'the objective around the session from their perspective was increased
373 confidence'. The coaches reported that many of the learners described the coach's belief
374 in them as empowering. The participants allocated time and strategy to developing

375 confidence at the expense of technical or tactical development. A point highlighted by
376 Carol, 'I could take them there and do lots more instruction with them, but for them
377 what they'd want that feeling [of doing it themselves]'. Here coaches are prioritising
378 personal development rather than performance development as anticipated by the
379 adventure sports coach's defined role (Collins and Collins, 2016) and seen in youth
380 sports coaching (Turnnidge et al., 2014).

381 The coaches ensured that the learner achieved a personal goal, even if this
382 changed or evolved over the coaching session. Setting and achieving a specific goal has
383 been reported as a source of self-efficacy in world-class performers (Hays et al., 2007).
384 From the learner's perspective, this included an aspect of challenge where they thought
385 there was a real chance of failure. Carol explains the structure of a multi-day coaching
386 course built towards goal accomplishment:

387 You are just putting in the foundations on that first day of a lot of little
388 individual things and then we did a bit more on the morning of the
389 second day. Then they managed to put it all together to produce that
390 final performance which was excellent.

391 Curran et al. (2015) and Thomas et al. (2011) report that confidence is developed over
392 time. We see that Carol builds the learning towards performance over the coaching
393 programme aiming for goal accomplishment via a mastery of performance.

394 James also highlights the importance of goal accomplishment adding the value
395 of vicarious experience in developing self-efficacy, two sources of efficacy initially
396 offered by Bandura (1977). More recently, Samson and Solmon (2011) also support
397 these two sources of self-efficacy as still pertinent despite the 50 years since they were

398 first reported by Bandura. Coaches are developing confidence in their learners in a
399 considered and structured way using a blend of approaches.

400 James cautions that students can become saturated, 'sometimes it's really easy to
401 just go that little bit too far with people. And not acknowledge where they're at
402 ...maybe they're just knackered and worn out, putting the hard-earned confidence at
403 risk'. Steve describes enacting a parental role, taking back control of a session to ensure
404 a positive outcome, retaining the learner's feeling of accomplishment and building the
405 tools for future learning. At this point, the coaches are explicitly protecting the learner's
406 self-efficacy.

407 *Sophistication in Feedback*

408 In developing a cognitive performer (mid-order theme of cognitive
409 performances), coaches were using discursive feedback to explore the pros and cons of
410 their options. All the coaches in this study employed a range of feedback methods and
411 structures. Tony justified the use of quick and direct feedback for near-instant changes
412 in performance, 'if quick fixes are available that permit me to open some doors for them
413 so that they can step through, and let's say explore or experiment with options'. Tony's
414 behaviour contrasts with the literature that reports the positive relationship between
415 augmented or delayed feedback and longer-term retention (Soderstrom & Bjork, 2015;
416 Vickers, 2007). Delayed or augmented feedback would seem the best option to promote
417 independence. However, the format of feedback depends on the potential outcome and
418 context, in this case permitting the learner accessibility to a more productive learning
419 environment. Highlighting the range of feedback coaches might use, Tony describes, 'a
420 willful refusal to give them feedback', that encourages the learners to generate their
421 own feedback, supporting independence later in the coaching programme where the

422 learners ‘finally reaped the rewards’ of his refusal. Employing the full range of
423 feedback options requires a PJDM approach, as reported in adventure sports coaching
424 practice. Tony knows when to give instant direct feedback to create change and when to
425 reduce feedback to encourage greater cognitive effort and longer-term learning.

426 Another feature of the feedback was its frankness. Carol details the bluntness of
427 the situation when it comes to ensuring safety in adventurous environments when she
428 anticipates her learner’s seeking independence:

429 When I saw that those guys are properly wanting to go strap themselves
430 in places [be independent post-coaching], so when it was good, I told
431 them it was good [safe], when it was bad [unsafe], I definitely told them
432 it was bad. There was no being nice really, as far as if I saw anything
433 mission-critical, there was no ambiguity [...] I was being quite blunt
434 whether it was safe or not.

