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6 **The Illusion of Competency versus the Desirability of Expertise: Seeking a Common**
7 **Standard for Support Professions in Sport**

8

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1 **Key Points**

- 2 1. The paper examines limitations in the commonly applied competency method of
3 evaluation for support professions and promotes an alternative, expertise-focused
4 approach.
- 5 2. The expertise approach goes beyond the use of competency-based systems, and even
6 the definitions of competence provided in this paper, to evaluate and facilitate
7 capacities for more elaborative and adaptive thinking, judgment and growth.
- 8 3. Bodies responsible for professional development and evaluation need to lead a long
9 overdue, widespread shift from competency-driven to expert practice across the
10 spectrum of science and coaching in sport, reflecting the situation already common in
11 medicine.

12

13 **Abstract**

14 In this paper we examine and challenge the competency-based models which currently
15 dominate accreditation and development systems in sport support disciplines, largely the
16 sciences and coaching. Through consideration of exemplar shortcomings, the limitations of
17 competency-based systems are presented as failing to cater for the complexity of decision
18 making and need for proactive experimentation essential to effective practice. To provide a
19 better fit with the challenges of the various disciplines in their work with performers, an
20 alternative approach is presented which focuses on the promotion, evaluation and elaboration
21 of expertise. Such an approach resonates with important characteristics of professions, whilst
22 also providing for the essential ‘shades of grey’ inherent in work with human participants.
23 Key differences between the approaches are considered through exemplars of evaluation
24 processes. The expertise-focused method, although inherently more complex, is seen as
25 offering a less ambiguous and more positive route, both through more accurate representation

1 of essential professional competence and through facilitation of future growth in proficiency
2 and evolution of expertise in practice. Examples from the literature are also presented,
3 offering further support for the practicalities of this approach.

4

1 **1 Introduction**

2 As support professions in sport science and medicine evolve, two distinct lines of
3 accreditation and consequent development have emerged. The first, built around evaluation
4 against a prescribed list of competencies, have become standard features of many
5 accreditation pathways in the sciences [1] and the core support role of coaching [2]. While
6 undeniably necessary and important however, higher level proficiency, or the development of
7 professional expertise, requires more than just the demonstration of inherently limited
8 prescribed competencies [3]. Perhaps as a consequence, a second and more expertise-based
9 system of training and accreditation has developed, led largely by the medical professions.
10 Somewhat confusingly, this approach is often referred to as the evaluation of competence; we
11 will return to examine the essential differences between these two apparently identical terms
12 in Section 2 of this paper. Expressly, however, and extending beyond the general response to
13 general challenge patterning of competency-based models, this expertise/competence focus is
14 grounded in the assumption that a multiplicity of solutions often exist for particular problems
15 and that optimum solutions often require specific or even idiosyncratic blends [4-6]. Given
16 that professional bodies must develop practitioners for complex and multifaceted
17 environments, we argue that an elevation in the standards and reputation of sport science and
18 coaching, as well as the efficacy of their interactions, requires a greater emphasis on expertise
19 than currently afforded.

20 Indeed, while acquisition of specific competencies may be a valuable building block
21 for initial development (providing the basic tools of the trade for example), discrepancies
22 across professions with regards to their competency or expertise/competence orientation
23 during final accreditation/continued assessment phases also pose particular issues for multi-
24 and inter-disciplinary support provision. More explicitly, the use of these different
25 approaches is, we suggest, illogical, suboptimal and perhaps even divisive. To clarify, it is

1 strange for parallel professions, working in the same domain and in increasingly closer
2 interdisciplinary harmony, to be trained and evaluated in such contrasting ways. A simple
3 example of this is medics being evaluated by expertise/competence, including the appropriate
4 weighting of factors to meet specific but diverse challenges, as opposed to coaches who are
5 usually evaluated on behavioral competency alone [5-7]. Second, with two almost opposite
6 styles, one has to be sub-optimal to the other. And third, we see it divisive (at least
7 potentially) in that these two approaches make clearly contrasting statements about the nature
8 of professionalism and the ways in which the professions should work. In simple terms,
9 practice is either grounded in judgment and decision or reproduction of (often prescribed)
10 behavior. Accordingly, it seems that reconsideration on this matter is overdue.

