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ARTICLE



Exploring the development of judgement and decision making in ‘competent’ outdoor instructors

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ABSTRACT

Over the last ten years there has been growing interest in the judgement and decision making (JDM) of outdoor professionals, though research to date has focused on the JDM processes of experts. In contrast, this study examined the JDM of less experienced, competent, but fully qualified outdoor instructors (N = 9) and the development of their JDM skills. Using semi-structured interviews and thematic analysis, we identified two overarching themes: Firstly, managing the cognitive load (relating to instructor JDM), and secondly social experiential learning (relating to instructor JDM development). We found these outdoor instructors needed to manage complex situational demands and high cognitive loads, while balancing the safety of their group with the development of their own JDM. We propose that a combination of challenging formative experiences, community of practice interactions, and explicit development of metacognition are essential to outdoor instructors JDM development. Implications for training, and future research are discussed.

KEYWORDS

Adaptive expertise;
situational demands;
cognitive load;
metacognition; experiential
learning

Introduction

Over the last ten years, there has been a growing interest in the judgement and decision making (JDM) of outdoor professionals (Boyes & Potter, 2015; L. Collins, Carson, Amos, & Collins, 2018; Collins & Collins, 2015, 2016b; Culp, 2016). Research has predominantly focussed on the decision making of expert outdoor professionals. However, little attention has been paid to how these experts developed those judgement and decision skills. For novice instructors to become expert, understanding the start and midway points of development of these JDM skills is essential. This requires comprehension of the experiences that facilitate the development of effective JDM in less experienced Outdoor Instructors (OI). Consequently, this research considers the JDM of less experienced but still ‘competent’ (qualified and capable of independent work with groups) OIs, and their understanding of their JDM development thus far. The intention being to better inform how to enhance the professional development of OIs in their journey from competent to expert, by recognising the ‘start point’ of the development process.

Judgement and decision making in the outdoors

The nature of the hyperdynamic environment, time pressure and poor information, that characterises the outdoors (L. Collins, Simon, & Carson, 2018) lends itself to a naturalistic decision-making approach (Zsombok & Klein, 1997), whereby conditions frequently involve high stakes, time pressures, uncertainty, organisational constraints and changing conditions. These factors require the

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decision maker to rely on experience, and intuition gained from decades of professional practice (Orasanu & Connolly, 1993; Zsombok & Klein, 1997). However, this does not account for the JDM of less experienced decision makers who are not considered expert but equally operate in conditions that may demand more naturalistic decision-making approach. In contrast, classical decision making, associated with planning adventurous activities (Collins & Collins, 2019), involves rational and logical processes that is often more time consuming and cognitively demanding. In an outdoor context, the two (naturalistic and classic), combine in a dual process, Professional Judgement and Decision Making (Collins & Collins, 2015; Culp, 2016). This nested approach proposes that naturalistic decision making sits within a broader framework of deliberate, classical decision making and reflection (Schon, 1983). For example, an OI may make planning decisions (classical decision making) before the session, which later scaffold dynamic judgements and decisions made in the field (naturalistic decision making). Metacognition (understanding and regulation of cognition) allows active cognitive processing that is essential to deep learning (Claxton & Lucas, 2007). This metacognition supports the instructor to better organise, access and operationalise knowledge gained through reflection (Collins, Carson, & Collins, 2016) and allows OIs to respond to novel problems in flexible and adaptive ways (Mees, Sinfield, Collins, & Collins, 2020) and to consider alternative options (Cruickshank, 2013).

Situational awareness, the perception of environmental elements, comprehension of their meaning, and the projection of their future status (Endsley, 1995), is key to JDM in these hyperdynamic conditions. For example, OIs may perceive a weather front on the horizon, comprehend a change in the weather (e.g., changes in wind direction, wind speed, precipitation and temperature) and project that this anticipated change will arrive sooner than forecasted. The instructors situational awareness and groups demands create high cognitive load (Collins & Collins, 2019) that imposes on an instructor's mental resources (Uhlarik & Comerford, 2002). Understanding and managing these combined situational demands (Abaham & Collins, 2015; Flach, 1995) increases the OIs cognitive load (de Jong, 2010), resulting in attentional narrowing and an associated deterioration of situational awareness (L. Collins, Giblin, Stoszkowski, & Inkster, 2020; Prinnet, Mize, & Sarter, 2016). The OIs cognitive load is managed through a variety of strategies including heuristics, utilisation of the OIs community of practice (Wenger, 1998), anticipation of acute cognitive loads where the environment or situation may become more demanding (Collins & Collins, 2019), and avoiding attachment to overly constructed plans (Mees et al., 2020). The nature of the outdoor environment is such that OIs both provide potential risk to participants, and protect against it (Jackson, 2016). Understanding of safety in the outdoors has improved over past decades (Brookes, 2016) and experienced OIs continually make decisions which aim to balance risk and competence to create a safe and quality experience for participants (Michael Boyes & O'Hare, 2003).

