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The Role of Situational Awareness in the Professional Judgement and Decision-Making of Adventure Sport Coaches

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Abstract

Coaching has been described, in part, as a decision-making process dependent on the coach's comprehension of the situational demands present in a coaching session. This is even more apparent in the hyperdynamic challenge of adventure sports coaching. Adventure sport coaches decide on and then deploy an optimum blend of coaching strategies to meet the demands of performer and context in an "it depends" approach. Through the lens of decision-making, research has shown that refining coaches' comprehension of the situational demands benefits and enhances both process and outcome. To date, however, limited attention has been paid to the development of tools that facilitate better understanding of these demands. Accordingly, this paper examines how coaches' descriptions of situations differ depending on their level of situational awareness. We present findings from a quantitative questionnaire and thematic analysis of transcribed descriptions, given by the coaches, of events encountered while coaching adventure sports. Coaches with different levels of experience and situational awareness describe situations differently, leading to a differentially more or less accurate conceptualization of a challenge they encountered. The implication is that encouragement of rich, deep descriptions of events may lead an adventure sport coach to develop greater comprehension of situational demands.

Keywords

Coaching, coach development, situational demands

Introduction

Recent developments in understanding adventure sports coaching (ASC) have focused on coaches' professional judgment and decision-making (PJDM) (Abraham & Collins, 2011; Collins & Collins, 2016a, 2016b). With this approach, outcome quality relates directly to the appropriateness of the decisions in action by the adventure sports coach (Collins & Collins, 2016a). PJDM is a contextually situated, dual decision-making process taken pre-, in-, and on-action, in which classic and naturalistic decision-making are employed in

synergy (Shea & Frith, 2016). In this approach, the proportion of each process is dependent on the context of the decision. The classic aspect of the process is deliberate, analytical, logical, thought through, and considered. This places high cognitive demand on the decision-maker because of the requirements for gathering accurate, expansive information and processing it (Kahneman, 2011). The classic aspect of the process is predominant in preplanning and session organization. In contrast, the naturalistic aspect of the process evolves to be less

cognitively demanding by simplifying contextual complexities into heuristics or pattern recognition. The naturalistic aspect is effective in simple tasks, but it is prone to heuristic bias. However, in complex tasks, the process can also prove cognitively demanding due to time pressure, the nature and poor quantity of information (Collins & Collins, 2019), and contextual pressures. In addition, a metacognitive aspect of the process (Collins et al., 2016) emphasizes the necessity of a continual audit by the decision-maker.

PJDM depends on the coach's knowledge and procedural, declarative, and conditional experiences together with, specifically for this paper, a synergy of appropriate technical and pedagogic strategies depending on comprehension of the situation's and decision's context. In short, the coach should have situational awareness (SA), which is an underpinning construct for effective decision-making in ASC (Endsley, 1995). Consequently, this paper examines the descriptions that ASCs with different levels of experience and SA make of situations in which their decision-making is challenged. Anecdotal evidence suggests that ASC developers have encouraged rich and full descriptions of situations as a strategy to develop greater SA in neophyte coaches for many years. If effective, use of rich, full descriptions may offer an opportunity to develop an evidence-informed tool that aids development of SA. Accordingly, to develop an understanding of SA as a construct and development tool, we consider its role in the coaching of adventure sports, before checking for differences in how ASCs with different levels of experience and SA conceptualize challenging situations.

SA, Demands, and PJDM

PJDM as Contextually Situated Cognition

PJDM and the SA that informs it are applicable in dynamic situations, especially those with ever-changing variables (Wickens, 2008). Adventure sports exhibit several attributes that require high levels of SA (Uhlarik & Comerford, 2002), while also linking to recently reported notions of adaptive expertise in ASCs

(Hatano & Inagaki, 1986; Mees et al., 2020). The environments for ASC are hyperdynamic and information-rich (Webb et al., 2021). They are characterized by high cognitive loads (Prinet et al., 2016; Collins & Collins, 2020), contain ill-structured problems (Simon et al., 2017), and are often time-limited with a clear association with in-action decision-making (Collins & Collins, 2016a). Consequently, a high level of SA is required in ASC environments.