11 In undertaking such evaluation, we suggest that competency-based approaches are not
12 only inherently limited but also unsuitable for facilitating high level proficiency in the sports
13 science, medicine, and coaching professions. This contention is not new. In sport
14 psychology for example, and despite ongoing support for competency-based approaches to
15 training and continued professional development [8], it has been acknowledged that learning
16 from ‘recipe-like’ experiences of expert practitioners (i.e., *what* they did) is limited unless
17 considered in tandem with *why* they did it [9]. In similar fashion, Jones and Wallace [10]
18 have highlighted how the ambiguities inherent in coaching require a much broader *adaptive*
19 *expertise* [11] if one is to effectively deal with the role’s regular challenges. In strength and
20 conditioning, an increased recognition of the need for individualized [12] and evidence-based
21 [13] prescription is also reflective of this thrust. Unfortunately, despite this growing
22 awareness, the positive examples set by medical disciplines [e.g. 4, 6], and even explicit and
23 detailed coverage of what competence assessment should look like [14: developed in
24 psychology but, so far in our experience, not followed by sport psychology organizations)
25 competency models nonetheless remain an industry standard.

1 Our case for expertise - rather than competency-based approaches in supporting and
2 guiding sports disciplines along pathways to expert performance is made in four parts.
3 Firstly, we offer some clarification between the various terms which serve to obfuscate
4 debate. Secondly, we consider some limitations of competency-based models. Thirdly, we
5 examine some exemplars of how expertise-based models can work to comparatively greater
6 effect. Finally, we conclude by suggesting some simple steps for action, together with a call
7 for this issue to be placed at the forefront of organizational debate over professional
8 accreditation and development systems.

9 **2 Competency, Competence, Expertise and Professionalism**

10 While the competency approach retains popularity across many interpersonal settings,
11 the inherent difficulty, as either a specific or generic term, is illustrated by the tautological
12 definition of Dooley et al.: “competency based behavioral anchors are defined as
13 performance capabilities needed to demonstrate knowledge, skill and ability (competency)
14 acquisition” [15]. According to this view, and problematically, competency is therefore a
15 subdivision of itself. Unsurprisingly, competency has therefore been described as a “fuzzy
16 concept” [16] and the few attempts to establish a coherent terminology appear to have had
17 little impact [17]. As such, typical competencies such as “arrives before the start of each
18 session in order to plan and prepare appropriately” offer apparent clarity but leave much
19 unanswered (e.g. what needs to be planned and what *is* appropriate?).

20 In contrast to competency, competence is more positively defined by Epstein and
21 Hundert (in relation to medical physicians) as “the habitual and judicious use of
22 communication, knowledge, technical skills, clinical reasoning, emotions, values, and
23 reflection in daily practice for the benefit of the individual and community being served” [18,
24 p. 227]. Crucial for our argument, these authors, Kaslow et al. [14], and Schön [19] see
25 professional competence as more than the acquisition and application of knowledge to simple

1 problems. Rather, “it is defined by the ability to solve ambiguous problems, tolerate
2 uncertainty, and make decisions with limited information” [18, p. 227]. This definition, we
3 suggest, resonates more closely with the type of problem likely to be met by professionals
4 across the performance sport environment. Additionally, and although Epstein and Hundert
5 still class the “demonstration of [more than] isolated competencies” as a “competence” [18,
6 p. 227], it also fits within the construct of *expertise*, which has been defined in terms of: a)
7 cognitive development (progression from superficial and literal understanding to articulated,
8 conceptual, and principled understanding); b) knowledge structure (more sophisticated
9 knowledge organization, and more elaborate mental models); and c) reasoning processes
10 (enhanced perceptual skill, more case-based reasoning, and greater reasoning flexibility) [20].
11 Finally, it also matches Carr’s fifth distinguishing characteristic of a profession; namely, that
12 which requires “a high degree of individual autonomy – independence of judgment – for
13 professional practice” [21, p. 34].

14 In summarizing this overview of definitions, we would highlight four issues which
15 seem to stand out as requirements for professional practice additional to subject knowledge;
16 namely, judgment, elaboration, flexibility and decision making. We will return to these
17 factors later. However, they should be borne in mind as criteria against which any standard
18 of professional practice may be measured. The key differences between competence and
19 competency are, hopefully, demonstrated as a lot more than mere semantics.

