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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 of
27 what is meant by independence in this context nor how it might be developed. This desire
28 is against the backdrop of a rise in participation in adventure sports in the UK over the
29 last five years. Sport England (2020) reports that, in 2019, 3.4 million adults took part in
30 an adventure sport twice in the 28 days before the survey. The Office of National Statistics
31 reports that the adventure sports sector contributed £1.8 billion to the UK economy in
32 2019 (Davies & Dutton, 2021), a contribution that has been rising since 2011.
33 Unsurprisingly, there is an academic and market interest in investigating and reporting on
34 adventure sports coaching practice. Specifically, Eastabrook and Collins (2020) report
35 that an important part of the coaching experience learners seeks is to develop their
36 independence and ability to undertake their own adventure. Given the differences in how
37 independence may be interpreted by individuals, climbing for example can be a
38 competitive, action or adventure sport depending on a participant's motivation or as a
39 requirement of challenge and performance. This aspect of coaching practice is not well
40 understood (Collins and Brymer 2020). Therefore, we seek to investigate how
41 independence is perceived and developed by the coach of adventure sports

42 Consequently, we aim to identify the coach's role in developing adventure
43 independence and to inform adventure sports coach development by providing insight
44 into this complex task. This study reports the findings from a group of high-level
45 adventure sports coaches whose stated aim is to develop performer independence. A
46 reflexive thematic analysis was conducted on the transcripts of ten semi-structured
47 interviews following observed adventure sports coaching sessions by those coaches.

48 **Review of Relevant Literature**

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

52 **The Nature of Independence in Adventure**

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

69 The desire to develop independence is not unique to adventure sports. Indeed,
70 many sporting performances require an athlete to independently recall and execute a skill
71 (Carson & Collins, 2011). However, in adventure sports independence appears to mean a

72 great deal more. This may be due in part to the naturally hyper-dynamic environment of
73 adventure sports with its inherent risk. (Christian et al., 2020; Collins & Collins, 2016).
74 A combination of the dynamic environment, personalised constructs for adventure and
75 independence means that no situation is duplicated, and performance has to be highly
76 adaptable and flexible as a response to the changing situational demands. This contrasts
77 with sports that take place in manufactured or managed environments in which the
78 dynamic aspect aspects of the environment are reduced often towards external regulation
79 to ensure a literal and figurative level playing field (Collins and Carson 2021).

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

90 **Adventure Sports Coaching Practice**

91 Adventure sports coaches have been reported as individualising their teaching to
92 align with their learners' notions of adventure (Eastabrook & Collins, 2021), this
93 incorporates independence. Logically then, effective coaching will also need the coach to
94 understand the individual's conceptualisation of independence. In short, what kind of
95 independence the learner wants while being coached and also post-coaching if any. These

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96 situational demands frame the coach's decision-making around the session at the micro-,
97 meso- and macro- levels; for example, the desired level of performance, levels of
98 participation and decisions regarding content, goals, direction, venue and pace of a given
99 session (Eastabrook and Collins, 2020).

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

110 PJDM proposes an intuitive, naturalistic decision-making process synergised and
111 nested within a classic, slower, rational process that checks for errors (Collins et al.,
112 2016). These are reflective processes, pre-action, in-action, on-action while still in
113 context and on-action that influences execution, and the coach's learning (Copper &
114 Allen, 2017). Mees et al. (2020) characterise this as an essential aspect of the adaptive
115 expertise cited earlier reflecting the complex interaction of the environment. It would
116 seem logical that the personal constructs of adventure and independence are also
117 situational demands. Combined with the highly individualised characteristics of coaching
118 in adventure sports it is unsurprising that authors also report a high cognitive load for the
119 coach (Collins & Collins, 2019; Mees et al. 2020).

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

135 **Methodology**

136 A sample group of five high-level adventure coaches was observed for two,
137 typically day-long adventure sports coaching sessions. Semi-structured interviews were
138 conducted following each session, yielding ten interviews. Interviews explored the
139 coach's practice with a particular focus on the strategies employed to develop the
140 learner's independence. The interviews were subsequently thematically analysed.