SA and Demands

The concept of SA has been a focus of investigation in aviation and the military (Salmon et al., 2006), and, to a lesser extent, in adventure sports. Both Endsley (2006) and Wickens (2008) highlighted SA as an aspect of expert practice when assessing and integrating information. Crane (1992) suggested that maintaining SA during demanding tasks and explicitly retaining focus on pertinent information is of critical importance. Perhaps the most helpful definition of SA is "...the perception of elements in the environment within a volume of time and space, the comprehension of their meaning, and the projection of their status" (Endsley, 1995a, p. 97). This definition provides three levels of SA: (1) Description, (2) Comprehension, and (3) Projection. This notion of SA appears to be the most enduring and pertinent in our case because of its relationship to the environment, PJDM, and expertise.

Of course, the SA of context is not sufficient on its own. The client brings additional aims, objectives, and pedagogic demands to PJDM for the ASC. These demands (Flach, 1995; Abraham & Collins, 2015) form additional considerations for judgment and decision-making. Some are fixed (e.g., in mountaineering, a desire to climb a particular route), while others are continually changing, such as incremental goal setting as a student's performance develops. In particular, there is a need to understand the objective constraints of the developmental relationship between contexts and client demands. Consequently, and reflecting the highly individualized coaching approaches essential for optimum ASC practice

(Eastabrook & Collins, 2020, 2021a, 2021b), client demands play a significant role in a broader situational comprehension.

Situational comprehension and decision-making—in particular, the ability to project those demands—are synergetic for the ASC. For example, the aim may be to descend a particular rapid on a river journey. However, this may be possible only at particular times due to the interaction of environmental conditions and participant skill levels. The ASC may have to decide how best to plan the session, or a series of nested sessions over a single day or multiple days, to arrive at the rapid at a given time. This PJDM must cater to the following situations: (1) when river levels are suitable for developing the clients' skills en route to that rapid and (2) when judging the required time and chronology of development. In short, PJDM must consider how to have the clients sufficiently and appropriately skilled to paddle the rapid in the anticipated condition.

Situational Comprehension in Professional Practice

Constraints are typical of all coaching settings. Poor perception and comprehension of these constraints—due to factors such as attentional narrowing, high task or cognitive load, working and short-term memory capacity, and decision-maker bias—play a part in understanding any inherent limitations. As such, effective SA is essential to enable an appropriate focus on and evaluation of the constraints that are in force in a particular situation. Adams et al. (1995) proposed three aspects of SA that work in synergy: (1) available information about the external environment, (2) the schema (the internal knowledge that has been generated as a result of training or experience and is often stored in the long-term memory), and (3) exploration (scanning and perception of the environment). Three additional client demands should also be considered in addition to the aforementioned points: (4) the individual being coached, (5) the synergy of that person with their environment, and (6) the coach's ontological and epistemological position, skill set, and experiences (see Collins & Collins, 2019, 2020). The mix of these six

situational constraints determines the conditionality of a given situation.

Adventure sport coaches typically acquire an underpinning practical ability in the adventure sports they coach (Collins & Collins, 2012). This ability enables the coach to accompany and thus coach their clients while also participating in an adventure sport. Importantly, it would seem likely that, as Mees et al. (2021) propose, the ASC's personal ability brings with it a level of SA, though perhaps not a full comprehension of the demands that coaching a group may also bring to play. Extending this perspective, Barry and Collins (2021) highlight that adventure sports coaches may not necessarily develop from an active practitioner background and may lack the SA assumed to be implicit with being a practitioner. Consequently, having strategies to develop SA are increasingly important.

Reflecting on the importance of situational comprehension required by ASC decision-making, the essential next step is to explore how the identification and comprehension of these factors may be developed to enhance PJDM. One approach used in complex environments has been to encourage in-depth descriptions of a given situation, akin to a "think-aloud" approach by neophyte ASCs. However, this may be problematic on several levels. For example, in the beginning, neophytes may not know what they should be looking at or thinking about. They may not even know how they should interpret what they are seeing. In short, they may be unaware of what they don't know! It has been recognized that an experienced coach/trainer and a trainer perceive and describe the environment differently. However, *how* exactly they differ has received little attention.

Given the significance of these insights, especially in the hyperdynamic world of ASC, we considered the descriptions of situations by ASCs with different levels of experience and SA who made challenging decisions. This led to our specific research questions: Do their descriptions differ? If so, could encouraging rich and deep descriptions that share the characteristics of those with higher-level SA be utilized to develop better SA and improve PJDM?

Method

For this study, a two-part approach was utilized with a sample of ASCs with varied length of experience in their respective sports. We expected this sample to reflect a range of SA skills and were interested in examining the depth and nature of the associated SA. In Part 1, to ascertain the ASCs' levels of SA, coaches were asked to complete three situational awareness rating (SAR) questionnaires (Taylor, 1990; Collins et al., 2020) following situations that had challenged their PJDM. Then, in Part 2, to ascertain the nature of the ASCs' descriptions, the same group recorded descriptions of three other similar situations.