20 **3 Competency-Based Problems**

21 **3.1 Apparent Comprehensiveness Masks Over-Simplification**

22 As a core feature of competency-based models, the number of statements which
23 comprise a particular ability suggests a careful and, at first sight, creditable attention to detail
24 from those who oversee professional training and evaluation. With more careful
25 consideration, however, this must be questioned. For example, at the time of writing the

1 British General Medical Council set 16 “outcomes” which must be realized in the 5500 hours
2 of training required for doctors [22]. Acknowledging that single, correct solutions can rarely
3 be prescribed – as practitioners cope with uncertainty and dynamic challenge in complex and
4 individual ways [4] – training and evaluation in this setting is, therefore, inherently thematic
5 [5, 6]. In contrast, qualification as a UK *Level 1* sports coach (capable only of assisting other
6 coaches) requires development and assessment of some 18 “competency units”, each with
7 numerous sub-divisions, in a 33 hour period [7]. Allowing for the various sub-components,
8 and diverging from medicine’s use of broader criteria to enable adaptive and creative
9 problem solvers, those that aspire to this coaching award (clearly of a much lower level than
10 medical training) must therefore satisfy a set of 123 learning criteria! Despite the complexity
11 faced, such lists of standalone abilities and activities are also found in many other support
12 discipline qualifications [1, 23, 24].

13 To emphasize our point, addressing such an extensive range of attributes is both
14 practically impossible and epistemologically questionable in that practitioners are being
15 trained and assessed in a way which is at odds with their operational environment. Thus,
16 competency-based models provide an apparently comprehensive yet ultimately deceptive
17 portrayal of practice requirements. The completeness of the competency-based descriptor is
18 clearly compromised by the volume of items covered, making it virtually impossible to
19 address all facets. As a consequence, examiners must opt to focus more on some criteria than
20 others and, paradoxically, thereby defy the logic on which the competency approach is
21 founded. By contrast, in an expertise-based approach, the differential weighting of factors
22 (some are clearly more important than others, and this differential co-varies with time) is
23 made explicit and overtly situated as a part of the evaluation, if only because fewer factors
24 are completed in more comprehensive detail [14; also see our worked example in section

1 4.2]. This approach, we suggest, is much closer to the real world challenges inherent in
2 interpersonal tasks.

3 **3.2 The Problems of Relevance, Balance and Complexity**

4 Contrary to optimally impactful real world practice, the key competencies currently
5 espoused by many professions can be viewed as context-independent, generic, and apparently
6 applicable across different settings, occupations, and tasks [1, 23, 24]. If, as Bolden and
7 Gosling [25] suggest, competencies are derived from practical job analyses, then they are
8 primarily functional, simplistic, and possess little applicability to the development and
9 training of professionals. To an extent, therefore, job competencies are limited to the
10 expression of what is measurable, tangible, and technical.

11 As such, one critical issue is *relevance*; in short, there is a fundamental lack of fit
12 between the basic premise of the competency approach and its practical applicability to
13 interpersonal settings in general, and even less to specific sport environments. For example,
14 how does the notion of competency relate to the moral, emotional, and relational dimensions
15 of client/patient/performer interaction? The problem, we argue, resides with the competency
16 approach's preoccupation with a set of job performance measures which (presumably)
17 represent the desired standard across environments. Thus, even when a Likert scale is
18 employed for measurement, the use of competencies implies that there is a right and wrong
19 way to perform; obviously a situation which is sometimes correct but usually not so in the
20 more complex challenges which typify the interpersonal elements of coaching and science
21 support [26, 27]. In effect, the emphasis on whether or not an individual is competent
22 patently neglects the essential subtleties of executional decision making, and emphasis on the
23 'what' instead of the 'why' represents satisfaction of a minimum rather than the far more
24 desirable expert standard.

1 Additionally, competencies are commonly concerned with an extremely broad but
2 undifferentiated range of skills. In the sport-support profession of psychology, for example,
3 the application of ethical principles, conducting research, delivering presentations and (of
4 greatest relevance) planning consultancy are all presented as equally weighted competencies
5 [23]. Furthermore, as these *whats* are often presented as equivalent, both in importance and
6 complexity, the practitioner's ability to monitor fundamental client/patient/performer safety
7 or comfort is presented with the same weighting as his/her ability to form effective
8 relationships, discern and design optimum actions/interventions for each situation, or even
9 make long term, interdisciplinary plans with a broad range of support staff [26]. Such issues
10 exemplify the challenges of *balance* which are left unaddressed by the competency approach.

