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7 Metacognition and Professional Judgment and Decision Making in Coaching: Importance,  
8 Application and Evaluation

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## Abstract

Previous research has emphasised the dynamic nature of coaching practice and the need to consider both *individual* performer needs and necessary *contextual* trade-offs in providing optimum solutions. In this regard, a Professional Judgment and Decision Making framework has been suggested to facilitate an optimum blend of actions against these complex and dynamic demands. Accordingly, we extend this work and address recent calls for greater focus on expertise-oriented assessments, by postulating on the aspirant/developing coach's capacity for and development of *metacognition* (i.e., active control over cognitive processes) as a 'tool' within the reflective process. Specifically, we propose that metacognition enables essential active cognitive processing for deep learning and impactful application, together with construction and refinement of useable knowledge to inform coaching decisions. Metacognition, therefore, helps to contextualise knowledge provided in training, further optimising the experience, particularly before certification. Finally, we exemplify how metacognition can be developed in coaches through the use of cognitive apprenticeships and decision training tools; and evaluated via a series of observed coaching episodes, with reasoning articulated through pre and postsession interview. Despite challenging traditional competency-based approaches to coach education, we believe that a considered mixed approach represents a vital next step in further professionalising sports coaching.

*Key words:* Assessment; Coach education; Development; Expertise; Training

50 Metacognition and Professional Judgment and Decision Making in Coaching: Importance,  
51 Application and Evaluation

52 Coaching practice is recognised and demonstrated as a dynamic process (e.g.,  
53 Abraham & Collins, 2011b; L. Collins & Collins, 2012, 2015; Martindale & Collins, 2012).  
54 Such work highlights the need to consider both *individual* performer needs and *contextual*  
55 trade-offs in providing optimum solutions. For example, despite a coach predominantly  
56 working to develop long-term performance, they might deviate from this approach to give a  
57 short-term boost to confidence at the expense of skill retention (i.e., a trade-off).  
58 Consequently, the ability to respond quickly and efficiently to selected, or preselected,  
59 subsets of factors is a crucial skill for any coach.

60 Influenced by the practices of other professions, a process of Professional Judgment  
61 and Decision Making (PJDM) has been suggested within the sport psychology and coaching  
62 literature, to facilitate an optimum blend of actions against such demands. This process,  
63 involving reflection during coaching (in action; Schön, 1983), post coaching activity (on-  
64 action; Schön, 1983) and by creating time within the coaching session/process for reflection  
65 (on-action/in-context; L. Collins & Collins, 2015; Schön, 1987) has, to date, been implicit  
66 within these suggestions. As such, this *Insights* paper extends these ideas by postulating on  
67 the requisite cognitive skills for a coach to employ a PJDM approach and, consequently, the  
68 implications for training and evaluation.

69 Successful operationalisation of the PJDM process relies on a coach's declarative  
70 understanding of 'what needs to be done' (e.g., blocked practice to generate a rapid  
71 performance gain *or* random practice to promote better long-term retention and transferable  
72 skills) which, in turn, cyclically links back to their intentions (Abraham, Collins &  
73 Martindale, 2006); in short, knowing *why* particular action(s) should be taken in response to  
74 the multifactorial demands of a situation (cf. Winter & Collins, 2015). Of course, knowing

75 *how* to enact those decisions is also important. We suggest that integrated application of the  
76 what, why (declarative knowledge) and how (procedural knowledge) of a PJDM approach are  
77 facilitated by metacognitive skills. Specifically, *metacognition* underpins the ability for  
78 reflection in-action, on-action and on-action/in-context, enabling the essential consideration  
79 and weighing up of alternative coaching options within the PJDM process (Cruickshank,  
80 2013). Crucially, such reflection supports coaches to recognise and address novel or complex  
81 problems while coaching. By addressing the coach's capacity for and development of  
82 metacognition, we aim to stimulate thought and debate within this developing avenue of  
83 research.