Participants

A purposive sample of 16 coaches was invited to take part in the study based on the following criteria: (1) must hold at least one ASC award from their relevant National Governing Body; (2) must have been employed as an ASC leader or instructor; and (3) must possess a willingness to engage in research. The sample represents a heterogeneous, purposeful sample (Etikan et al., 2016) ($n = 16$, men = 9 and women = 7), specializing in either water-based ($n = 8$) or mountain-based ($n = 8$) activity. Unique codes were ascribed to preserve anonymity (e.g., ASC1, ASC2, ASC3, etc.), and steps were taken to disidentify situations to avoid deductive disclosure. Demographics are presented in Table 1.

Table 1. Participant Details

<i>ASC (M/F)</i>	<i>Age (years)</i>	<i>Experience (years since accreditation)</i>	<i>Specialization</i>	<i>Qualifications</i>
1 (F)	24	3	Whitewater kayaking	Introductory qualification in a single field (e.g., Mountain Leader) (Summer) - https://www.mountain-training.org Or BCAB Paddlesport Instructor Award (https://www.britishcanoeingaward.org.uk)
2 (M)	26	4	Mountaineering	
3 (F)	25	2	Mountaineering	
4 (F)	28	4	Mountaineering	
5 (M)	34	5	Whitewater kayaking	Introductory qualification in multiple fields and a single high-level certification in a specialism (e.g., Mountain Leader (Winter) or Mountaineering Instructors Award- https://www.mountain-training.org Or BCAB Coach Award (https://www.britishcanoeingaward.org.uk)
6 (M)	33	5	Whitewater kayaking	
7 (F)	37	7	Mountaineering	
8 (M)	39	6	Sea kayaking	
9 (F)	41	6	Mountaineering	
10 (F)	39	8	Mountaineering	Multiple high-level certifications in a field or single high-level qualification and high-level trainer status (e.g., Mountaineering Instructors Certificate- https://www.mountain-training.org Or BCAB Performance Coach (https://www.britishcanoeingaward.org.uk)
11 (M)	45	10	Sea kayaking	
12 (M)	44	8	Whitewater kayaking	
13 (M)	52	12	Mountaineering	
14 (F)	41	8	Mountaineering	
15 (M)	50	10	Mountaineering	
16 (M)	45	8	Sea Kayaking	

Instrumentation and Procedure

Part 1: Retrospective Evaluation of Participant SA

Following invitation, provision of information, and consent, each participant was asked to complete an SAR questionnaire following three separate self-selected coaching situations in their specialty during which they identified that their decision-making ability was challenged. The participants were instructed to select events (1) that involved a recognized decision by the coach and (2) that neither clients' security nor coaching quality would be adversely affected by completion of the questionnaire, which would require less than 5 minutes. An original questionnaire by Taylor (1990) based on SAR, as utilized by Collins et al.

(2020), was piloted with a representative group ($n = 3$), and a cognitive interview was conducted (Willis et al., 1999). Following a single change—the word session-to-situation adjustment across all questions—a nine-item questionnaire was finalized and distributed to the participants. The version used is presented in Figure 1.

Participants were presented with a large pencil and copies of the questionnaire printed on waterproof paper. They were asked to complete the questionnaire “in the field” immediately following the three separate, critical non-safety situations. These events were self-selected by the coach participant, with our aim being ease of completion, contextuality, breadth, and accuracy. Participants rated each of the nine questions using a seven-point Likert scale (1 = low, 7 = high) based on the perceptions of their own SA while at work.