11 Finally, competency frameworks are also somewhat limited in their sensitivity to and
12 management of *complexity*. In coaching, for instance, it could be argued that key activities
13 like safety checks and basic planning fit well with competency criteria. When applied to a
14 more esoteric and crucial responsibility, however, this framework is far less pertinent. For
15 example, when managing change in high level coaching the landscape is characterized by a
16 level of uncertainty, unpredictability, and discretion which runs counter to the essence of the
17 competency model (i.e., to separate and silo work roles rather than to represent them
18 holistically). Arguably, the notion of competency represents only a fraction of the
19 complexity. On this premise, the acceptance of competencies as a basis for evaluating
20 complex performance seems particularly problematic and misplaced [28].

21 **3.3 Inherently Limited Applications for Optimizing Performance**

22 Despite their prevalence across a host of domains, Mintzberg [29] has identified that
23 “acquiring various competencies does not necessarily make an individual competent”.
24 Indeed, simply exhibiting a competency in the test environment, or meeting a baseline
25 requirement, does not guarantee that the competency will be used appropriately in other

1 settings; nor does the absence of a competency in a test make one incompetent unless *reasons*
2 for its omission are considered. Recognizing that the measurement-driven approach also fails
3 to consider the appropriateness of using a particular behavior for a particular context, such
4 data are unlikely to provide an accurate picture of a professional's performance, or provide
5 much in the way of facilitating optimally critical and informative feedback. For instance, the
6 overuse of a normally beneficial competency can become a weakness in certain
7 circumstances, as studies on organization derailment have demonstrated [30, 31]. This is
8 acknowledged in some competency frameworks, although such approaches would seem to
9 reflect a move towards the more reason-focused, expertise approach described in section 4 of
10 this paper.

11 Furthermore, and problematically, the idea of a competency-based performance
12 measure clearly undermines its applicability for formative purposes [14]. For example, if
13 individuals feel that they are being assessed, this can impact significantly on the criticality
14 and openness required for a developmental process to work. Furthermore, the 'experimenter
15 mentality' [32] requires a tolerance for the drop in performance which often results from
16 engaging in development-focused activities. In simple terms, competencies are commonly
17 too gross to account for the important nuances or the shades of grey which are often the
18 subtle tipping points between success and failure in high level sport [33, 34].

19 **4 Advantages and Exemplars of Expertise-Based Solutions**

20 **4.1 What Does it Take to Get Better? Pursuing a Developmental Focus**

21 Perhaps if competency frameworks were used to suggest what individuals 'could do',
22 rather than what they 'should do' (i.e. proficiency scaling) this would offer a productive way
23 forward. In this manner, switching the focus toward exploring the factors affecting
24 progression, including the ability to learn, reflect and adapt [35], would facilitate the
25 evolution of new variants and mental models on professional service delivery [36]. Focused

1 on individual and organizational needs, competencies could then be deployed as hypothesis-
2 generating (rather than hypothesis-testing) tools to drive development- (rather than
3 assessment-) oriented conversations [37]. This fits well with the view of practitioner as
4 experimenter [32] and would lead to even greater benefit from the skills of reflective practice
5 which, perhaps inappropriately, currently coexist with competency models: culminating in a
6 problematic mix of shades of grey with black and white! Unfortunately, while professional
7 adaptability and judgment require such an experimental approach, this isn't an inherent
8 feature of competency evaluations. In short, the 'it depends on the context' outcomes of
9 carefully considered critical reflection are often inherently at odds with the 'do it this way to
10 pass' specificity of competency assessments; at least, how they are currently employed in
11 many sports settings.

12 In fact, the potential to focus on features of effective performance *evolution*
13 (evaluating ongoing growth rather than just current competence) is already well established in
14 sport, with the characteristics of both the developing individual [38, 39] and the optimum
15 development environment [40, 41] having been established, applied, and successfully
16 exploited. In the support practitioner domain, it is interesting to see that coaches think
17 similar features apply to their own profession; indeed, an orientation to which they might
18 aspire [42]. As such, the 'skills to become more expert' are already apparent and tacitly
19 accepted, offering an important potential for growth [42].