The outdoor instructor

We use the term 'Outdoor Instructor' (OI) as the culturally accepted language for this role within the Outward Bound Trust and across the UK. We intend the term to encompass leaders, educators, facilitators, coaches and instructors working in the personal development domain of the outdoors. JDM is considered one of the most valuable leadership skills in the outdoors (L. Collins et al., 2018). Boyes and Potter (2015) propose that OI decisions can be categorised into: logistical (e.g., timings), safety (e.g., students wellbeing), pedagogical (e.g., learning objectives), environmental (e.g., weather), and group dynamics (e.g., conflict resolution). Regardless of experience and qualification, all OIs must skilfully choose and implement pedagogic and practical skills, whilst retaining a cognitive capacity to manage both the long-term demands and acute demands that may arise (Collins & Collins, 2019).

Professional outdoor practice can be considered in three domains: performance development, personal development and experiential development (Collins & Collins, 2016b; Sinfield, Allen, & Collins, 2019). Many studies focus on OIs in a performance development role. This study, however, will focus on OIs in a personal development role, where a holistic approach to development that prioritises personal development above technical development is taken (Sinfield et al., 2019).

JDM development in outdoor instructors

Judgement and decision making is developed by reflection on experience (Klein, 2015) likely in an experiential learning model which involves the environment, activity, senses, emotions, cognitions and a change in the self (Beard, 2016). However, there is little understanding surrounding the specifics of this process in student instructors (Enoksen & Lynch, 2018). Mees et al. (2020) propose that OI training should consider a pedagogic approach that facilitates the development of agility and adaptability in OIs through intentional reflection. Aadland, Vikene, Varley, and Moe (2017) suggest a tool for the development of JDM in sea kayaking risk assessment, believed to accelerate experiential learning by supporting reflection. Additionally, Sutherland and Stuhr (2014) note that observations of experienced colleagues are vital to development in teacher education, whilst this research is not based in the dynamic outdoor environment, it further highlights the experiential nature of effective JDM development. A community of practice approach allows for an exploration of the transfer of tacit knowledge in a social context (Roberts, 2006), such as the tacit knowledge held by outdoor professionals which often forms the basis of their judgements (Collins & Collins, 2013). As such, community of practice may be significant in understanding the development of JDM in OIs.

We suggest that current insight into OIs progression from novice to expert (Shooter & Furman, 2011) is lacking. Consequently, we intended to add to the empirical research in this area by considering two questions: what are the key components of competent OIs' JDM, and how do competent OIs perceive they have developed their JDM skills? These findings will inform future approaches to OI development and evaluation.

Materials and methods

Given the exploratory aims, and lack of empirical evidence in OIs development of JDM, we took an inductive approach. Qualitative semi-structured interviews and a thematic analysis were adopted to explore the breadth and richness of participants perceptions (Braun, Clarke, Hayfield, & Terry, 2019). Our intention being to generate findings grounded in the experiences of the participants, and to provide real world implications for the efficient development of JDM in OIs.

Participants

The participants in this study were active OIs (N = 9) aged between 22 and 35 years (M = 26), working in Outward Bound Trust centres in the UK. Three female and six male OIs participated, representative of the trusts gender ratios (27% female). Participants voluntarily self-selected for the study based on four criteria: (1) 1–6 years of experience working as an OI since gaining initial National Governing Body qualifications,¹ (2) currently working as an OI, (3) maintained all continuous professional development requirements, and (4) be willing to discuss their professional practice. We recognise that these participants differ from 'experts', consistent with the findings of Mees et al. (2020).

Procedure

Following approval from the university's ethics committee, potential participants received an information letter and consent agreement. An interview guide was designed and cognitive pilot (Willis, 2005) conducted with a representative sample (N = 3). Four questions and prompts were refined, resulting in a semi-structured interview guide. Consenting participants were observed instructing all day sessions of adventurous outdoor activities such as gorge walking or canoeing, with groups of young people between the age of 10 and 18 years. The purpose of these sessions was predominantly personal development. The observation enabled the researcher to comprehend the OIs working context and assisted in selecting an appropriate aspect of the session as the basis for the interview.

Table 1. Semi-structured interview questions and prompts.