Situation Awareness Rating Questionnaire							
For your chosen situation, please circle your responses.							
Thank you for your time. This will take no longer than 5 minutes.							
<i>Q1. How changeable is the situation?</i>							
Is the situation highly unstable and likely to change suddenly (high = 7) or is it very stable and straightforward (low = 1).							
1	2	3	4	5	6	7	
<i>Q2. How complicated is the situation?</i>							
Is the situation highly unstable and likely to change suddenly (high = 7) or is it very stable and straightforward (low = 1).							
1	2	3	4	5	6	7	
<i>Q3. How variable is the situation?</i>							
Is it complex with many interrelated components (high = 7) or is it simple and straightforward? (low = 1).							
1	2	3	4	5	6	7	
<i>Q4. How aroused are you in this situation?</i>							
Are you alert and ready for activity (high = 7) or do you have a low degree of alertness (low = 1).							
1	2	3	4	5	6	7	
<i>Q5. How much are you concentrating on the situation?</i>							
Are you concentrating on many aspects of the situation (high = 7) or focused on only one (low = 1).							
1	2	3	4	5	6	7	
<i>Q6. How much is your attention divided in this situation?</i>							
Are you concentrating on many different aspects of the situation (high = 7) or focused on only one (low = 1).							
1	2	3	4	5	6	7	
<i>Q7. How much spare mental capacity do you have in this situation?</i>							
Do you have sufficient capacity to attend to many variables (high = 7) or nothing to spare at all (low = 1).							
1	2	3	4	5	6	7	
<i>Q8. How much information have you gained about the situation?</i>							
Have you received and understood a great deal of information (high = 7) or is it very stable and straightforward (low = 1).							
1	2	3	4	5	6	7	
<i>Q9. How familiar are you with the situation?</i>							
Do you have a great deal of relevant experience (high = 7) or is this a new situation (low = 1).							
1	2	3	4	5	6	7	

Figure 1. Situational Awareness Rating Questionnaire. Adapted from Taylor (1990) and Collins et al. (2020)

Part 2: In-context Evaluation of SA

Following Part 1, participants were provided a digital voice recorder with a windproof microphone and asked to describe, immediately in the field, three different non-safety critical ASC situations that posed challenges to their PJDM. Our criteria and aim were the same as those for Part 1. Digital recordings were downloaded for transcription once the coach returned to base. On occasion ($n = 2$), the transcriptions were downloaded several days after the event due to the long duration of the activity.

An initial pilot and trial of the approach identified that ASCs 1, 2, 3, and 4 struggled with integrating data collection with their practice. Accordingly, we collected data for these four participants via a recorded open interview, once again immediately after the event. Importantly, this modality still permitted a longitudinal “as-it-happened” data set, except that data were recorded by an interviewer. The remaining 12 participants used a variety of the recording techniques: voice-activated record via settings on the Dictaphone (this resulted in several “pocket” conversations), microphone activated via a switch on the microphone, and press to record directly into the Dictaphone. Coaches were introduced to these different methods by the researchers and allowed a period of experimentation to familiarize themselves with the equipment and its use in the field. Once the participants felt sufficiently skillful with the recording techniques, data were collected. Participants utilized different techniques depending on the context (background noise; e.g., wind, waves), ease of use (hand availability; e.g., holding paddles or ice axes), and access to the recording device for situations when using gloves, or if in the pocket for warmth to conserve the device’s battery life due to temperature or protection from the other elements (e.g., waves, blizzard conditions). Each participant refined the recording technique until it was efficient and integrated into their practice. First, all participants recorded their description by identifying themselves, their location (a six-figure grid reference or latitude and longitude and simple descriptor; e.g., “50 m

southwest of headland”), and the date and time, and then by using a unique reference subsequently. Our aim in both approaches was to make an accurate and spontaneous descriptive account of a given situation. On two occasions, multiple entries of a single incident were made, both due to interruptions by clients. These are treated as a single entry and reflection on the incident.

Analysis

For Part 1 data, following completed collection for Parts 1 and 2, questionnaire responses were analyzed with regard to three factors, each of which is represented by a group of questions as follows: (1) questions 1, 2, and 3 were indicative of the demands on the coach (what they felt the situation did to them); (2) questions 4, 5, 6, and 7 were indicative of supply (what the coach had to contribute to the situation); and (3) questions 8 and 9 were indicative of understanding (what they felt they needed to do during the situation). Our intention was to inform the final measurement of the participant’s SA and to avoid any potential influence on Part 2 of the study. We also used these data to compare self-ratings between ASCs. Lacking a clear definition of experience in coaching, we created three categories on the basis of length of experience: (1) low (4 years or less); (2) medium (between 5 and 7 years); (3) high (8 or more years).

For Part 2 data, following collection of the recorded situation descriptions, each recording ($n = 36$, mean duration = 7 min.) was transcribed verbatim and time coded by a commercial transcription service. These transcripts were read and reread while listening to the audio recordings to allow for our immersion in the data (Morrow, 2005) and to ensure accuracy. Inaudible or partly audible (due to wind, water, or clothing noise) descriptions were discounted ($n = 7$), and the participants were asked to record new incidents as replacements for the old descriptions. We explicitly sought to understand the characteristics of the description rather than content, paying attention to the order of events, detail, and depth, considering the implicit value placed on factors within the

event, the relationship of factors, and the ASCs reflection during the description.