84       Such concepts will apply across most, if not all, sports; since the PJDM process is  
85 apparent between different contexts (e.g., open vs. closed skill sports), levels of challenge  
86 (e.g., practice vs. competition) and within different environments (e.g., indoor vs. outdoor).  
87 However, our interests lead to a particular focus on Adventure Sports Coaching (ASC); a  
88 hyper-dynamic environment that is especially demanding on coaches' ability to make  
89 effective decisions (see L. Collins & Collins, 2012, 2015; L. Collins, Collins & Grecic,  
90 2015). Accordingly, the paper is presented in two stages: (1) we introduce and explore  
91 metacognition as a 'tool' within the reflective process and (2) we propose how metacognition  
92 can be trained and evaluated in developing/aspirant coaches.

### 93                   **Metacognition and Reflective Thinking within the PJDM Process**

94       In part, the practical success of a PJDM framework relies on a coach's *understanding*  
95 of the situational demands (Abraham & Collins, 2011a). However, less attention has been  
96 directed towards coaches knowing *how* to apply aspects of their knowledge, that is, the  
97 process of translating theory into practice. In offering a potential solution, Abraham and  
98 Collins (2011b) proposed that PJDM requires a process of nested decisions that are  
99 developed via nuanced in-action, on-action and on-action/in-context *reflective* processes.

100 Inevitably, therefore, alternative actions are always generated, contextualised and critically  
101 considered against intended outcomes when using this approach. Working without reflection  
102 could explain why coaches sometimes make suboptimal decisions based on *heuristic*  
103 constructs from personal experience (Collins & Collins, 2016b). In other words, Naturalistic  
104 Decision Making processes are potentially weakened by the coach's lack of breadth and  
105 depth in experience (Klien, 2008; Lyle, 2003). Accordingly, it would appear essential that  
106 coaches develop *metacognitive* skills as a necessary adjunct to increasing declarative  
107 knowledge (Abraham & Collins, 2011a), *if* they are to safeguard themselves against such  
108 potential pitfalls associated with narrowly formed heuristics or 'recipe coaching'.

109         When considering the scope of metacognition, Kruger and Dunning (1999) argue that  
110 "the skills that engender competence in a particular domain are often the very same skills  
111 necessary to evaluate competence in that domain—one's own and anyone else's" (p. 1121).  
112 Indeed, Kruger and Dunning's findings imply that those metaskills, including metacognition,  
113 are an important aspect of a coach's performance evaluation. Crucially within ASC,  
114 understanding one's own coaching and personal ability has safety implications and  
115 developmental impact (Collins & Collins, 2012). The highly-dynamic coaching environment  
116 in adventure sports, coupled with the inherent risk and requirement for the coach to engage in  
117 the adventure activity, means that the coach must comprehend the interaction between the  
118 task, environment and participant (L. Collins & Collins, 2016a). In summary, Kruger and  
119 Dunning suggest that knowledge used to produce coherent judgments about a situation is the  
120 same as that which underlies the ability to recognise good judgment.

121         Action, reason and deliberation are central to the Aristotelian notion of *phronesis*  
122 (practical wisdom). The judgements that are required to exercise practical wisdom, link the  
123 capacity to deliberate, evaluate and take action in a practical way. The constant audit of the  
124 coaching process (D. Collins, Collins & Carson, 2016; L. Collins & Collins, 2016b) includes

125 an evaluation of the decision making process, itself a metacognitive process. Indeed, these  
126 skills are well suited to the complex coaching environment and presumably, if they can be  
127 articulated can also be taught. Fenichel and Eggbeer (1990) described this process of  
128 enacting phronesis as “the ability to do the right thing, at the right time, for the right reason”  
129 (p. 21); notably, this quote has become increasingly synonymous with wisdom and is  
130 similarly utilised in the educational domain. In this regard, we can describe phronesis as  
131 good judgment (the *how*), which differs from the knowledge of coaching (the *what*) and  
132 could be considered a metaskill. Crucially, however, Claxton and Lucas (2007) proposed  
133 that merely being taught to think is insufficient, being taught to think *well* is most  
134 appropriate. With these distinctions in place, it is worth exploring the mechanisms which  
135 *underpin* thinking well as opposed to thinking *per se* (cf. cognition and metacognition), if we  
136 are to encourage an adaptive, flexible and creative coaching workforce.