Question	Prompt/Probe
Tell me about your session . . . ?	• Group • Weather • Activity • Logistics • Plan
Using the decision points identified above/ regarding the decision you made:	• Depth - can you tell me a bit more about that • Factors impacting decision
• How did you come to that decision? • What factors influenced your decision/did you consider? • What were you aware of at that point? • What are you looking for/noticing • How did you know that your decision would be appropriate? • What told you to make that decision/to do that? • How have you learnt that?	• Balance of factors • Significance—what's important? What's most important? Why? • Past experiences
Using the decision points identified above/ regarding the decision you made:	• Specific - Which experiences, why? How have they learnt from that experience? Before/during after? • Time/relevance of considered previous learning • During planning, activity or on reflection? • Summarise/repeat back—check correct
• Describe . . . • Detail, Depth • Choice factors • Significance—why? • Specific factors - why? • Factors impacting decision • Factors which do not impact decision • Differing levels of importance/significance, why? how is that known? • How is decision made	
Is there anything else that was significant to you at that time which we haven't gone into?	Prompts as before if so.
• Revisit previous questions	

Interviews were conducted soon after the session. Participants were asked to describe a mutually agreed situation and decision in their session (see Table 1). Data was digitally recorded and securely stored using an Olympus VN-711pc digital voice recorder. Interviews lasted between 27 and 55 minutes ($M = 36$ minutes).

Analysis

Data were transcribed verbatim by the first author. This achieved familiarisation with the text, checking and correcting against the recorded interview. Transcripts were then sent to each participant for verification as an accurate account of the interview. Unique identifying codes (Robson & McCartan, 2016) were assigned to ensure the OIs' anonymity and avoid deductive disclosure (e.g., OI1). Each transcript was re-read several times to fully comprehend its essential features (Sandelowski, 1995). Bracketing was utilised by the first author (Tufford & Newman, 2012) to guard against researcher assumption and bias.

The first author is a qualified senior OI who subscribed to the notion that theory-free knowledge is not possible. She therefore acknowledged that while bringing specialised experience to the researcher role, her previous experiences, ideology, and knowledge will have influenced data collection and analysis. Accepting this active engagement, a reflexive thematic analysis (Braun & Clarke, 2020) process was undertaken in which reliability and rigour were integrated. Inter-rater reliability was avoided in favour of critical friend discussions with the second and third authors (see Costa & Kallick, 1993). Tracy's (2010) universal criteria (worthy topic, rich rigor, sincerity, credibility, resonance, significant contribution, ethics, and meaningful coherence) were considered and applied equally to ensure rigour (Smith & McGannon, 2018).

Initial codes were generated by identifying relevant excerpts using NVivo 12 software. Codes were collated into sub themes, then reviewed and revised multiple times into themes and overarching

themes in an iterative and reflexive process. Therefore, identification of themes was not dependent on the frequency of codes, but on what they revealed about OI decision making and development.

Results

Two overarching themes, five themes and fifteen subthemes were identified in the analysis (Table 2). Following a description of the context, each theme will be presented separately in relation to the research question and supported by quotes.

What are the key components of competent outdoor instructors' decision making?

OIs described a variety of situational demands (environment, group, resource, and self) and ways in which they managed these. Safety was identified by OIs as a priority in JDM and needed to be maintained as each situation evolved. The process of managing situational demands, maintaining safety, and facilitating learning in each hyperdynamic environment meant OIs were often operating with a high cognitive load, and developing strategies to maintain this load at a manageable level. Each of these themes are presented individually below, however this interdependent nature is demonstrated in the thematic map (Figure 1).

Managing the cognitive load

OIs typically described JDM as more analytical in low demand conditions (few variables, familiar environments, low consequences), whereas high demand 'naturalistic' conditions (many variables, high consequences) caused greater cognitive demand. The latter necessitated a more naturalistic decision-making approach (Collins & Collins, 2019). The balance in using naturalistic and classical decision making was flexible, particularly in-action, and certainly increased the OIs cognitive load. OIs cognitive load was also impacted by additional pressures presented by situational demands, as OI8 described: 'You might not make the correct, or the same decision that you'd make under normal circumstances.' This suggests that OIs JDM process may be sub-optimal when there is a high degree of situational demands, OI8 continued: "with the pressure, you're just forced into, yeah, you're just not properly evaluating, you might be wrongly prioritising what's important'. OIs awareness of this potential impact of situational demands on their JDM process, their metacognition, shows an ability to make judgements on the level of safety and level of risk they were willing to accept. OI9 commented:

If I feel something's dangerous or potential to cause a serious issue, then I will step up. That's where I will draw the line. So, like, I'm happy for their day to not go as strongly as I thought it could go, but I draw the line at safety.

Table 2. Overarching Themes, Themes and Sub-themes.