435 Carol’s bluntness reflects the fundamental responsibility of coaches to keep their
436 learners safe, both when with her and in their future adventures. She perceives a
437 responsibility for their future security by being their coach. This example is also
438 balanced with non-verbal feedback, where Carol repeated what her learners noticed,
439 ‘well, you obviously think I can do it; otherwise, you’d be right next to me’. Here,
440 Carol’s position relative to the learner gives feedback on her view of the performance.
441 Both her examples of feedback were built on knowing the learner and emphasise the
442 importance of good interpersonal skills, which aligns with coaches in other domains:
443 business coaching (Ianiro et al., 2015), Olympic sports coaching (Jowett & Cockerill,
444 2003) and learner expectations in adventure sports (Eastabrook & Collins, 2021). In a
445 potentially stressful environment, during performance pressure, a strong bond between

446 learner and coach appears to permit a frankness in feedback that may not be accepted in
447 other contexts but is considered to be appropriate by the learners. As Jowett and Slade
448 (2021) highlight that it is the authenticity and trust in the relationship that ensures
449 learners believe the coaches' intentions are positive towards them, even when the
450 feedback is frank. Critically, honest and potentially frank or blunt feedback guides the
451 learners to safe and adventurous independent adventures. Both that they are capable of
452 being independent or critical pieces of knowledge that will keep them safe.

453 *Structuring Activity to Facilitate in-session Independence*

454 The coaches sought to capitalise on the environment to facilitate learning. James
455 explains, 'I can make an opportunity where you will [learners] get a powerful right
456 answer'. James could provide the answer or allow the learner to experience the answer
457 themselves. Whilst this resembles a dynamical ecological approach (Anson et al., 2005),
458 the coaches stress that they are engineering these opportunities through careful venue
459 selection and skill acquisition leading to such moments, or how the task is framed to the
460 learner; more akin to guided discovery (Mosston & Ashworth, 2002). Such learning
461 requires cognitive effort on the part of the learner to understand the significance of
462 particular environmental factors. For example, they are using a developed high-level
463 situational awareness to adapt performance as discussed in the first higher-order theme.

464 Similarly, Tony created an 'opportunity during that period to paddle with
465 freedom within that part of the tide race to set their own challenges', which
466 acknowledges Tozer et al.'s (2007) and Mees et al.'s (2020) point that the development
467 of adaptive skill requires practice with that purpose. Practice with that purpose develops
468 self-efficacy through experimentation, error recognition, adaptation and feedback, as
469 would be common in many forms of coaching. In addition, the unstructured nature of

470 such freedom or solo time allows for a contextual sense-making or ‘situatedness’ of any
471 potential learning (cf. Kalisch et al., 2011). During such free practice, the coaches were
472 careful to support the learner’s experience and ownership:

473 If I suggest better alternatives, they might or might not remember that.
474 But it seems to me that what is likely to happen is that their sense of
475 independence at that moment gets eroded, rather than enhanced. And it
476 seems to me that we don’t risk their growing sense of independence
477 quite as much if they are permitted to commit to their actions. And if it’s
478 a slightly sub-optimal outcome, as long as there aren’t important safety
479 issues attached to it, then a willingness to commit to decision-making
480 seems to grow. (Tony)

481 Carol echoes the safety aspect, ‘the only time I’m going to probably interfere is if I think
482 it’s radically unsafe or that it’s going to perpetuate a poor behaviour in the future’, and
483 comments that she might add a safety factor but, ‘it will all [be] very, very low key, you
484 don’t interrupt or stop the process that [the learner’s] going through’. This appears to be
485 a risk-versus-benefit decision on Carol’s part. One interesting factor is that due to the
486 independence fostered, as long as safety is not compromised, the learner-owned sub-
487 optimal solution trumps a coach-intervened optimal one. Consequently, the learners can
488 come up with their own possible but not optimum solutions to their own performance
489 situation.

490 The use and acceptance of sub-optimal performances may be a critical
491 difference between high-level adventure sports coaches and high-level traditional sports
492 coaches. It’s logical to strive for optimum performance in traditional sporting, but this
493 contrasts with the learner’s individualised personal conceptualisation of adventure and

494 independence where the learner writes and rewrites the ‘rules’ for participation.
495 Literature reporting coaches specifically sacrificing performance appears rare, requiring
496 further investigation. However, in pursuit of removing barriers to green physical activity
497 (Grimwood et al., 2014; Patel et al., 2012; White & Smith, 2014), these strategies focus
498 on wider factors other than just performance could be useful. The direct implication is
499 that adventure sports coaches, at times, decide to prioritise ownership, confidence, and
500 durability of performance and thus independence over the *ideal* technical or tactical
501 performance.