137         In applying effective decision making within a PJDM framework, we suggest that  
138 metacognition is used to operationalise the knowledge generated by coaches’ reflective  
139 process. Consequently, this enables the modification of existing schema and generation of  
140 new versions through a multilooped comparative audit in which current experience and  
141 potential coaching solutions are contrasted and considered (Collins & Collins, 2013). This  
142 adaptation and generation of new, accessible and internalised schemata allows the coach to  
143 be adaptive, flexible and creative in response to situational demands as they unfold. In short,  
144 coaches become capable of accurately selecting and activating an optimum behaviour from a  
145 broader repertoire under naturalistic conditions; that is, a heuristic for *adaptive expertise* (cf.  
146 de Oliveira, Lobinger & Raab, 2014).

147         More specifically, metacognition utilises both analogous and metaphoric dimensions  
148 to problem solving. Using analogies, the coach is able to create understanding through a  
149 contextual relationship between the known and the newly experienced coaching scenario (cf.

150 Carbonell, 1985) and, from this, to select a best fit rather than optimum solution which, in  
151 turn, may be adapted in situ (adaptability and flexibility): for example, linking a carved turn  
152 on skis with a carved turn in a kayak, when a kayaker is on skis for the first time. When  
153 encountering novel and/or poorly defined challenges, the coach reconceptualises the  
154 challenge in a metaphoric way by aligning the experience more broadly with a range of  
155 known strategies and approaches, considering the challenges in a more thematic, or  
156 principled, manner; as shown when asking a skier to “crush a grape under your big toe” to  
157 encourage use of an edging with a ski. Font, Bolite and Acevedo (2010) proposed that such  
158 metaphoric thinking would enable coaches to anticipate, solve and address the novel  
159 problems that are encountered in dynamic environments. In both analogous and metaphoric  
160 thinking, however, there is a requirement for a higher level of contextual thinking skill that is  
161 fundamental to the PJDM process, namely metacognition. The coach processes the flow of  
162 information in each coaching situation (micro level), at an intervention level (meso) and  
163 programme (macro) level. Metacognitive capacity allows the coach to better organise,  
164 prioritise and make accessible (e.g., the metaphoric or analogous strategies) newly  
165 constructed or adapted information across long-term timescales, in this capacity  
166 metacognition improves the flow of information.

167         Despite this seeming advantage towards designing high-level practice, Collins,  
168 Collins and Carson (2016) identified that metacognition cannot always be articulated by the  
169 coach. Such inability raises concern over how the coach could communicate such nuances  
170 while training or mentoring others. In order to act as a coach educator therefore, an ability to  
171 consider and apply necessary decisions from reflections on-action/in-context (e.g., when  
172 facing new situations or the need to implement trade-off decisions) becomes a critical skill; in  
173 simple terms, an ability to provide a commentary of one’s own metacognition in practice.



174 The need for metacognitive skills in coach educators is, therefore, an important aspect of  
175 coach education (cf. Kruger & Dunning, 1999).

176 Metacognition is also important because it enables the active cognitive processing that  
177 is essential for deep learning (Claxton & Lucas, 2007; Schön, 1987) and application,  
178 construction and refinement of useable knowledge. Metacognition helps the coach to  
179 contextualise the knowledge acquired in training, further optimising the experience between  
180 training and certification by providing the tools for reflection and supporting the  
181 developmental aspect of professional practice. As such, we now address how metacognition  
182 might be developed and assessed by training organisations (e.g., national governing bodies)  
183 when implementing a PJDM framework within coach education.

#### 184 **Developing and Evaluating Metacognition within the PJDM Process**

185 A PJDM focus in coach education would need to be in concert with the developments  
186 of an expertise focus for evaluation (EFE) of coaching practice. Furthermore, education and  
187 evaluation would need to reflect the *appropriate* synergy of skills required in the coaches'  
188 role. Realistically, and despite recent criticisms of competency-based approaches (see  
189 Collins, Bruke, Martindale & Cruickshank, 2015), *some* aspects of the coach's performance  
190 *will* be suitable for competency focused assessment methods. These are essentially the  
191 *components* of the coaching process (e.g., equipment setup, maintenance, aspects of safety),  
192 the essential content which often has a right or wrong categorisation, while an expertise-  
193 oriented assessment would measure the interactional and decision making aspects of  
194 coaching in practice; a situation where shades of grey solutions (or 'it depends') are more  
195 appropriate. In simple terms, our proposal here is not for an either/or approach, but that  
196 current competency-based approaches, best utilised for specific and stereotypic skills, ought  
197 to *also* emphasise an expertise-based approach for the complex situations such as coaching.  
198 A mixed assessment strategy in which competency and expertise foci coexist clearly offers a

199 more valid and reliable assessment of requisite skills. Accordingly, the PJDM tools (e.g.,  
200 metacognition, reflectivity, adaptability and flexibility) will need to be understood by  
201 educators and coaches; they will need to know how knowledge interacts between these  
202 various factors and demonstrate an ability to articulate and utilise them. Therefore, coach  
203 educators should be skilful coaches *and* educators who can articulate the dynamics of the  
204 coaching process.