Overarching theme	Theme	Sub-theme
Managing the cognitive load	Situational Demands	Environmental demands
		Group needs
		Availability of resources
		Self-awareness
Social experiential learning	Safety	Physical safety
		Psychological wellbeing
	Formative experiences	Being challenged
		Purposeful practice
		Variety of experience
		Formal coaching
	Community of practice	Informal coaching
		Use of questioning
		Reflective practice
		Ad hoc opportunity
	Metacognition	Increase in self awareness

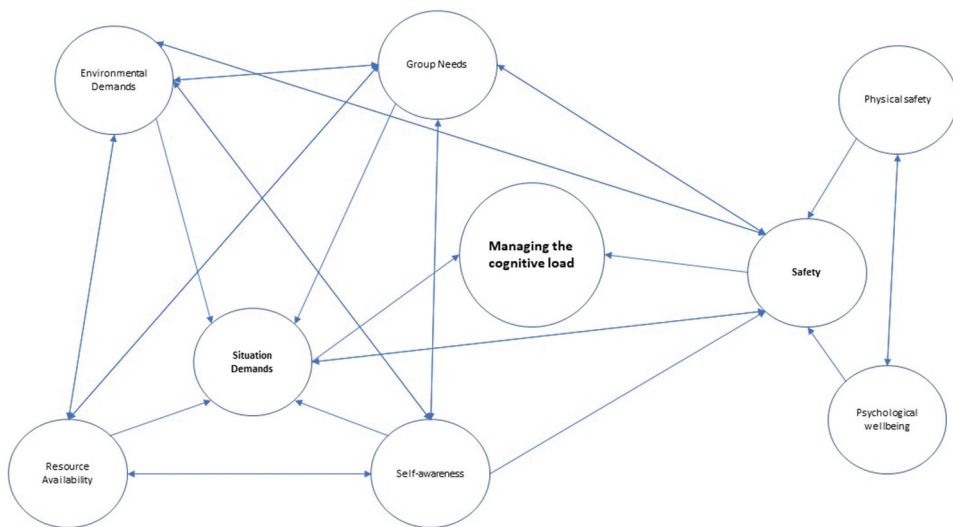


Figure 1. Thematic map: What are the key components of competent OIs' decision making?

To minimise additions to cognitive load, OIs used heuristics in their JDM, for example, 'if something doesn't feel right it probably isn't' (OI2). Practiced schemas were also used to reduce cognitive load, increasing capacity to manage other situational demands. These schemas are demonstrated in OIs recognition of a norm, OI2 explains: 'Today's session wasn't like a normal session'. Seemingly, as OIs' skills and confidence increased and cognitive load in the environment decreased, they began to deviate from these practiced schemas, embracing adaptability and flexibility within safe parameters. OI9 described this progression:

I think if I was very new, like first year, I think I would have been very on it with ... all like crossing the T's dotting the I's kind of thing ... as I get more comfortable with venues, more comfortable in those environments, with the centre as well, and all that kind of stuff I feel like you know where you can relax it a bit while still keeping it safe.

This modification of schema is a further indication of the OIs' metacognition. Reflecting its emerging significance, metacognition is examined in greater detail later.

Situational Demands

OIs situational demands existed in four co-dependent domains: (1) the environmental demands (e.g., weather, venue, situational awareness) 'the tide and the wind were going in the direction we wanted it to go in the end, but it was too strong for us just to do the journey' (OI3), (2) the group needs (e.g., group dynamic, physical needs, learning needs) 'the needs of the group and the needs of themselves, in reality, was that we needed to get ourselves off that hill' (OI4), (3) the availability of resources (e.g., organisational parameters, co-workers skills, logistics) 'With the buses we had, we couldn't have got [there]' (OI2), and (4) self-awareness (e.g., ability, adaptability, pedagogy) 'let them make mistakes, we'll just stop them at the last safe moment, because I think that's better.' (OI8). These factors acted in synergy. For example, to optimise the experience for the group, the OIs choice of venue was influenced by the weather conditions and the learning objectives. Additionally, decisions were affected by OIs pedagogy, philosophy and ontology. Simultaneous comprehension of the situational demands, the manner in which they interact, and an ability to foresee implications was essential to OIs JDM and allowed OIs to anticipate and make in-action decisions about future plans. However, it added considerably to working memory demands, which increased OIs cognitive load.

All OIs described some kind of recognition, or 'gut-feeling' (OI2), (see Klein, 2004) which informed their JDM, a heuristic developed through experience and reflection (Klein, 2015). OI7 described: 'The

feeling that you get. Sometimes you just know when you know'. The unconscious use of heuristics by Ols suggests an innate tendency toward this style of JDM to reduce cognitive load, or as part of a dual process. However, if not developed through reflection on a broad and deep range of experiences, heuristics can undermine JDM process (Klein, 2008; Simon, Collins, & Collins, 2017).

Pre-session decisions were often based on Ols predictions of how the forecasted conditions would manifest in each environment; however, a disparity between actual conditions and Ols predictions was often evident, OI1 described:

I didn't realise how strong the wind was and how big the tides were, erm, 'cause the boats were bobbing up and down and flying around, so yeah 'til I got there I didn't realise how much of a factor that would be ... I tried to plan it but like with most things it changes once you get there and see what's actually happening.

This indicates Ols' ability to contextualise information (e.g., how a weather forecast will affect a specific environment) may still be developing, consequently producing a potentially avoidable increase in cognitive load, while also highlighting a weakening of the potential heuristic.