502 This second higher-order theme articulates high-level coaching processes that
503 develop confidence in the learners through a mastery of performance that achieves a
504 specific goal. Equally, a strong coach-learner relationship permits the coach to draw on
505 a range of feedback strategies including blunt, non-verbal, short/direct and discursive to
506 foster independence. Finally, coaches here prioritised ownership and a sense of
507 independence over optimal technical and tactical performances, allowing sub-optimal
508 but safe performances.

509 **Developing the Individual’s Capacity to Learn**

510 The third theme is constructed of three mid-order themes: practical aspects of
511 learning in adventurous environments, developing an ability to learn socially and
512 increasing learner’s ownership of learning.

513 ***Practical Aspects of Learning in Adventurous Environments***

514 All the coaches highlighted the significance of preparing the learners for their
515 own adventures. Carol explains, ‘we talked quite a lot about venues, crags to go to,
516 making sure that when you’re going there, everything’s in your court’. Brymer (2010)

517 highlights that preparation is a crucial aspect of risk management; however, the
518 planning described here extends beyond risk management toward positive performance
519 and learning opportunities. The coaches prepare learners to anticipate changes in the
520 environment and how to adapt to them. For example, Steve ‘talked a lot more about
521 consolidating their tidal flow experience’ to give meaning to their planning. The
522 coaches achieved this by exposing the learners to the ‘fullness [most adventurous]’ of
523 the hyper-dynamic environment to clearly understand their environment, reinforce their
524 self-belief and contextualise future learning. Such experiences provide the authenticity
525 desired by learners. Natasha explains that, ‘I really encouraged them to think about
526 practising things in a lower [easier] environment’. Carol comments on authenticity,
527 ‘they just need a little bit more time and that sort of stuff to make sure it all beds in
528 properly. Exposing the learners to a learner-perceived full experience in a hyper-
529 dynamic environment contextualises the learner’s future learning. It provides the
530 learners with the opportunity to identify the abilities they need to achieve their desired
531 independent performance and take ownership of their learning, conforming to self-
532 determined learning where learners learn to take ownership of their progress (Blaschke,
533 2012).

534 Carol highlights that such exposure with a coach present allows room for
535 mistakes, enabling learners to figure it out for themselves while having the coach as a
536 ‘safety net’. The coaches here embrace the complex environment, allow for mistakes
537 and exploit them for further learning. James is keen for the learners to know that ‘there
538 aren’t absolute black and white answers’. The coaches’ reluctance to turn to right and
539 wrong answers reflects two aspects of Schommer’s (1994) epistemological dimensions,
540 sources and certainty of knowledge. The coach views this sophistication as vital to aid

541 the learner's development towards independence and the learner's ability to learn from
542 their own errors thus demonstrating control of the learning.

543 Practising skills with the coaches also gave the learners self-belief and the belief
544 that their goal was achievable. Steve exemplifies this: That feeling of, okay, I've got a
545 handle on this, I know what I'm doing. This contrasts with the possible out-of-control
546 sensations associated with thrill-seeking and risk-taking historically and wrongly
547 associated with adventure sports (Brymer & Gray, 2009). Tony is more explicit, 'it lies
548 entirely within your abilities to take yourself back to places like that and organise that
549 kind of training [experience].

550 Carol cautions that 'what's going to be important now is them [learners] getting
551 out and using it as quickly as possible' as the benefits of exposure to the hyper-dynamic
552 environment to facilitate their practice are perceived as short-lived. Learners are given
553 guidance and sometimes explicit instructions on where, what, how and why to practice,
554 to encourage post-coaching development, independently of the coach.

555 ***Developing the Ability to Learn Socially***

556 The findings reported in this section add further empirical support to recent
557 publications that highlighted social learning as a function of action-sports learning
558 (Collins et al., 2022; Ellmer et al., 2020) and learning in nature sports (Collins &
559 Brymer, 2020). Specifically, all coaches view learning as a collaboration between
560 themselves and the learner. This collaboration is reliant on the coach's good
561 interpersonal skills. James elaborates on the informality, 'it felt kind of like we were
562 just having a chat' but 'there's obviously a lot, to the process'. This *chat* is implicit of
563 the benefits of informal learning, the coach plans these individualised interactions as
564 both informal and also highly contextual. Similarly, when encouraging learner