205         Reflecting the teaching of PJDM, this would need to identify flexible, as opposed to  
206 repeated, mental processes (cf. our earlier conceptions of metacognition). In turn, these  
207 require developing coaches to plan, explain and evaluate their own thinking and learning in  
208 addition to their coaching. Both Bolton (2010) and Moon (1999) identify that nonroutine,  
209 open-ended learning tasks involving a degree of uncertainty serve to encourage higher quality  
210 thinking and metacognition. This approach may be challenging for coaches or training  
211 programmes that encourage a routine or proceduralised process. Indeed, recent study  
212 suggests that firmly fixed beliefs in one solution can counter the acceptance and  
213 implementation of others, even when the alternative is proven to be more efficacious  
214 (Yarritu, Matute & Luque, 2015). Accordingly, the shift towards PJDM enables learners to  
215 construct meaning, make judgments and produce multiple solutions to new or unique  
216 problems *and* to challenge doctrine and dogmatism; all promoted perhaps by a greater  
217 tolerance, acceptance or even pursuit of productive ambiguity. As such, upfront selling and  
218 gaining long-term commitment to this approach will be essential as a fundamental  
219 requirement for intentional, goal-directed change of well-established behaviours (cf. Carson  
220 & Collins, 2011; Prochaska, DiClemente & Norcross, 1992).

221         Crucially, explicit pedagogies associated with the teaching of metacognition and  
222 PJDM must ensure that the learning transfers beyond the context in which it is taught. In  
223 turn, this must be supported by suitable theoretical underpinning, metacognitive ability,

224 curriculum design, delivery materials, an explicit epistemology, pedagogy and infrastructure.  
225 In particular, an educational environment in which these skills are valued and demonstrated  
226 as elements of expert practice, a shift towards an adaptive notion of expertise. Notably, this  
227 may necessitate some focused work on broader coach and coach educational cultures before  
228 it can be achieved (cf. Cruickshank & Collins, 2012; Stoszkowski & Collins, 2012).

### 229 **Metacognitive Approaches in Coach Education**

230 Addressing the combined tuition of practical and cognitive performance elements, the  
231 constructivist approach of a cognitive apprenticeship (CA; Collins, Brown & Newman, 1987)  
232 offers one pedagogic mechanism to this learning. In practice, using approaches such as CA  
233 exposes the implicit processes associated with performing complex skills. In doing so, the  
234 CA approach focuses on articulating and identifying the tacit processes within the  
235 complexity, encouraging students to observe, identify and practice them with help from the  
236 tutor coach. For example, the decisions associated with selecting and placing an anchor  
237 while rock climbing provide opportunity for such an approach. CA requires the learner to  
238 consciously engage in the cognitive aspect of the process, be motivated to learn and to  
239 accurately reproduce the cognitive and motoric aspects of the skill. Adding ecological  
240 strength to such practice, the activity being taught is modelled in a real-world context  
241 utilising explicit coach–trainee interactions. Following this, situated cognition (A. Collins et  
242 al., 1987; Godden & Baddeley, 1975) then aids the development of metacognitive processes  
243 by assisting at the skill level just beyond what the learner could accomplish themselves; that  
244 is, the zone of proximal development (Vygotsky, 1978).

245 To exemplify how a CA may be achieved in the sporting context, consider Vickers'  
246 (2007) decision training model. Indeed, this model reflects a sophisticated epistemological  
247 position (Schommer, 1994) that accepts the integrated nature of practical and cognitive  
248 performance. It may also align with concepts such as Christensen, Sutton and McIlwain's

249 (2016) *mesh* theory that advocates a motoric and cognitive aspect to performance and  
250 learning. Both Vickers' decision training model and Christensen, Sutton and McIlwain's  
251 *mesh* theory provide a pragmatic integration of cognitive and motoric aspects of performance  
252 and offer an alternative to purely technically-focused syllabi. Such approaches may allow the  
253 integration of PJDM into both the education and practice of the coach.