As authors, we subscribe to the notion that theory-free knowledge is impossible, and we acknowledge that bringing our specialized experience will inevitably influence and benefit data collection and analysis (Timmermans & Tavory, 2012). Accordingly, the abductive generation of themes has an inherently subjective aspect and, as such, themes cannot be generated without reference to the researchers' values and experiences (Collins & Stockton, 2018). It is impossible to put aside preconceptions and biases. A reflective journal and a critical friend, the second author, were utilized to assist in challenging any assumptions and reducing potential bias.

Results

Data: Part 1

Reflecting on the recommendations of Norman (2010), the Likert values associated with the factor

variable were considered as parametric, and all analyses preceded on this assumption. To compare differences in SA in relation to experience of ASCs, we completed a series of one-way ANOVAs on the mean values for supply, demand, understanding, and mean SA. These data are shown in Table 2.

ANOVAs showed significant differences on all factors, as shown in the table. For Demand and Supply, follow-up Tukey tests showed this as being due to differences between the low and high categories. Understanding the difference was significant between medium and high, while on SA all three experience levels were different from each other. It seems that greater experience is associated with improvements in SA, at least as measured by the self-report SAR. This finding supports the longstanding assumption to this effect in ASC development.

Table 2. Mean (*SD*) scores for participants of different experience levels

Experience level	Demand *	Supply **	Understanding **	Total SA **
Low (4 years or less)	2.7 (0.5)	3.5 (0.2)	3.4 (0.6)	3.2 (0.3)
Medium (5 to 7 years)	4.1 (0.6)	4.1 (0.4)	2.8 (0.3)	3.7 (0.2)
High (8 years or more)	4.8 (1.6)	4.5 (0.5)	4.3 (0.8)	4.5 (0.6)

Note. * $p < .05$, ** $p < .01$

Data: Part 2

Analysis of the verbatim transcripts identified that the descriptions from the greatest, mid, and least experienced instructors differed, and the descriptions of situations differed with the different levels of SA as identified using the SAR.

Description Level

Reports from participants with the lowest levels of experience (ASC 1, 2, 3, and 4) and the medium level (ASC 5, 6, 7, 8, and 9) were typically shorter than those of the highest level (ASC 10, 11, 12, 13, 14, 15, 16), and they

outlined events in descriptive terms based on major factors in a situation. Notably, it was observed that little consideration was given to cause and effect by the coaches at this level. Their descriptions reported the conditions observed, such as, “[T]he wind was blowing down the lake [westerly] about 15 miles an hour. I have a canoe group with twelve kids” (ASC1, a whitewater kayaking instructor). Notably, however, the coaches didn’t actively seek information or challenge what was observed. These coaches lacked a meta skill, an understanding of the need to seek out information to support their decisions. We

attributed this to a lack of experience working in dynamic environments. Furthermore, descriptions lacked pertinent details, such as group age. For example, ASC1 watched a lake that faced southwesterly. The wind was stronger than that mentioned in the forecast because it funneled through the valley. The lake had sheltered sections caused by headlands on the southern side. ASC1's verbalization included none of these aspects; the report remained totally descriptive, with little interpretation. We speculate that these participants lacked a mental model of PJDM in practice.

Scope for development was also apparent in practitioners with medium experience. ASC7, a mountaineering instructor, described a situation in which she needed to change her choice of a climbing route after scrambling up to the initial pitch.

"...[T]he group was moving too slowly, right after departing from the bus. When we got to the first steep bit, they really slowed up and started 'gibbering a bit' [became very tentative moving]. We sped up once we got over the first step, but then they got very quiet when they saw the route. Once we got into the corrie [a hollow in a hillside], I opted for the easier first pitch."

While the description was accurate, it was also sequential, chronological, and from a single perspective—the describer's. In a similar fashion, ASC8 described a decision regarding route choice while sea kayaking.

"...[A]s we left the bay, I could see and feel [from inside the bay] that the wind was stronger than it looked and was in a different direction than was told in the forecast. As we came out [of the bay], I could see that I'd been looking at the back side of the waves and hadn't picked up on the little white tops on the downwind side. The group struggled, like they had yesterday, in the following conditions, rather than try and turn. I elected to simply head off slightly [across the wind] and hide behind the headland..."

Notably, both these descriptions were recounted one point at a time as the situation

was "scanned," as it unfolded, or was recounted. The description followed the events. There was limited focus on particular issues, with all aspects having similar weighting and emphasis. Stronger descriptions linked the situation to recent, directly relevant experiences, such as the reference to yesterday in ASC8's description, with limited anticipation for the future; stronger accounts did relate to ideas or external information, though these were not considered or questioned. Not mentioned, however, was the reference to the forecast and its impact on the event or the meaning of the events.