565 reflection, Natasha suggests that, ‘sometimes those questions are being pretty open, just
566 getting them to reflect on how well they thought that performance had gone, allowing a
567 holistic recognition on their technical performance’. There are clear parallels with social
568 constructivism as reported in sports coaching (Stoszkowski & Collins, 2014) and shared
569 mental models (Giske et al., 2015), where the coach and learner construct a best-fit
570 performance, see sub-optimal cited earlier, within the shared conception of independent
571 adventure sports participation. Tony encourages, ‘everybody to share their personal
572 reflections’ as part of developing a micro-community of practice. Natasha
573 acknowledges the cultural aspects, encouraging the learners to ‘feel more like they are
574 paddlers’ by sharing a language, attitude and knowledge. Thus, the coaches share the
575 culture, behaviours and language knowing that they are facilitating the entry into the
576 adventure community of practice. As Ellmer et al. (2020) highlight the more time spent
577 in a community of practice the more accessible knowledge can become. Coaches here
578 recognise the value of this engagement because it is an aspect of situating the future
579 learning process.

580 ***Increasing Learner’s Ownership of Learning***

581 The coaches developed the learner’s intrinsic feedback mechanisms. Natasha
582 suggests these mechanisms allow the learner to self-check when the coach is not there,
583 an aspect of independence. She is asking her learners, ‘what makes [one] flat spin better
584 than another?’ Natasha uses questions from this open question to guide the students to
585 develop answers. Fostering intrinsic feedback in adventure sports coaching practice
586 confirms a point made by Christian et al. (2020), who suggest that this is desirable,
587 given each situation's unique nature. The process reported here by Natasha could be
588 considered self-checking, a student-led approach described by Mosston and Ashworth
589 (2002) in physical education. Natasha and her learner are developing a common

590 language to understand their performance so is collaborative in nature. Developing the
591 learners like this seems novel to adventure sports coaching practice, particularly in the
592 degree to which the learner is empowered to continue their learning. The learners are
593 determining the success criteria and using feedback to measure their own performance.

594 All the coaches are developing the learner's ability to reflect on their own
595 sensations and experiences and reduce their reliance on the coach. Tony highlights the
596 progressive nature of developing such reflective skills, 'it took us a couple of days to
597 arrive at a point where they embraced the idea that I really didn't want to have to tell
598 them too much anymore'. Initially, Tony's learners wanted him to help them make
599 sense of and to structure their reflection. However, Tony was shaping his coaching
600 interactions over the programme to wean the learners off his feedback and onto their
601 own, therein learning independence. Carol echoes Tony in a practical sense whilst on
602 the activity:

603 That idea of stopping, thinking, planning, I had to prompt him quite a
604 few times on the first route, but by the time we came round to the second
605 route, he was starting to realise that he needed to be doing these things
606 for himself and he did that the whole way up, the second pitch that he
607 led.

608 However, in contrast to Tony, here Carol encourages her learners to reflect on-action
609 and in context, a timing of reflection described by Collins and Collins (2013), to aid
610 their performance by creating opportunities for reflection during the activity, whereas
611 Tony refers to a more structured on-action reflection (Schön, 1983). Reflection is a
612 dimension of expertise in many fields (Schön, 1983). Hickman and Stokes contend that
613 reflective abilities would aid practitioners in their sense-making abilities but suggest

614 that practitioners often ignore reflection to focus on technical development. In contrast
615 to their point, the high-level practitioners here were coaching to develop reflective
616 practice in learners alongside their technical ability through a range of reflective tools.
617 This appears to reflect the learnacy skills highlighted by several authors (Agonács &
618 Matos, 2019; Claxton, 2002; Green & Schlairet, 2017).

619 This final higher-order theme builds an account of coaching practice that takes
620 learners into the fullness of the adventurous environments to provide a context for their
621 future learning, an experience that also fulfils aspects of the desired coaching
622 experience and in the development of the learner's confidence. Equally, the coaches are
623 offering cultural and social engagement to aid their post-coaching learning potential and
624 giving the learners tools to learn themselves. Developing the ability to learn in
625 adventurous environments recognises that the benefits of coaching may only be short-
626 lived without independent practice. Therefore, coaches are giving the learners a better
627 understanding of how learning takes place in adventurous environments, what to learn
628 and where to practice, guiding post-session development.