254         Staying with the constructivist paradigm, problem-based learning strategies focus on  
255 engaging learners in a process of collaborative and self-directed inquiry (Jones & Turner,  
256 2006). Here, the role of the teacher is to guide, facilitate and challenge the learning process  
257 rather than strictly provide knowledge. Accordingly, learners are presented with an authentic  
258 problem and, through discussion within their learning group, prior knowledge is used to  
259 address the problem; thus formulating a shared mental model to explain the problem (Ojala &  
260 Thorpe, 2015). This framework, on which students can construct knowledge relating to the  
261 problem, is managed by the coach educator. Following the generation of a shared mental  
262 model, students work independently in self-directed study to research the *specific* aspects of  
263 the problem. Finally, the students re-group to discuss and refine their initial explanations  
264 based on what they learnt. As such, students are agents in this socioconstructivist process in  
265 which meaning and interpretations of the world are based on experiences and interactions;  
266 learning becomes a continuous and lifelong process. Identifying a suitable line through a  
267 white water rapid prior to allowing a group to paddle it provides an opportunity with a group  
268 of trainee coaches. In this case, the problem is to descend the rapid in a safe and controlled  
269 manner with a group. Students are allowed to inspect the rapid, individually, prior to  
270 developing a strategy for descent that draws on their previous experiences. Then, the trainee  
271 coaches share each possible approach and construct a shared mental model to descend the  
272 rapid. After paddling the rapid the strategy is reviewed by the team.

273         As another possible method, transformative teaching strategies address psychological

274 and behavioural characteristics in an attempt to alter a learner's perspective relating to an  
275 experience of activity from fundamentally rational and analytical positions (Taylor & Collins,  
276 2016). The approach focuses on altering the learner's philosophy by *challenging* the  
277 underlying premises of their perspective. Facilitating such understanding is the goal of a  
278 transformative approach and, in that respect, develops autonomous thinking. Mezirow  
279 (1997) describes the construction of dilemma by providing options and forcing a choice by  
280 the learners. In this way the teacher can facilitate transformation. Transformative  
281 approaches have value in the coach education process: For example, Taylor and Collins  
282 (2016) highlight a transformational approach in addressing a novice coach's epistemology,  
283 transforming a naive epistemological position towards a sophisticated position (Schommer,  
284 1994).

285         Clearly, the development of metacognition plays a pivotal role in these approaches.  
286 However, an important aspect must also be considered, that of the right approach in the right  
287 place at the right time alluded to earlier. We have advocated that a single approach to  
288 assessment is flawed and we must, *de facto*, extend such observation to teaching approaches  
289 (Collins, Collins & Willmott, 2016); this seems to simply strengthen the need for  
290 metacognition in both coaching and coach education practice.

291         An EFE process (and the professional development which accompanies it) could  
292 potentially be the nature of the decisions that accompany and drive the adaptability,  
293 flexibility and creativity within the coaching process, not just the coaching tools. Aligning  
294 the philosophy of coaching, education and assessment within the scheme becomes  
295 imperative; in this context, a coaching philosophy that values and reflects adaptive expertise.  
296 This philosophical position would be aligned with a core of declarative knowledge and  
297 declarative skill. This differs from presenting basic techniques for instruction; the emphasis  
298 becomes to construct the fundamental techniques from these declarative elements.

299 Throughout the educative process, the explicit interaction between declarative elements is  
300 illustrated and articulated (i.e., the PJDM process). This would be achieved via a reduction in  
301 the instruction of basic content in favour of declarative content, metacognitive skills and  
302 PJDM to utilise and operationalise that knowledge. Thus, the focus of assessment becomes  
303 how and why we teach, rather than solely the what; the situation which exists at present in  
304 competency-based assessments.