Safety

Eight of the nine Ols identified safety as the most significant factor in their decision making and reported a sense of constant awareness and consideration of safety. OI8 recounted: 'Safety was always in the back of my mind'. Beyond this desire to maintain and control safety however, Ols demonstrated more sophisticated judgement in accepting a level of risk to facilitate meaningful learning. OI6 described: 'when I make decisions, I'm definitely conscious of the idea of risk versus benefit'. Although some options were considered unsafe and immediately disregarded, decisions which supported Ols to judge the level of risk against feeling in control of safety, and creating authentic learning opportunities were preferred. However, Ols explained that a perfect balance of these factors was often impossible, as OI7 describes: 'I didn't wanna step on Josh's toes because he was doing a great job, but then I was also aware of people moving and I didn't have my eyes on them', instead settling on an acceptable, rather than optimal, solution.

In increasingly dynamic environments OI JDM focused on manipulating the situational demands to a degree which they felt able to manage. OI3 explained:

We decided to put them in two diamond rafts, and then basically me and the other instructor then kind of had control of them both, relatively, as long as they paddle a little bit we can move them where we want them to go.

Here, the OI reduced their span of control by grouping boats together into only two units to reduce their cognitive load, thereby improving safety.

How do competent outdoor instructors perceive they have developed their decision-making skills?

Throughout Ols descriptions of their professional development, the common narrative was of learning through experience, particularly within a community of practice. Metacognition allowed Ols to effectively reflect on their experiences, understand thought processes, construct new declarative knowledge, utilise this knowledge in-action as a basis for their JDM, and be purposeful in their own development. As with the components of JDM, the relationships between these themes are complex, and are best shown in the thematic map (Figure 2).

Social experiential learning

Ols described two types of experiences which helped them develop their JDM: experiences they found challenging, and experiences in which they reflected on their emotions, both positive (e.g., success) and negative (e.g., failure, or near miss). These experiences were reflected upon (critical incident analysis; Tripp, 2012), as OI5 described 'Thinking about the emotions during that time', identifying self-awareness.

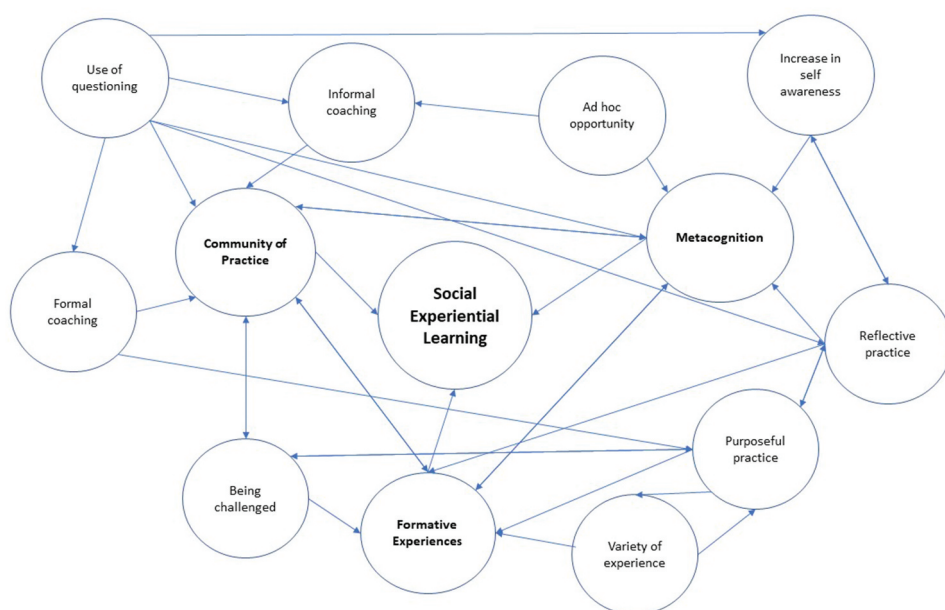


Figure 2. Thematic map: How do competent OIs perceive they have developed their decision making skills?

Alongside these formative experiences, working within a supportive and knowledgeable community of practice was highlighted as key to JDM development: formal coaching (e.g. intentional training, mentors) and informal coaching (e.g. observation, impromptu discussion, advice). These interactions supported OIs both in-practice, and in their pre-session decision making by constructing learning experiences, modelling, and challenging OIs cognitive reasoning, thus developing their metacognition and consequently JDM. By using a range of metacognitive skills OIs enabled themselves to not only reflect on their experiences and thus develop JDM, but also to consider and analyse this development and its efficacy.

Formative experiences

'Trial and error in the past' (OI1) was the initial aspect of development to which every OI attributed their current skills. However, thinking more deeply than this to identify the experiences they had learnt from was difficult for OIs, requiring considerable probing from the interviewer. This difficulty implied a tacit development of declarative knowledge and was likely not something OIs had previously reflected on. The key past experiences could be categorised as: personal outdoor experience, professional outdoor experience, and non-outdoor experience: 'It's a bit of life experience, it's a bit of on the job experience' (OI8). OIs metacognition supported deep learning through these experiences and transferability of the resulting knowledge to new contexts.