141 **Researchers' Positioning**

142 Removing all potential bias from qualitative research is improbable and in this
143 case undesirable. Attempts should be made to be transparent about potential biases to

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

160 **Participants**

161 A purposive sample of 12 coaches was invited to take part in the study. All met
162 the inclusion criteria: holding at least one high-level activity-specific coaching award
163 from their relevant NGB; having over ten years; coaching experience since senior
164 accreditation; an explicit and stated desire to teach for independence; and an openness
165 and willingness to engage in research. Such criteria have been used in previous research
166 investigating high-level adventure sports coaching practice and are used here for
167 consistency (Collins et al., 2016; Copper & Allen, 2017). A further screening process was

168 used to ensure the suitability of the sample and to aid trustworthiness that would safeguard
169 the findings.

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

176 INSERT TABLE 1 CLOSE TO HERE

177 **Procedure**

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

182 *Pre-session Interview*

183 Following written consent, the participating coach and author met before the
184 observed session to continue rapport building and explore the coach's practice and goals
185 for the session that provides a clear contextual grounding (Morrow, (2005, p. 253).
186 Interviews were conducted by the first author at locations agreed with the coach which
187 was the venue for the day's coaching activity. The mean duration was 25 minutes. The
188 notes from these interviews were used as a reflexive aid during the analysis of the
189 subsequent post-session interview to ensure accurate meanings, thus improving the
190 richness and depth of findings Sparkes & Smith (2009). The pre-interview transcripts did

191 not contribute to the thematic analysis as that set of interviews grounded and
192 contextualised the observations described next.

193 INSERT TABLE 2 CLOSE TO HERE

194 *Practical Session Observations*

195 The first author adopted the peripheral member research approach (Angrosino,
196 2007, p. 167); being present in the setting to gain an insider perspective and understanding
197 of the context but not participating directly in the activity. The author captured video
198 footage of the coaching sessions using a discrete, body-mounted camera (a GoPro
199 Session) so as not to unduly alter the coach's behaviour (Sparrman, 2005). The
200 participating coaches reported feeling comfortable with video due to the prevalence of
201 such cameras and frequent use by their students to record their own experiences however,
202 the coaches' knowledge of the focus of observations should be cited as a limitation of the
203 methods used. Field notes were taken throughout the observation, constructing a narrative
204 of the activity with an in-action reflective commentary (Montgomery & Bailey, 2007).
205 The field notes and video were used in the post-session interview to ensure accuracy of
206 recall (Rosenstein, 2017) and later in grouping codified units. Notes were made against
207 an operational definition of coaching actions that seemed to have a direct effect on the
208 learner's degree of independence, either enhancing or reducing it.

209 *Post-Session Interviews*

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

214 INSERT TABLE 3 CLOSE TO HERE

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

227 **Data Analysis**

228 Following the procedures developed by Braun et al. (2018) and noting the
229 reflections of Braun and Clarke (2019), a six-step reflexive thematic analysis was
230 conducted on the post-session interviews. The post-session interviews were transcribed
231 and codified by the first author to ensure a single coherent data set. The transcripts were
232 read and reread, listening to the audio to enable correction and immersion in the data and
233 improve understanding. Codified units were identified by significance as indicated by the
234 interviewee or by the authors reflecting the research aims and focus participant, selected
235 from the transcripts in a semantic reading. Field notes were used reflexively to aid
236 comprehension and to assist with coding and labelling of subsequent themes (Ruck &
237 Mannion, 2019). Post-session transcripts were read and reread several times developing

238 the themes and their meanings which were checked against the reflexive tools: the pre-
239 session interview transcript, field notes, and video and interview notes. This coding was
240 performed in NVivo 11, facilitating good visualisation of the coding.