Comprehension Level

Participants who demonstrated a higher comprehension level of SA recounted more relevant details. For example, ASC10, a mountaineering instructor, said:

"I should have stopped to put on crampons earlier, but it was better to keep moving into a safe spot. So I just cut and kicked huge steps for the last bit. There was a bit of faff [time wasted] with the crampons, because they'd only put them on in really calm flat places, so as we moved on, we really slowed up, the extra weight and height plus the slight slope angle, all really slowed them up."

These descriptions did not fully expand in detail to create associations with other factors in the current situation or from other experiences and situations. However, the description does contain recognition that some factors may be more significant—in short, a rationalized weighting of factors. Alternatives are also considered, such as putting crampons on earlier.

Accounts were also recalled in the context of a "bigger question," such as the aims of the activity. ASC10 continued:

"...[T]he whole idea was for them to put what they'd tried in practice into a real situation, so they had to do it at some point, and I had to make sure it was safe and typical, rather than really desperate, to stop

and fit them [the crampons] to the boots.”

ASC12, a whitewater kayaking instructor, described a situation he had rarely encountered:

“...[A]t this point in the autumn, the trees still have their leaves, and when we get through storms with a lot of rain to bring the rivers up, there is always potential to have new trees in the river. The lower stretch of this river is heavily wooded and has lots of blind bends, so I led this section from the front and moved the group either from a large eddy to a large eddy or have them ready, so people are always moving toward a safe eddy. When I'm upfront, I like to put the weaker paddlers immediately behind me so they can see the line and we don't have the ‘Chinese whispers’ problem with line [path taken through the rapid]. As you move further up the group, the line becomes less and less precise. As I came down to a tight left-hand bend, the paddler behind me was upside down for some reason. I didn't see them go in, his roll had been ok, but he ‘flailed’ [had multiple attempts to roll] a bit this time. Although he eventually came up, he was still downstream of me. I confirmed with a quick glance upstream that all the group except one had made[eddyed out] eddies. I knew they would stay put, so now I was able to ensure that the last paddler had made an eddy before I decided to chase the boater, who was downstream, and get him into an eddy, despite the fact that it would break my line of sight with the rest of the team. This was going to break a key rule for me, but I guess it was OK, because I'd briefed them to stay put if this

happened. Perhaps rules are made to be broken sometimes.”

In a second recording of the same situation, ASC12 stated the following:

“...[T]his all turned out OK. The group had stayed where they were in their eddies, and I was able to get the last guy sorted quickly, as it happened. All I had to do was get back upstream to regain my line of sight by going to the outside of the bend in a small eddy, and I could then bring the group down into the same eddy on the inside of the bend. So, this worked, because the group had a line of sight of each other rather than me having to have a line of sight all the time. This might change my brief a bit, especially with capable groups, who want to improve their river sense.”

At this more advanced level, the statements of the practitioner were often linked to the goals of the session or the participants and the demands (needs and wants) of the clients. A stronger description offered an overview reflecting a desire and recognition to develop greater situational comprehension. In short, the participant coach actively sought information. This “active looking” implicitly recognized that the incident has potential for further learning, a value in paying attention to the situation, or the prioritization and relationship between key points in that situation. There is recognition that a greater understanding of the complexity of the situation is required. ASC9, a mountaineering instructor, described a situation while ski touring:

“We've skinned [skied] up through the forest tracks at the bottom of the valley; we've been in the shade. It's pretty cold. As we left the trees, I could see that our route to the col [gap] was now in mid-morning sunlight. The group had been moving slowly, anyway ... they'd overdressed ... So I took a couple of

minutes to let them lose a few layers. I had a couple of routes in mind. Once I'd put my hat in my pocket and changed my gloves, I took a look at the routes onto the col. I was going to need to be careful to not knacker[tire] them out [the group]. I wanted an easy skinning line on consistent snow with few kick turns ... They had got tired yesterday and got proper 'ropey' [were performing poorly]. I could see snow blowing off the ridges higher up, which matched the forecast, and I was looking for any signs that the snow was sliding off the older snow, below [or] above my routes. It wasn't. However, the map told me that the slope was quite steep. I could see another guide ahead; he'd broken a good trail, and I didn't notice any issues with the snow for them. But it would take me a while to get to that point. I looked back up above the route to check. I reckon we would move more easily [faster] on the other guides route—less knacking. The descent was gonna be a long one, and I needed them fresh and not falling over. That seemed less likely if they had some bounce left in their legs, so an easy skin up would be great.”