### 305 **What could an Evaluation of Adaptive Coaching Expertise look like?**

306 A variety of different approaches exist, although all (we suggest) would incorporate  
307 some form of questioning on the whys of decisions taken. For example, the evaluation of  
308 adaptable coaching skills could be assessed via a series of observed coaching episodes, with  
309 reasoning articulated through pre and postsession interview. In simple terms, the coach is  
310 asked to overtly discuss the reasoning through which decisions were reached, what  
311 alternatives were considered and under what circumstances such alternatives would have  
312 been used (cf. the big five approach; Collins et al., 2015). To enhance validity, both coaching  
313 session and interview could be recorded, the footage being used to assist in stimulating the  
314 coaches' recall of the session and the audio to form part of a professional development log.  
315 Encapsulated within this concept would be the need to generate a constantly learning coach,  
316 with an improvement in thinking skill, sophistication and practice being expected at each  
317 assessed session. Evaluation would extend over a series of nonlinked sessions in which  
318 preplanning, adaptation of that plan and its underpinning rationalisation can be articulated.  
319 Indeed, distributing sessions has been shown to facilitate more accurate judgments of  
320 learning; that is, metacognition (cf. Dail & Christina, 2004). To avoid the potential for post  
321 hoc rationalisation of actions, consideration could be given to developing the reflective  
322 process as an articulation of the coach's internal dialogue (not unlike the commentary  
323 provided in advanced driver training, blue light response training or those training in

324 emergency care). Noninterventionist approaches to assessment may be challenged by such a  
325 notion and some would argue that this influences the coaches' performance and that the  
326 assessment is compromised. However, the focus of evaluation is not to measure performance  
327 in that instance but rather, to evaluate the rate and nature of development, the individual's  
328 trajectory of development. Consequently, evaluation and feedback would initially be largely  
329 formative, a mentoring process or the CA approach highlighted earlier, then developed to a  
330 point at which the trainee is operating with full autonomy. Alongside development in the  
331 metacognitive aspects of performance, developments in practice should be observed and  
332 greater autonomy demonstrated by the coach.

333         Alignment between the desired learning outcomes (adaptive expertise) and delivery  
334 (declarative knowledge and skills, PJDM (reflection and metacognition)) would need to be  
335 matched with a suitably skilled workforce of trainers, examiners and quality assurance.  
336 Indeed, the nuances of coaching and educative practices may differ such that an expert coach  
337 may not philosophically be an effective or skilled coach educator.

338         The use of case study approaches and constructing case formulations (Martindale &  
339 Collins, 2012) is another way in which the nested nature of planning may be evaluated. This  
340 would be particularly relevant from Level 3 upwards (based on the current UK Coaching  
341 Certification formulation of levels) as coaches' decision making becomes increasingly  
342 layered; as per the first example presented at the start of this paper. The point here is that, as  
343 the timespan of the coaching relationship extends, there is an inevitable need for long-  
344 (macro) and short- (micro) term decisions to increase in coherence. As above, metacognition  
345 on these levels is essential if such longer-term relationships (which characterise higher  
346 performance contexts) are to be optimised. These considerations notwithstanding however,  
347 we would suggest that there is strong merit in introducing elements of EFE at the earliest  
348 stages of a coach's education journey. The sense that 'it depends' is the correct answer to

349 many elements of the coaching process is an important consideration; not one that should  
350 suddenly appear at a specific level.

### 351 **Conclusion**

352 In this paper we have explained how coaches could develop the metacognitive skills  
353 required in adaptive and flexible coaching situations. We proposed that a mixed assessment  
354 could be employed to evaluate coaching. Developing metacognition alongside declarative  
355 knowledge and skill presents a contrast to more proceduralised notions of coach education  
356 and coaching. In this context, universal employment of competency-based approaches does  
357 not cater for the often complex reality of coaching and, we suggest, is leading to suboptimal  
358 professional standards. As such, we anticipate that adopting a mixed approach will foster and  
359 encourage adaptive expertise alongside competency, but with challenge, since the perception  
360 of performance is, in itself, influenced by a lack of metacognition. However, through our  
361 ongoing systematic, considered and applied-focussed research, we believe that this is a  
362 necessary next step in the development and further professionalisation of sports coaching.