Purposeful practice in varied, authentic contexts was important to OIs in developing JDM, and was sought out personally and professionally. OI1 described: 'Putting myself in the middle of the estuary in different weather conditions, different tide ranges, and seeing how it reacts'. This promoted development of complex environmental knowledge required to make good decisions. Within safety parameters and their existing skill level, and supported by metacognitive skills, OIs learnt from situations where they were challenged to make difficult decisions. These situations provided opportunity to assimilate previous procedural and declarative knowledge and operationalise new knowledge, in turn, developing adaptable JDM.

Ols acknowledged that, although they 'learn by doing' (OI8), sometimes 'it's just having the confidence to give it a go' (OI1). Ols described a need to identify and address weaknesses to gain the confidence to practice their JDM skills in action, within the context of their current ability. OI2 explained their attention to their weaker areas, practicing purposefully: 'So if it's in a location I'm not so familiar with I'll be ... seeking it out, just because I wanna learn as much as I can for the next time I do it'. Ols' intention to improve and progress is highlighted by this search for challenge.

Community of practice

Declarative knowledge which informed JDM was largely socially constructed. All Ols noted receiving formal coaching with more experienced Ols at the beginning of their career, an opportunity, understood by Ols, to gain new ideas and develop confidence. OI5 explained: 'I suppose the time that I've had with [my employer] so far, and the amount of coach or shadow weeks that I've had ... has given me the confidence to make those decisions'. Gaining national governing body awards (a prerequisite to independent work as an Ol) involves formal training, a consolidation period, followed by an assessment. However, while OI6 described 'I think the learning through qualifications gives you the confidence to then go out and get that experience', no other Ols considered the NGB process as a feature of their JDM development.

In addition to formal coaching, a range of pivotal informal coaching experiences were highlighted by Ols. This informal coaching was generally unplanned, for example, observing other Ols' practice ['I suppose seeing other people make those decisions and discussing that with them' (OI5)], asking questions of other Ols ['why have you done it that way? What's the reason behind doing it that way?' (OI2)], or when advice was volunteered ['(they) suggested to me, have you tried whispering?' (OI4)]. The community of practice played an important role in supporting this cognitive apprenticeship, intentionally or otherwise, by modelling, coaching, giving feedback, questioning, and articulating their own metacognitive processes.

Despite informal coaching being a valued feature of all Ols development, its importance was not apparent in its nature, as described by OI1 'That's something I've just picked up along the way from working with [other instructors] ... it wasn't intentional, I wasn't like 'oh I'm observing this' it's sort of just in the back of your head'. The unintentional disposition of this learning meant that the onus was on Ols to recognise and capitalise on the opportunities as they appeared, and required a level of prior knowledge. OI5 explained: 'I used the knowledge that I already had and questioned them as to why they did what they did'.

Metacognition

Although metacognitive ability varied, it was evident in all Ols. This was demonstrated by Ols understanding of JDM as a vital skill and therefore their ability to recognise and prioritise development of those skills, as OI4 explains: 'Something I prided myself on was making good safe decisions'.

Generally, Ols were quite articulate in describing their decisions, suggesting a high level of metacognition surrounding their knowledge relating to the decision itself; OI5 explains:

I'll think back to what worked well for certain expeditions, and what age group that group was, and why that route worked for them, and why it might work for this group, given the things that I can see in front of me.

This ease in explanation also implies that Ols' JDM was generally conscious, or consciously checked at least. By contrast, conveying how and why their JDM had developed was difficult for Ols. OI7 commented: 'How have I learnt that? ... Well ... it's probably from doing it so much', and OI5 described 'none that I can think of right now but thinking about ... there will have been factors'. These long pauses and vague answers revealed Ols difficulty and highlight the difference in metacognition surrounding their JDM development, and the JDM itself.

Ols further identified that purposeful reflection was key to the development of their JDM, however this was executed with varying degrees of ease. OI1 described: 'I'm good at making the decisions, but then when people ask me why, I can't explain it'. In contrast, OI9, the most experienced of the Ols interviewed, noted: 'I think it [reflection] starts to happen quite naturally now' inferring that as experience increases, reflective skills improve also, if implicitly. All Ols recognised their reflection, and reported a variety of styles; some valued using 'critical friends' (OI4), while others preferred to be 'reflective in my head' (OI5). Several Ols also described reflection as 'just ingrained in myself' (OI9) or 'just something that I do naturally' (OI6) demonstrating the integrated nature of reflection in their practice.

Ols reflective practice supported the development of declarative knowledge surrounding JDM, which developed metacognition, supporting their JDM across contexts. OI2 explained:

Things can look logical, but then when you look at it in a broader sense it becomes, actually, that might be dangerous to do it in that way ... So, knowing the why and the how in a bit more detail means it's more likely to be safe.