241 Coded units were exported into Excel for ease of data manipulation. This allowed
242 the development of rich low-order themes through a ‘thought-out adventure’ approach
243 (Braun & Clarke, 2019, p. 591). The codified units were grouped and regrouped to reach
244 a convergence of lower-order themes that gave an emerging narrative of the coaches’
245 practice concerning their stated aim of developing independent performance. Mid- and
246 higher-order themes were subsequently developed and regularly reviewed against the
247 field and interview notes, low-order themes allowed grouping of the volume of themes
248 and units and significance emphasised in the transcripts (Krane et al., 1997). At this
249 grouping stage, consideration was given to possible, linked, latent concepts. To aid
250 trustworthiness, peer debriefings were conducted between the first and second author and
251 then again between the first and the third and fourth to reduce bias and improve the
252 narrative of the findings, where the mid- and higher-order grouping process was repeated
253 each time (Sparks, 1998). This allowed for the assessment of the degree of convergence
254 and refinement of the names and therefore meanings of the mid and high-order themes.
255 Peer debriefing acts as an audit of the data, improving the reliability of the analysis
256 (Shenton, 2004), reflecting the backgrounds of the authors who acted as critical friends
257 who bring knowingness and relevance to the analysis (Braun et al., 2018).

258 **Results and Discussion**

259 Braun and Clark (2019) suggest that results and discussions can be treated
260 separately, as is common in research, or can be combined. We have combined to explore
261 the meanings of each theme fully and their relationships to the existing literature. The
262 thematic analysis developed three higher-order themes: developing a cognitive

263 performer, an attuned coaching process that fosters independence; and developing the
264 individual's capacity to learn. The first is formed of two mid-order themes, 11 lower-
265 order themes and 198 codified units. The second, three mid-order, 34 lower-order and
266 490 codified units, and the third, three mid-order, 28 lower-order and 398 codified units.
267 Table 4 provides a breakdown of the construction of the higher-order themes with mid-
268 order themes and exemplar quotes. Each mid-order theme is in turn discussed against the
269 literature, within each higher-order theme subheading.

270 INSERT TABLE 4 CLOSE TO HERE

271 **Developing a Cognitive Performer**

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

275 *Teaching for Comprehension*

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

284 Comprehension is identified as a feature of long-term learning that supports
285 retention and skill transfer (Soderstrom & Bjork, 2015). A typical strategy reported by

286 the participants was to support comprehension via discussion of the pros and cons of
287 different aspects of the technique with the learners. James exemplifies, ‘by verbalising
288 what's going on and giving the pros and cons, they get an insight into that [complexity]’.

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

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

308 ***Teaching for Adaptability***

309 The coaches emphasised the need to develop adaptability. Adaptability allows
310 the learner to perform by modifying what they do without the coach being present,
311 improving independence and confidence (see Collins & Collins, 2020). A point also made
312 by Greenburg and Culver (2020) and Ellmer et al. (2020) in their studies of learning in
313 action sports. Natasha explains that the development of technical performance into
314 adaptable performance must start early. She acknowledged that she is no longer teaching
315 the learner how to spin but giving her different ways of experiencing the sensations of the
316 spin, allowing and encouraging her student to become adaptable. The coach recognises
317 the need for adaptability as a response because of the hyper-dynamic environment in
318 which no two instances are identical (Christian et al., 2020). Adaptability via independent
319 learning ability (Claxton, 2002) and independence are seen as synergetic by the coaches.
320 Carol states 'we will get to the point where they [learners] can do it themselves'.

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

330 As a part of teaching for adaptive performances, all coaches in this study were
331 developing the learner's ability to make decisions that affect the nature of their

332 performance. Carol explains that the first step is often to encourage the learners to
333 recognise the need for a decision because a particular technique is unsuitable. She reports
334 telling her learners, 'I need you guys to make a decision'. However, Carol continues, 'it
335 takes quite a long time even when you are used to doing it... you have to persevere'. Tony
336 also highlights the difficulty of making decisions in adventure sports to their learners by
337 having to 'encourage them to make a decision'. Reluctance to make decisions has not
338 been previously reported in adventure sports learners, but has been in adventure sports
339 coaches; Collins et al. (2016) reported that coaches need to develop confidence in their
340 decision-making 'over time and practice' (p. 7), which would seem to be equally true of
341 learners. The consequences of a poor decision have the potential to be disastrous and
342 confidence in that skill is a key factor. Carol and Tony are developing confident learners
343 via decisions and adaptation to performance. James echoes this; '[learners] start to
344 understand that there's a lot of complexity within [adventure]', suggesting that embracing
345 this complexity would help the learners develop adaptability. Tony observes that over
346 time, the learner's decisions become, 'more generalisable to different situations and
347 different environments, which starts by gaining confidence in specific places'. The
348 decision-making process becomes transportable between contexts as part of a problem-
349 solving strategy. Tony's example highlights the interrelated nature of the higher-order
350 themes, where a specific focus on confidence has a positive effect on the learner's
351 development.