## References

- Abraham, A., & Collins, D. (2011a). Effective skill development: How should athletes' skills be developed? In D. Collins, A. Button, & H. Richards (Eds.), *Performance psychology: A practitioner's guide* (pp. 207–229). Oxford: Elsevier.
- Abraham, A., & Collins, D. (2011b). Taking the next step: Ways forward for coaching science. *Quest*, *63*, 366–384. doi:10.1080/00336297.2011.10483687
- Abraham, A., Collins, D., & Martindale, R. (2006). The coaching schematic: Validation through expert coach consensus. *Journal of Sports Sciences*, *24*, 549–564. doi:10.1080/02640410500189173
- Bolton, G. (2010). *Reflective practice, writing and professional development*. London: Sage.
- Carbonell, J. G. (1985). *Derivational analogy: A theory of reconstructive problem solving and expertise acquisition* (1534). Retrieved from Carnegie Mellon University Computer Science Department:  
<http://repository.cmu.edu/cgi/viewcontent.cgi?article=2533&context=compsci>
- Carson, H. J., & Collins, D. (2011). Refining and regaining skills in fixation/diversification stage performers: The Five-A Model. *International Review of Sport and Exercise Psychology*, *4*, 146–167. doi:10.1080/1750984x.2011.613682
- Christensen, W., Sutton, J., & McIlwain, D. (2016). Cognition in skilled action: Meshed control and the varieties of skill experience. *Mind and Language*, *31*, 37–66. doi:10.1111/mila.12094
- Claxton, G., & Lucas, B. (2007). *The creative thinking plan*. London: BBC Books.
- Collins, A., Brown, J. S., & Newman, S. E. (1987). *Cognitive apprenticeship: Teaching the craft of reading, writing and mathematics* (Technical Report No. 403). BBN Laboratories, Cambridge, MA: Centre for the Study of Reading, University of Illinois.

- Collins, D., Burke, V., Martindale, A., & Cruickshank, A. (2015). The illusion of competency versus the desirability of expertise: Seeking a common standard for support professions in sport. *Sports Medicine*, *45*, 1–7. doi:10.1007/s40279-014-0251-1
- Collins, D., Collins, L., & Carson, H. J. (2016). “If it feels right, do it”: Intuitive decision making in a sample of high-level sport coaches. *Frontiers in Psychology*, *7*, 504. doi:10.3389/fpsyg.2016.00504
- Collins, D., Collins, L., & Willmott, T. (2016). Over egging the pudding? Comments on Ojala and Thorpe. *International Sport Coaching Journal*, *3*, 90–93. doi:10.1123/iscj.2015-0068
- Collins, L., & Collins, D. (2012). Conceptualizing the adventure-sports coach. *Journal of Adventure Education and Outdoor Learning*, *12*, 81–93. doi:10.1080/14729679.2011.611283
- Collins, L., & Collins, D. (2013). Decision making and risk management in adventure sports coaching. *Quest*, *65*, 72–82. doi:10.1080/00336297.2012.727373
- Collins, L., & Collins, D. (2015). Integration of professional judgement and decision-making in high-level adventure sports coaching practice. *Journal of Sports Sciences*, *33*, 622–633. doi:10.1080/02640414.2014.953980
- Collins, L., & Collins, D. (2016a). Professional judgement and decision-making in adventure sports coaching: The role of interaction. *Journal of Sports Sciences*, *34*, 1231–1239. doi:10.1080/02640414.2015.1105379
- Collins, L., & Collins, D. (2016b). Professional judgement and decision making in the planning process of high level adventure sports coaching practice. *Journal of Adventure Education and Outdoor Learning*, Advance online publication. doi:10.1080/14729679.2016.1162182