Discussion

This research set out to identify the key components of Ols' JDM, and how Ols perceive they have developed their JDM skills. The complex relationships between the themes identified (Situational demands, Safety, Formative experiences, Community of practice, Metacognition) show that OI JDM and its development is multifaceted. Going forwards a deeper understanding of the continued progression of JDM must be gathered to understand how we can best facilitate professional development for Ols.

Ols in this study held a student-centred pedagogy and sophisticated epistemology promoted by the dynamic environment (Christian, Hodgson, Berry, & Kearney, 2019) leading to decision making being based predominantly on the needs of the learner in that environment. Ols were also less able to articulate the meta process, compared to expert adventure sports coaches (e.g., highly experienced and qualified; Collins, Carson et al., 2016). Similarly, adaptive expertise research showed competent Ols to be metacognitively active, but to a lesser extent than highly experienced Ols (Mees et al., 2020), suggesting that whilst not yet experts, the Ols in this study are working on the spectrum of adaptive expertise. Managing all situational demands simultaneously required a capacity to comprehend them and project their future state; Endsley's (1995) levels of situational awareness can possibly be applied to situational demands though this requires further investigation. A failure to fully comprehend the situational demands, for example, the group needs, learning objectives, and organisational constraints, would hinder the flexibility of Ols JDM.

Ols created highly structured and detailed plans (supporting findings by Boyes, Potter, Andkjaer, & Lindner, 2019) informed by resource availability and learning outcomes, mirroring Collins and Collins (2016a) resource audit and pedagogic audit, before entering the environments that necessitated a naturalistic style of decision making. This detailed planning, and desire to stick as close to the original plan as possible were due to, we suggest, both the Ols level of experience and the demands and expectations of their organisation. As a consequence of these detailed plans Ols were able to maintain their cognitive load at a manageable level, although this also typically reduced their potential for adaptability in action (Mees et al., 2020), likely accounting for why Ols described feeling their choices were limited. The schemas and heuristics used by Ols further reduced this cognitive load. Effective heuristics are developed with experience, and increasingly researchers are identifying that the transferability of that experience is important (Mees et al., 2020). While Ols may work across a range of activities, the leadership and group working aspects of the situational demands may be more readily transferable, suggesting a meta process. Equally, the Ols are required to be skilled in the activities prior to becoming instructors. It seems likely that personal experience is also a significant factor in developing robust heuristics. Though requiring further investigation, this practice and

experience outside the workplace should not be underestimated by OI and organisations and will be discussed further later.

Experts can avoid disparity between predicted and actual conditions using their large banks of experience, thus managing their cognitive load (Collins & Collins, 2019). OIs however were still building this catalogue of knowledge, which may explain the acute increase in cognitive load when conditions were not as expected. Furthermore, Boyes et al. (2019) stated that even experienced leaders face situations which were not as they had envisioned. Further investigation is therefore required to discern if this trait is related to experience or environment.

Whilst OI preferences in reflective practice were specific to the individual (Moon, 2013), OIs predominantly reflected on-action, echoing findings by Mees et al. (2020). The high cognitive load appeared to occupy cognitive space, rendering in-action reflection, which allows for greater adaptability, unachievable. As a feature of highly experienced OIs (Collins & Collins, 2019), it is imperative that the cognitive load is managed to allow for this in-action reflection, if progression towards expert practice is desired. Collins and Collins (2019) suggest how this is achieved by highly experienced OIs, though it remains uncertain how this can be developed in less experienced OIs.

Not only is the reflective practice (thinking on the experience) vital, it is metacognition, (thinking on the thinking) which enables robust development and deep learning (Claxton, 2002). We therefore support the notion that metacognitive development should be a significant part of OI training, such as that provided by national governing bodies or employers. This training could, for instance, provide tools and guidance to assist developing OIs in purposeful and intentional reflective practice, and subsequent metacognitive development. As an example, reflection appeared to be taking place as a result of the questions asked in interview for many OIs, implying that metacognitively challenging questions such as those asked in these interviews could be used to structure reflective practice as a strategy for continued JDM development, though this warrants further investigation.

It is likely that JDM processes are initially developed implicitly through personal experience in the outdoors, which may account for the tacit nature and difficulty in articulating these parts of OI processes. Alternatively, it may be that OI mentors struggle to articulate their own metacognitive processes (D. Collins, Collins, & Carson, 2016), leading to less developed metacognitive skills in the developing OIs. Nevertheless, as with many skills, an element of individual difference is likely and consequently some OIs will find this metacognitive thinking easier to develop than others. By highlighting the significance of metacognition in OI JDM development through these findings, a greater focus can be placed on it in OI training, to allow all OIs to develop to an appropriate level.