Level 3-Projection

The descriptions of participants demonstrating the highest SA, a projection level of SA, accentuate and prioritize; the descriptions are nonsequential and highlight relationships of key and non-key factors that relate to the goals or aims of the activity. Factors recognized as irrelevant are ignored or frequently “stored” in anticipation of future need. ASC11, a sea kayaking instructor, described a situation as follows:

“As we came down toward the headland and island, I noticed that it didn't look as I would have expected it. I had clocked [noticed] earlier on,

off the lobster pot buoys, that we had a bit more tide with us than expected. I'd anticipated overfalls off the headland, but they seemed much more formed, as if we were later in the tide. I wondered if this was due to being late off the beach, but that had only been 20 [minutes] waiting at the roadworks. So, I was confused, despite that, I decided to buy some time and pulled the group into one of those small, rocky bays under the cliffs for a drink and some kit fuff, while I had a good look for a bit longer. Two things came in my mind: the first was the overfalls, and the second was the implication further along the trip. As there was a second headland, I had no chance of escaping between the two. I watched for a while and realized it was the groundswell that was accentuating the little bit of wind over tide that I had. It was a ground swell as well that steepened things up a bit as it went through. With my small group, I simply had to move past the overfalls sharpish [immediately] after a large set of swells had gone through using the lull. The implication for later in the day was not significant. As there was a sneak past the next headland at the point of the tide, I hoped to get there. As long as we moved well for the next hour, we'd be OK, just had to move past this lot [the overfall] now rather than dither and stick with the plan! It was the ground swell.”

In this description demonstrating the element of projection, there is an understanding of the future implication, consideration of external factors, anticipated changes in those factors, and the effect they may have throughout the activity.

The strongest descriptions explicitly considered and reconsidered the factors and their interactions that were relevant to the aims

of the session. For example, ASC16, a sea kayaking instructor, described this situation:

“I’d noticed, when we got a super obvious front in the clouds, literally a blue sky, then a line which was the cold front and blue sky afterwards. I’d never seen it quite that obvious before, so I highlighted it to the group and explained that as the front moved across us during the day the temperature would drop and the wind shift. This had a couple of implications. First, the group had not been good at dressing for the conditions on the previous days. Second, the change in wind direction will move the wind from across the tidal movement to against it. So, I’d expect the sea to become more complex. The group had been good on previous days out in the mountains and on the river, but they’d only been on the sea a couple of days, and this was a much bigger environment. The main focus of the group was to develop their seamanship skills. So, I told the group my observations of the front and the implications it had for us later in the trip. I think at that point, I could have shared a lot more of the options I was considering with the group, but I was concerned that it would overload them. So, I only highlighted the three most likely possibilities and the things that had to happen for us to follow [either of those]: a particular course of action, you know, if we are at this point at this time, then this is possible, and if we are late, then that is not possible and these two become the key possibilities”

These descriptions can be open-ended, implying a link to the future and the implication for effect as the situation unfolds. The description includes critical on-action but in-context reflection that may be brought about by the description itself. Ad hoc associations may also be identified during the description,

as shown by ASC 14, a mountaineering instructor:

“He struggled on the step out. That is pretty exposed, and it feels like the valley floor is a long way down. Might have been easier to have a high anchor above so he’d felt more secure with the rope above him. It would have been easier for the assist as well to be fair, as it was. He did OK, but he got pretty pumped, mainly because of the exposure rather than just the move.”

This may be cyclical and iterative in nature. There is distancing, consideration of different perspectives, including that of the individual students about their needs to achieve what they want—multiple futures as each student develops. Alternative implications for immediate and future practice are extrapolated to other locations at the venue. Alternative futures are also considered; e.g., ASC13, a mountaineering instructor, stated, “If this happens, then this is likely to happen later.” ASC13 continued:

“I didn’t know which way that was going to go to be honest. Her climbing was a bit inconsistent yesterday, and it shocked her up, I guess. But if she climbed well on the first pitch, I could make a call about which of the next options I had—the easier diagonal line or the harder direct up to me on the stance. As long as she had the brain space left, we could even finish on the rib [ridge]. Would depend on how well [easy] she found the moves [on the direct line].”

Finally, at this level, the projection changes, due to the possibility of different future events, suggesting a meta-process. Indeed, a meta-projection may be at play here. There appears to be a capacity to project the trajectory of change in both the environment and the student’s development.