352 This higher-order theme reveals a narrative that the coaches are framing
353 performance in terms of the construction of a valid solution to the problem of their desire
354 to participate, the level of skills needed and the environmental impact, rather than a
355 replication of specific performance. The coaches sampled here are encouraging their

356 learners to take ownership of their decisions and embrace the complexity of adventure
357 sports performances.

358 **Attuned Coaching Process that Fosters Independence**

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

362 *Specific Focus on Developing Confidence*

363 In all the practical sessions, confidence is a stated focus. Tony offers an example,
364 ‘the objective around the session from their perspective was increased confidence’. The
365 coaches reported that many of the learners described the coach’s belief in them as
366 empowering. The participants allocated time and strategy to developing confidence at the
367 expense of technical or tactical development. A point highlighted by Carol, ‘I could take
368 them there and do lots more instruction with them, but for them what they'd want that
369 feeling [of doing it themselves]’. Here coaches are prioritising personal development
370 rather than performance development as anticipated by the adventure sports coach’s
371 defined role (Collins and Collins, 2016) and seen in youth sports coaching (Turnnidge et
372 al., 2014).

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

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

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

386 James also highlights the importance of goal accomplishment adding the value of
387 vicarious experience in developing self-efficacy, two sources of efficacy initially offered
388 by Bandura (1977). More recently, Samson and Solmon (2011) also support these two
389 sources of self-efficacy as still pertinent despite the 50 years since they were first reported
390 by Bandura. Coaches are developing confidence in their learners in a considered and
391 structured way using a blend of approaches.

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

399 *Sophistication in Feedback*

400 In developing a cognitive performer (mid-order theme of cognitive
401 performances), coaches were using discursive feedback to explore the pros and cons of

402 their options. All the coaches in this study employed a range of feedback methods and
403 structures. Tony justified the use of quick and direct feedback for near-instant changes in
404 performance, 'if quick fixes are available that permit me to open some doors for them so
405 that they can step through, and let's say explore or experiment with options'. Tony's
406 behaviour contrasts with the literature that reports the positive relationship between
407 augmented or delayed feedback and longer-term retention (Soderstrom & Bjork, 2015;
408 Vickers, 2007). Delayed or augmented feedback would seem the best option to promote
409 independence. However, the format of feedback depends on the potential outcome and
410 context, in this case permitting the learner accessibility to a more productive learning
411 environment. Highlighting the range of feedback coaches might use, Tony describes, 'a
412 willful refusal to give them feedback', that encourages the learners to generate their own
413 feedback, supporting independence later in the coaching programme where the learners
414 'finally reaped the rewards' of his refusal. Employing the full range of feedback options
415 requires a PJDM approach, as reported in adventure sports coaching practice. Tony knows
416 when to give instant direct feedback to create change and when to reduce feedback to
417 encourage greater cognitive effort and longer-term learning.

418 Another feature of the feedback was its frankness. Carol details the bluntness of
419 the situation when it comes to ensuring safety in adventurous environments when she
420 anticipates her learner's seeking independence:

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

427 Carol's bluntness reflects the fundamental responsibility of coaches to keep their learners
428 safe, both when with her and in their future adventures. She perceives a responsibility for
429 their future security by being their coach. This example is also balanced with non-verbal
430 feedback, where Carol repeated what her learners noticed, 'well, you obviously think I
431 can do it; otherwise, you'd be right next to me'. Here, Carol's position relative to the
432 learner gives feedback on her view of the performance. Both her examples of feedback
433 were built on knowing the learner and emphasise the importance of good interpersonal
434 skills, which aligns with coaches in other domains: business coaching (Ianiro et al., 2015),
435 Olympic sports coaching (Jowett & Cockerill, 2003) and learner expectations in
436 adventure sports (Eastabrook & Collins, 2021). In a potentially stressful environment,
437 during performance pressure, a strong bond between learner and coach appears to permit
438 a frankness in feedback that may not be accepted in other contexts but is considered to be
439 appropriate by the learners. As Jowett and Slade (2021) highlight that it is the authenticity
440 and trust in the relationship that ensures learners believe the coaches' intentions are
441 positive towards them, even when the feedback is frank. Critically, honest and potentially
442 frank or blunt feedback guides the learners to safe and adventurous independent
443 adventures. Both that they are capable of being independent or critical pieces of
444 knowledge that will keep them safe.

445 *Structuring Activity to Facilitate in-session Independence*

446 The coaches sought to capitalise on the environment to facilitate learning. James
447 explains, 'I can make an opportunity where you will [learners] get a powerful right
448 answer'. James could provide the answer or allow the learner to experience the answer
449 themselves. Whilst this resembles a dynamical ecological approach (Anson et al., 2005),
450 the coaches stress that they are engineering these opportunities through careful venue
451 selection and skill acquisition leading to such moments, or how the task is framed to the

452 learner; more akin to guided discovery (Mosston & Ashworth, 2002). Such learning
453 requires cognitive effort on the part of the learner to understand the significance of
454 particular environmental factors. For example, they are using a developed high-level
455 situational awareness to adapt performance as discussed in the first higher-order theme.

456 Similarly, Tony created an ‘opportunity during that period to paddle with freedom
457 within that part of the tide race to set their own challenges’, which acknowledges Tozer
458 et al.’s (2007) and Mees et al.’s (2020) point that the development of adaptive skill
459 requires practice with that purpose. Practice with that purpose develops self-efficacy
460 through experimentation, error recognition, adaptation and feedback, as would be
461 common in many forms of coaching. In addition, the unstructured nature of such freedom
462 or solo time allows for a contextual sense-making or ‘situatedness’ of any potential
463 learning (cf. Kalisch et al., 2011). During such free practice, the coaches were careful to
464 support the learner’s experience and ownership:

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

473 Carol echoes the safety aspect, ‘the only time I’m going to probably interfere is if I think
474 it’s radically unsafe or that it’s going to perpetuate a poor behaviour in the future’, and
475 comments that she might add a safety factor but, ‘it will all [be] very, very low key, you

476 don't interrupt or stop the process that [the learner's] going through'. This appears to be a
477 risk-versus-benefit decision on Carol's part. One interesting factor is that due to the
478 independence fostered, as long as safety is not compromised, the learner-owned sub-
479 optimal solution trumps a coach-intervened optimal one. Consequently, the learners can
480 come up with their own possible but not optimum solutions to their own performance
481 situation.

482 The use and acceptance of sub-optimal performances may be a critical difference
483 between high-level adventure sports coaches and high-level traditional sports coaches.
484 It's logical to strive for optimum performance in traditional sporting, but this contrasts
485 with the learner's individualised personal conceptualisation of adventure and
486 independence where the learner writes and rewrites the 'rules' for participation. Literature
487 reporting coaches specifically sacrificing performance appears rare, requiring further
488 investigation. However, in pursuit of removing barriers to green physical activity
489 (Grimwood et al., 2014; Patel et al., 2012; White & Smith, 2014), these strategies focus
490 on wider factors other than just performance could be useful. The direct implication is
491 that adventure sports coaches, at times, decide to prioritise ownership, confidence, and
492 durability of performance and thus independence over the *ideal* technical or tactical
493 performance.

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

501 **Developing the Individual's Capacity to Learn**

502 The third theme is constructed of three mid-order themes: practical aspects of
503 learning in adventurous environments, developing an ability to learn socially and
504 increasing learner's ownership of learning.