629 **Practical Implications**

630 The adventure sport NBGs emphasise autonomous performances, from both a
631 cognitive (Fitts & Posner, 1967) and ecological (Brymer & Davids, 2013) position of
632 skill acquisition. These findings show that coaches are developing comprehension and
633 adaptability of performance through decision-making where these cognitive efforts are
634 at odds with these theories of skill acquisition. Further work could determine the degree
635 and nature of cognitive effort that would inform more appropriate models of skill
636 acquisition in adventure sports. However, these findings suggest that teaching learners
637 to think and understand their performance is an integral aspect of independence. As

638 such and specifically, these findings should promote adventure sports coaches to
639 support learners to adapt their performance via explicit consideration based on their
640 perception of the environment. To realise this coaching strategy, the coach's ability to
641 articulate their perception, action and justification will be a key ability and will require
642 experience.

643 Equally, this exploration of coaching practice touches on existing literature that
644 seems to offer the most likely explanation of the coaches' behaviours; shared mental
645 modes (Giske et al., 2015) and learnacy (Claxton, 2002) are two examples. More
646 specific investigations are needed to gain more evidence for this use in adventure sports
647 coach education, but the findings here offer a direction for inquiry. These examples
648 offer exciting venues for enhancing understanding and development of coaching
649 practice that could be of benefit to those outside adventure sports, such as those aiming
650 to facilitate independence in green physical activity where health and wellbeing are
651 primary objectives.

652 **Limitations and Future Directions**

653 The final sample of five coaches could be strengthened through a wider
654 recruitment campaign that would increase the breadth of the findings. Equally,
655 interviewing beyond two coaching sessions could be expanded, particularly where the
656 participants are high-level coaches in more than one adventure sport. More sessions
657 would create a richer data set while also allowing any potential differences between
658 adventure sports to come to light. Lastly, this study only sampled UK coaches, limiting
659 the potential generalisability of the findings. Expanding the scope to seek perspectives
660 outside the UK and separately between adventure sports would be worthy of further
661 investigation in answering the need for this study as set out in the introduction. The
662 findings indicate the potential suitability of specific coaching practices such as

663 cognition in performance. There is now interest in sufficiently narrow investigations to
664 support these indicative findings with the view to inform coaching practice and
665 education.

666 **Conclusion**

667 We used semi-structured interviews based on two coaching sessions to explore
668 how independence may be developed. The findings show that coaches are developing a
669 conscious representation of the performance to scaffold future learning post-coaching;
670 the *what* and the *why*. Coaches are also developing the individual's ability to learn in
671 adventurous environments, allowing them to take ownership of their development post-
672 coaching; the *where* and the *how*. For the coach, this is achieved with a coaching
673 process that has the stated aim of developing independence, which is the lens through
674 which these adventure sports coaches operationalised their PJDM. These findings do
675 not draw on a single coaching strategy or paradigm, highlighting the need for coaches to
676 be able to choose the appropriate tool at the most appropriate time to develop
677 independence.

678 **Disclosure Statement**

679 There are no potential conflicts of interest to report.

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901 **Table 1**

902 *Demography of the coaches*

Coach	Age	Experience in adventure sports (Years)	Specialist Activity (Interview focus)	Qualifications Title
Tony	47	25	Sea Kayaking	British Canoeing Level 5 White Water, Sea Kayak
Steve	56	30	Sea Kayaking	British Canoeing Level 5 Sea Kayak
James	35	15	Winter Mountaineering	Winter Mountaineering and Climbing Instructor
Natasha	36	15	White Water Kayaking	British Canoeing Level 5 White Water Kayak
Carol	43	25	Rock Climbing	Winter Mountaineering and Climbing Instructor

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Opening Question	Secondary question	Probes	Time
Group			
What is the background of the group you are coaching?	Who are they?	Inspiration	5
	Where do they come from? i.e. club, group, marketing/internet?	Objectives	
	What do they want from their coaching?	Learning	
	How does this coaching fit into their wider picture of participation?	Confidence	
		TTPP	
		Social group	
		Location	
		New independent adventures	
		Enjoyment	
Session			
What are the objectives for this session?	How does this session fit within the whole coaching episode?	Long-term goals	10
	What have you done to prepare them for the session?	Short-term goals?	
	How will future sessions link to this session?	Pre-learning	
	Is there anything you are including that the clients have not specifically asked for, but you are covering?	Seeds for the future?	
	Where is it going to take place and why?	Safety	
		Environment	
		Logistics	
		Reflection	
		Motivations	
		Planning	
		Individualisation	
		Adventure?	
Approach			
How do you plan to achieve your session objectives?	What coaching strategies do you plan to deploy?	PJDM	10
	When/how will you use each?	Awareness of group	
	How will you know if it's working?	Technical development	
	How will the environment impact learning?	Deliberate practice	
	How do you think this will foster independence?	Individualisation	
		Independence	
		Ability to learn	
		Ownership	
		Ability to make decisions	
		Foster confidence	