This meta-process appears to have two implications; first, the expectation is to coalesce the projected student development with projected environmental change. For example,

“If the student continues to develop at this rate and the environment changes as predicted, the student should be able to descend that rapid later in the day.” The implication is that a different pedagogic approach may be selected to ensure both predications combine favorably or that a change of activity is considered; e.g., “Am I doing the optimum thing to ensure the desired outcome?” (ASC13, mountaineering instructor). The second implication is that there is a comparison of anticipated changes in the environment and student development against the observed; that is, as ASC14 wrote, “. . . to see what I expect to be happening and check that is happening, for real.”

Discussion

The nature of the descriptions changed with the increase in the ASC level of experience and SA. This supports our initial hypothesis and suggests a potential value to a full-descriptions approach, either in isolation or in combination with reflective tools, as typically used by coach and guide developers. Accepting the small sample sizes and consequent effect on statistical power, the findings suggest that ASCs with greater experience and levels of SA describe situations differently from those with lower levels of SA, though additional investigation with the less experienced coaches would be beneficial. We accept that these descriptions are not concurrent to the event and, while contextually situated, they are on-action in context rather than in-action or post-action. Reflecting the risk associated with the ASCs’ role, however, we felt that it was not ethically acceptable to ask the instructor to do anything that could compromise safety and that our in-action in context approach was a pragmatic solution. Also, we felt that this approach would reduce the potential for post-hoc rationalization, though this cannot be ruled out. The findings would support the assumption that SA improves with experience.

We would also want to guard against overstating the implications, as there was a wide range of responses from among the participants (see, for example, the range of standard deviations in Table 2). In short, some experts had a low level of comprehension of situational

demands. We speculate that this may reflect the epistemological position of the ASC (Collins et al., 2015; Christian et al., 2017), possibly linked to the epistemology associated with a given activity, or that they did not individualize their practice as a pedagogic strategy, perhaps more as an outcome of practicality, (see Collins & Collins, 2020) while teaching lead climbing or the situation was not one in which the clients should have influence because of their experience; for example a safety critical situation.

However, the findings offer a promising insight into the possibilities of an in-depth and contextually-situated, fuller description technique that builds on any anecdotal use to date. In comprehending the characteristics of these different levels of description, coach developers may be well placed to facilitate in-depth descriptions while in context. First, this could take place by recognizing the desirable characteristics of a description and contrasting them with the description presented by the trainee. The purpose of the developer should be to facilitate a richer, deeper description, perhaps as a precursor to an approach, such as the Big 5 suggested by Collins and Collins (2020). This also fits well with most reflective models applied to action, such as those of Gibbs (1998), Kolb (1984), Driscolls (1994, 2000, 2007), and Rolf, Freshwater, and Jasper (2001), in which a description of events is the first stage of the process. Indeed, reflecting the generally long duration of adventure experiences and the time taken until “on-action” models of reflection can be applied, a rich, deep description may also be advantageous in aiding later recall. The approach works with digital recording or pictorial capturing of the situation to stimulate recall during on-action reflection. In this respect, we might consider developing “active looking” by novice coaches and subsequent rich descriptions to support multiple reflective learning techniques.

Conclusion

We acknowledge the limitations of the study as noted earlier but, at the same time, stress the significant body of research, conceptual links,

and reported successful use that underpins this approach. In response to our initial aims, do the descriptions of coaches differ according to their levels of SA? Yes. However, factors such as environment, task, epistemology, and security are all factors at play in ASC. Could encouraging rich and deep descriptions that share the characteristics of those with higher-level SA be utilized to develop better SA and improve PJDM? Yes. Building on the anecdotal use to date, this study supports the approach of encouraging and developing rich description of situations and provides a basis for further development. In practical terms, the importance of a shared mental model for decision-making in context, specifically its “situatedness,” may imply that any fuller-description approach requires that decision makers possess sufficient experience and may not be suitable for novice coaches. This is also a criticism of situated learning (Cassidy & Rossi, 2006). Though this critique appears to be addressed simply, further investigation is clearly needed to fully develop a tool for coach developers. For the moment, however, the fuller-description approach seems to be viable and worthy of further investigation.

Authors' Declarations

The authors declare that there are no personal or financial conflicts of interest regarding the research in this article.

The authors declare that they conducted the research reported in this article in accordance with the [Ethical Principles](#) of the Journal of Expertise.

The authors declare that they are not able to make the dataset publicly available but are able to provide it upon request.

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