505 *Practical Aspects of Learning in Adventurous Environments*

506 All the coaches highlighted the significance of preparing the learners for their own
507 adventures. Carol explains, 'we talked quite a lot about venues, crags to go to, making
508 sure that when you're going there, everything's in your court'. Brymer (2010) highlights
509 that preparation is a crucial aspect of risk management; however, the planning described
510 here extends beyond risk management toward positive performance and learning
511 opportunities. The coaches prepare learners to anticipate changes in the environment and
512 how to adapt to them. For example, Steve 'talked a lot more about consolidating their
513 tidal flow experience' to give meaning to their planning. The coaches achieved this by
514 exposing the learners to the 'fullness [most adventurous]' of the hyper-dynamic
515 environment to clearly understand their environment, reinforce their self-belief and
516 contextualise future learning. Such experiences provide the authenticity desired by
517 learners. Natasha explains that, 'I really encouraged them to think about practising things
518 in a lower [easier] environment'. Carol comments on authenticity, 'they just need a little
519 bit more time and that sort of stuff to make sure it all beds in properly. Exposing the
520 learners to a learner-perceived full experience in a hyper-dynamic environment
521 contextualises the learner's future learning. It provides the learners with the opportunity
522 to identify the abilities they need to achieve their desired independent performance and
523 take ownership of their learning, conforming to self-determined learning where learners
524 learn to take ownership of their progress (Blaschke, 2012).

525 Carol highlights that such exposure with a coach present allows room for
526 mistakes, enabling learners to figure it out for themselves while having the coach as a
527 ‘safety net’. The coaches here embrace the complex environment, allow for mistakes and
528 exploit them for further learning. James is keen for the learners to know that ‘there aren’t
529 absolute black and white answers’. The coaches’ reluctance to turn to right and wrong
530 answers reflects two aspects of Schommer’s (1994) epistemological dimensions, sources
531 and certainty of knowledge. The coach views this sophistication as vital to aid the
532 learner’s development towards independence and the learner’s ability to learn from their
533 own errors thus demonstrating control of the learning.

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

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

546 ***Developing the Ability to Learn Socially***

547 The findings reported in this section add further empirical support to recent
548 publications that highlighted social learning as a function of action-sports learning

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549 (Collins et al., 2022; Ellmer et al., 2020) and learning in nature sports (Collins & Brymer,
550 2020). Specifically, all coaches view learning as a collaboration between themselves and
551 the learner. This collaboration is reliant on the coach's good interpersonal skills. James
552 elaborates on the informality, 'it felt kind of like we were just having a chat' but 'there's
553 obviously a lot, to the process'. This *chat* is implicit of the benefits of informal learning,
554 the coach plans these individualised interactions as both informal and also highly
555 contextual. Similarly, when encouraging learner reflection, Natasha suggests that,
556 'sometimes those questions are being pretty open, just getting them to reflect on how well
557 they thought that performance had gone, allowing a holistic recognition on their technical
558 performance'. There are clear parallels with social constructivism as reported in sports
559 coaching (Stoszkowski & Collins, 2014) and shared mental models (Giske et al., 2015),
560 where the coach and learner construct a best-fit performance, see sub-optimal cited
561 earlier, within the shared conception of independent adventure sports participation. Tony
562 encourages, 'everybody to share their personal reflections' as part of developing a micro-
563 community of practice. Natasha acknowledges the cultural aspects, encouraging the
564 learners to 'feel more like they are paddlers' by sharing a language, attitude and
565 knowledge. Thus, the coaches share the culture, behaviours and language knowing that
566 they are facilitating the entry into the adventure community of practice. As Ellmer et al.
567 (2020) highlight the more time spent in a community of practice the more accessible
568 knowledge can become. Coaches here recognise the value of this engagement because it
569 is an aspect of situating the future learning process.

570 ***Increasing Learner's Ownership of Learning***

571 The coaches developed the learner's intrinsic feedback mechanisms. Natasha
572 suggests these mechanisms allow the learner to self-check when the coach is not there,
573 an aspect of independence. She is asking her learners, 'what makes [one] flat spin better

574 than another?’ Natasha uses questions from this open question to guide the students to
575 develop answers. Fostering intrinsic feedback in adventure sports coaching practice
576 confirms a point made by Christian et al. (2020), who suggest that this is desirable, given
577 each situation's unique nature. The process reported here by Natasha could be considered
578 self-checking, a student-led approach described by Mosston and Ashworth (2002) in
579 physical education. Natasha and her learner are developing a common language to
580 understand their performance so is collaborative in nature. Developing the learners like
581 this seems novel to adventure sports coaching practice, particularly in the degree to which
582 the learner is empowered to continue their learning. The learners are determining the
583 success criteria and using feedback to measure their own performance.