910 **Table 3**911 *Post-activity interview guide sheet*

Opening Question	Secondary questions	Probes	
Reflection How did the session go?	Do you think you achieved the objectives you set out pre-session? What was a key moment in the session? Why? Impact? How successful was the session? Was the learner's notion of independence realised?	Reflection Planning Alternation; why, how Flexibility Adaptability Linear	Success/failure Arousal levels Extend of planning Value for money Learners' future learning/participation
Learning ability How has learning capacity been developed in this session?	What learning tasks/challenges were set? Why/How? How did the group influence individualisation? How/when was feedback given? How did you facilitate any reflection on the session? Do you think they developed anything implicit from the session? How would this session impact future sessions? What would you like to see the learners practice in the future?	[Video footage] Practice Ownership Awareness of learning? Arousal levels Self-efficacy TTPP Limitations Environmental factors Social learning Feedback Demonstration/modelling	
Decision-making How was their personal decision-making developed in this session?	Were the learners able to gain ownership over their decisions in the session? How and why? What were the decisions they were making? Did you explain your own thinking at any point? Why? How will they use their DM in the future?	[Video footage] Reflection in action in context Limitations Pros and Cons Awareness of decisions Self-efficacy TTPP Environmental factors	Social learning Questioning Feedback Adventure first / context
Confidence Did the learner's confidence levels change throughout the session?	What did you do with them to achieve this change? How and Why? Did you share any of your own experiences with the learner to benefit their development? How and when? Did the learner achieve a particular goal/accomplishment? What and how? To what extent do you think that change is long-term?	[Video footage] Learner reflection Environmental impact Adventurous experience Level of challenge Ownership of activity Personal (learner) limitations	Use of feedback Increase in comfort zone

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914 **Table 4. The thematic analysis of the post-session interviews**

Higher-order Theme (3)	Mid-Order Theme (8)	Exemplar Codified Units (coach)
Developing a cognitive performer	Teaching for comprehension of the performance	‘I think that was quite important, that they have a clear picture of what they’re meant to be doing, then they can actually see when it goes wrong and they correct it’ (Sam) ‘beginning to understand that things aren’t as random as perhaps we might think they are’ (Steve)
	Developing an adaptive performance	‘trying [get learners] to solve a problem rather than just copying a technique’ (Sam) ‘They want some principles to follow. They want some guidelines that will help them reach out for a decision’ (Tony)
Attuned coaching process that fosters independence	Specific focus on developing confidence	‘if you give people mechanisms to kind of cope and to be able to manage when their confidence drops, then yes. Then we’re onto a winner’ (Natasha) ‘I was like actually let’s just let this go because it’d be empowering for him’ (James)
	Sophistication in feedback	‘their underpinning foundation skills are pretty strong. It’s just an unfamiliarity with the environment. And as a consequence, I was able to take something other than a very direct approach’ (Tony) ‘it’s less direct coaching. And it’s more, have you thought about this, have you thought about that’ (Steve)
	Structuring activity to facilitate in-session independence	‘I could take them there and do lots more instruction with them, but for them what they’d want that feeling of being independent’ (Sam) ‘let’s park it now because I can make an opportunity where you’ll get a powerful right answer’ (James)
Developing the individual’s capacity to learn	Practical aspects of learning in adventurous environments	‘they need to consolidate for themselves’ (James) ‘realising that between the two of them there’s knowledge and they can actually figure these things out if they put both of their brains together and put the ideas out’ (Sam)
	Developing the ability to learn socially	‘I’m using any anecdote or evidence to help bolster their experience, kind of justify, so they’re not going to get the absolute answer’ (James) ‘I did not want to contribute to their discussions, because I was mindful that they may attach weight to anything I suggested’ (Tony)
	Increasing learners ownership of learning	‘he does a smooth flat spin that intrinsically feels nicer. So we’re kind of talking about sensations on the boat as you’re in the feature and so making him think about those things as well’ (Natasha) ‘being open with them kind of facilitated that process and helped them to draw comparisons between the two exercises’ (Tony)

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