- Collins, L., Collins, D., & Grecic, D. (2015). The epistemological chain in high-level adventure sports coaches. *Journal of Adventure Education and Outdoor Learning, 15*, 224–238. doi:10.1080/14729679.2014.950592
- Cruickshank, A. (2013). Case study 1: A Professional Judgement and Decision Making (PJDM) approach to consultancy with an elite junior judo player. *Sport and Exercise Psychology Review, 9*, 15–23.
- Cruickshank, A., & Collins, D. (2012). Culture change in elite sport performance teams: Examining and advancing effectiveness in the new era. *Journal of Applied Sport Psychology, 24*, 338–355. doi:10.1080/10413200.2011.650819
- Dail, T. K., & Christina, R. W. (2004). Distribution of practice and metacognition in learning and long-term retention of a discrete motor task. *Research Quarterly for Exercise and Sport, 75*, 148–155. doi:10.1080/02701367.2004.10609146
- de Oliveira, R. F., Lobinger, B. H., & Raab, M. (2014). An adaptive toolbox approach to the route to expertise in sport. *Frontiers in Psychology, 5*, 709. doi:10.3389/fpsyg.2014.00709
- Fenichel, E., & Eggbeer, L. (1990). *Preparing practitioners to work with infants, toddlers and their families: Issues and recommendations for educators and trainers*. Arlington, VA: National Center for Clinical Infant Programs.
- Font, V., Bolite, J., & Acevedo, J. (2010). Metaphors in mathematics classrooms: Analyzing the dynamic process of teaching and learning of graph functions. *Educational Studies in Mathematics, 75*, 131–152. doi:10.1007/s10649-010-9247-4
- Godden, D. R., & Baddeley, A. D. (1975). Context-dependent memory in two natural environments: On land and underwater. *British Journal of Psychology, 66*, 325–331. doi:10.1111/j.2044-8295.1975.tb01468.x

- Jones, R. L., & Turner, P. (2006). Teaching coaches to coach holistically: Can Problem-Based Learning (PBL) help? *Physical Education and Sport Pedagogy, 11*, 181–202.  
doi:10.1080/17408980600708429
- Klien, G. (2008). Naturalistic decision making. *Human Factors, 50*, 456–460.  
doi:10.1518/001872008X288385
- Kruger, J., & Dunning, D. (1999). Unskilled and unaware of it: How difficulties recognising one's own incompetence lead to inflated self assessments. *Journal of Personality and Social Psychology, 77*, 1121–1134.
- Lyle, J. (2003). Stimulated recall: A report on its use in naturalistic research. *British Educational Research Journal, 29*, 861–878. doi:10.1080/0141192032000137349
- Martindale, A., & Collins, D. (2012). A professional judgment and decision making case study: Reflection-in-action research [Special issue]. *The Sport Psychologist, 26*, 500–518.
- Mezirow, J. (1997). Transformative learning: Theory to practice. *New Directions for Adult and Continuing Education, 1997*, 5–12. doi:10.1002/ace.7401
- Moon, J. (1999). *Reflection in learning and professional development: Theory and practice*. London: Kogan Page.
- Ojala, A.-L., & Thorpe, H. (2015). The role of the coach in action sports: Using a problem-based learning approach. *International Sport Coaching Journal, 2*, 64–71.  
doi:10.1123/iscj.2014-0096
- Prochaska, J. O., DiClemente, C. C., & Norcross, J. C. (1992). In search of how people change: Applications to addictive behaviors. *American Psychologist, 47*, 1102–1114.  
doi:10.1037/0003-066x.47.9.1102

- Schommer, M. A. (1994). Synthesising epistemological belief of research: Tentative understandings and provocative confusions. *Educational Psychology Review*, 6, 293–319. doi:10.1007/BF02213418
- Schön, D. (1983). *The reflective practitioner: How professionals think in action*. Aldershot, UK: Ashgate.
- Schön, D. (1987). *Educating the reflective practitioner*. San Francisco: Jossey-Bass.
- Stoszowski, J., & Collins, D. (2012). Communities of practice, social learning and networks: Exploiting the social side of coach development. *Sport, Education and Society*, 19, 773–788. doi:10.1080/13573322.2012.692671
- Taylor, W. G., & Collins, L. (2016). Jack Mezirow: Transformative learning in coaching. In L. Nelson, R. Groom, & P. Potrac (Eds.), *Learning in sports coaching: Theory and application* (pp. 150–160). Abingdon: Routledge.
- Vickers, J. (2007). *Perception, cognition, and decision training: The quiet eye in action*. Champaign, IL: Human Kinetics.
- Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.
- Winter, S., & Collins, D. (2015). Why do we do, what we do? *Journal of Applied Sport Psychology*, 27, 35–51. doi:10.1080/10413200.2014.941511
- Yarritu, I., Matute, H., & Luque, D. (2015). The dark side of cognitive illusions: When an illusory belief interferes with the acquisition of evidence-based knowledge. *British Journal of Psychology*, 106, 597–608. doi:10.1111/bjop.12119