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

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

596 However, in contrast to Tony, here Carol encourages her learners to reflect on-action and
597 in context, a timing of reflection described by Collins and Collins (2013), to aid their

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598 performance by creating opportunities for reflection during the activity, whereas Tony
599 refers to a more structured on-action reflection (Schön, 1983). Reflection is a dimension
600 of expertise in many fields (Schön, 1983). Hickman and Stokes contend that reflective
601 abilities would aid practitioners in their sense-making abilities but suggest that
602 practitioners often ignore reflection to focus on technical development. In contrast to their
603 point, the high-level practitioners here were coaching to develop reflective practice in
604 learners alongside their technical ability through a range of reflective tools. This appears
605 to reflect the learnacy skills highlighted by several authors (Agonács & Matos, 2019;
606 Claxton, 2002; Green & Schlairet, 2017).

607 This final higher-order theme builds an account of coaching practice that takes
608 learners into the fullness of the adventurous environments to provide a context for their
609 future learning, an experience that also fulfils aspects of the desired coaching experience
610 and in the development of the learner's confidence. Equally, the coaches are offering
611 cultural and social engagement to aid their post-coaching learning potential and giving
612 the learners tools to learn themselves. Developing the ability to learn in adventurous
613 environments recognises that the benefits of coaching may only be short-lived without
614 independent practice. Therefore, coaches are giving the learners a better understanding of
615 how learning takes place in adventurous environments, what to learn and where to
616 practice, guiding post-session development.

617 **Practical Implications**

618 The adventure sport NBGs emphasise autonomous performances, from both a
619 cognitive (Fitts & Posner, 1967) and ecological (Brymer & Davids, 2013) position of skill
620 acquisition. These findings show that coaches are developing comprehension and
621 adaptability of performance through decision-making where these cognitive efforts are at

622 odds with these theories of skill acquisition. Further work could determine the degree and
623 nature of cognitive effort that would inform more appropriate models of skill acquisition
624 in adventure sports. However, these findings suggest that teaching learners to think and
625 understand their performance is an integral aspect of independence. As such and
626 specifically, these findings should promote adventure sports coaches to support learners
627 to adapt their performance via explicit consideration based on their perception of the
628 environment. To realise this coaching strategy, the coach's ability to articulate their
629 perception, action and justification will be a key ability and will require experience.

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

639 **Limitations and Future Directions**

640 The final sample of five coaches could be strengthened through a wider
641 recruitment campaign that would increase the breadth of the findings. Equally,
642 interviewing beyond two coaching sessions could be expanded, particularly where the
643 participants are high-level coaches in more than one adventure sport. More sessions
644 would create a richer data set while also allowing any potential differences between
645 adventure sports to come to light. Lastly, this study only sampled UK coaches, limiting
646 the potential generalisability of the findings. Expanding the scope to seek perspectives

647 outside the UK and separately between adventure sports would be worthy of further
648 investigation in answering the need for this study as set out in the introduction. The
649 findings indicate the potential suitability of specific coaching practices such as cognition
650 in performance. There is now interest in sufficiently narrow investigations to support
651 these indicative findings with the view to inform coaching practice and education.

652 **Conclusion**

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

663 **Disclosure Statement**

664 There are no potential conflicts of interest to report.

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886 **Table 1**

887 *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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891 **Table 2**892 *Pre-session interview guide sheet*

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
		Short-term goals?	
	What have you done to prepare them for the session?	Pre-learning	
	How will future sessions link to this session?	Seeds for the future?	
	Is there anything you are including that the clients have not specifically asked for, but you are covering?	Safety	
	Where is it going to take place and why?	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	

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895 **Table 3**896 *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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899 **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)