Informal coaching between more and less experienced OIs, particularly the process of questioning cognitions, was key to developing JDM skills, especially metacognition and situational awareness. Yet, a level of prior knowledge was required to capitalise on opportunities. We surmise that if the developing OI cannot ask the right questions, and the experienced OI does not pass on their knowledge voluntarily, the development opportunity may be lost. To maximise the impact of these socially rooted experiences, perhaps it would be valuable for developing OIs to receive training in how to capitalise on time spent working alongside more experienced OIs during the initial stages of their career, and equally for experienced OIs to be guided in their coaching of neophyte OIs. A potential solution is a cognitive apprenticeship (Dennen, 2004) approach, which requires experts to make their thinking visible, and tools such as Collins and Collins (2020) 'Big 5' questions may be of interest to those wishing to level up their skills in mentoring OIs.

The sporadic nature of informal developmental coaching reported does not seem to support the substantial significance placed on it by OIs when contemplating their progression, or the wealth of research into social theories of learning (e.g., Bandura, 1977). Regarding formal coaching, interestingly, only one OI considered the national governing body certification process as a feature of their JDM development, echoing research by Sinfield et al. (2019). This further raises questions surrounding explicit JDM training within the national governing body process. Other formal coaching (e.g., mentoring; Lester, Hannah, Harms, Vogelgesang, & Avolio, 2011) opportunities appeared few and far between, particularly once OIs had progressed from the initial stages of their development. As such, increasing

opportunities for OIs to work together purposefully by questioning and challenging the others thought processes, may be of value to the continued development of JDM. Organisations, or OIs themselves, may wish to consider how to make best use of their professional community of practice to create opportunities to share knowledge and increase metacognition, as a strategy for developing judgement and decision making.

The recognition of challenging experiences as significant contextualises research by Kahneman and Klein (2009), who proposed high validity (real life) experience is key to development, into an outdoor context. The importance placed on these challenging experiences is congruent with the development of adaptive expertise (Pulakos et al., 2009), further backing the consideration of OI development in the context of adaptive expertise (Mees et al., 2020). Opportunities for purposeful practice in these challenging situations, however, may not have been accessed without OIs' self-motivated attitude; being challenged is effortful, therefore, individuals must want to develop to put themselves in these conditions. Employers would be well placed to encourage OIs to challenge themselves, work in unfamiliar environments, and vary their practice purposefully to fortify their JDM development. However, it is also worth recalling the potentially negative impacts of cognitive overload on learning (de Jong, 2010), necessitating a careful balancing act.

Lastly, we re-state that in every example of JDM given by OIs, safety was considered first and foremost. A clear-cut, conscious emphasis on objective safety in JDM is something which has not previously been highlighted as a feature of expert OIs and, as such, this preoccupation with safety may be a feature of the developing OI. We recommend further research into the JDM, and development of JDM, in expert OIs in order to better illuminate the path of optimal development.

Limitations and further research

We acknowledge the characteristic limitations of qualitative research (e.g. limited transferability, small sample size) alongside the benefits (e.g., gathering in-depth data). Data was collected within a single organisation but across the UK, providing a broad geographical base. Therefore, to provide a universal view of JDM development in OIs and ensure that findings are not a result of the specific organisations values and processes, we suggest that further research in a variety of settings is undertaken. Finally, the first author was known to some of the participants prior to the study; while we acknowledge the potential impact of this on the results, we also note the benefits of easy rapport building and the potential for gaining a deeper insight during interviews.

The findings offer implications for OI development and training, a focus on metacognition and reflective practice, whilst maximising opportunity for practice in appropriately challenging situations and maintaining a workable cognitive load. Organisational culture which utilises, and trains, the community of practice effectively would enhance opportunities for these experiences and the development of metacognition in OIs. We propose future research be undertaken to explore the features and development of JDM in more experienced OIs, thus continuing to build a holistic view of JDM development and how this development can be best supported.

Conclusion

This research has examined the key components of competent, but not yet expert, OIs' JDM and explored how these OIs perceive they have developed their JDM skills, unlike previous research which has principally focused on expert outdoor professionals. Findings showed that OIs' metacognition allowed them to develop greater understanding and knowledge of their working context and of themselves, which increased their confidence providing enough self-assurance to engage with opportunities for purposeful practice in high validity and challenging situations. OIs' development to this point allowed them to make decisions and judgements to balance complex situational demands with their primary focus on safety while using strategies to manage their cognitive load. OI JDM development was reliant on a socially oriented experiential learning process, underpinned by

metacognitive skills. We propose that there is opportunity to purposefully use the community of practice and to increase metacognition in Ols as they progress forwards in their career. With the continued professionalisation of the outdoors a focus on the development of JDM and consideration of how to support Ols in their development is crucial.

Note

1. Mountain Leader Award, Rock Climbing Instructor Award ('Mountain Training', 2020); Level 1 Coach (British Canoe Union, 2020)

Disclosure statement

No potential conflict of interest was reported by the authors.

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