20 **4.2 An Exemplar of the Expertise Approach – A focus on Decision Making**

21 As eloquently stated by Smith, Shanteau, and Johnson [43, p. 4] "academic research
22 generally and our society particularly have largely neglected the fact that sound judgment and
23 decision making are the crux of many professions. By understanding and communicating
24 what professional decision makers do and how they do it well, we make valuable
25 contributions both to our field and to the professional community at large." Of course, a

1 much wider range would be used in an expertise approach; for example, the development of
2 more self-driven, autonomous approaches to development. For the present, however, we
3 outline the understanding and development of declarative reasoning as an exemplar focus
4 which may effectively address our identified four part curriculum of judgment, elaboration,
5 flexibility and decision making. It is in this vein that we see the scenario-based training and
6 formative testing of expertise in support professionals to offer an opportunity for: facilitating
7 expert learning; enabling practitioners to form more complete mental models of practice;
8 providing a “cognitive apprenticeship” model which makes thinking “visible” to peers and
9 supervisees [44]; and establishing “cognitive authenticity” [45]. Significantly, fewer factors
10 are considered but in a lot more detail, with the underpinning rationale of decisions and
11 choices explicitly explored. With regard to the weighting issues highlighted earlier, only key
12 factors are considered, whilst other, less important aspects are examined only if they impact
13 on these core issues.

14 Given that time on the job alone is insufficient for developing expertise [46], teaching
15 the *structures* of ‘ideal’ thinking [47], rather than ideal solutions, holds great promise for
16 professional training and evaluation. Once again, there is already a good start in this
17 direction; for example, Kahneman and Klein’s recent work on the blending of systematic
18 analysis and skilled intuition [48]. Teaching and assessing the skills of professional judgment
19 also offers a structure to the more widespread (although often sub-optimally applied) ideas of
20 Schön on critical thinking [32]. Significantly, this approach offers a means to enhance
21 aspects of expertise which seemingly play no role in the existing evaluative structures of
22 competency. Moreover, the existence of a strong literature base [49] means that application
23 of expertise would be more strongly grounded than the competency based models which
24 represent the pillars of effective practice (at least as it is currently defined).

1 As a means of briefly demonstrating the differences underpinning the approaches
2 considered, consider the evaluation process to be followed with a coach under a competency
3 or an expertise focus. In the former case, the evaluator would look for behavioral or verbal
4 examples of satisfying the criteria; typical examples would include “identify the types of
5 information needed to plan an activity within sessions” or, from a higher level award,
6 “explain how to structure language during instruction that is appropriate to participants”. In
7 contrast, an expertise focused evaluation would consider the processes and meta-processes
8 associated with these target behaviors. Exploring the why of a behavior, the reasoning
9 underpinning its selection and use, candidates would also be asked about alternatives;
10 namely, what other options were considered, why they were rejected, and what would need to
11 change for a different option to be taken [50]. Through this focus on decision making,
12 training routes would therefore help to develop the aforementioned thinking structures,
13 adaptability, and critical analysis that will allow practitioners to prosper in their dynamic and
14 complex (and eventually unsupervised) applied environments.

15 Furthermore, specific reference to underpinning principles (for example, what jargon
16 terms were and were not essential and why, or the need for declarative knowledge in certain
17 kinds of learner) would be required so further increasing the candidate’s ability to make
18 judgments and adapt in different situations to that presented as the test environment [4, 27].
19 Such approaches would seem essential if trainees are to go beyond clear *knowledge that X*
20 *means Y* towards the more subtle blending and elaboration necessary for professional practice
21 [51]. As another example, we would highlight the use of validated measures of reflective
22 thinking, once again using a range of simulations, which are highly predictive of effective
23 clinical thinking and decision making later in training [52].

24 **5 Conclusion**

1 In concluding this brief overview, we should stress that not all practitioners who
2 utilize a competency-based approach are guilty of the problems identified in this paper. As
3 with so many prescribed methods these approaches are, as we have observed, used solely for
4 guidance while the assessment process encourages broader and extra-evaluation debate so as
5 to offer formative direction to the candidate. It is interesting that such a *reflective coaching*
6 approach has sometimes been criticized as ‘going beyond’ the process. Accordingly, in
7 support of more effective professional practice and skillful practitioners across the board, we
8 would hope that an expertise based approach would be encouraged as more of a core modus
9 operandi rather than infrequent and unregulated extra.

10 Indeed, our message is that competency approaches are just too simplistic for all but
11 the most basic of roles and responsibilities apparent in the sports world. As an alternative,
12 the expertise approach seems to fit better with the characteristics of professionalism, going
13 even beyond the definition of competence (as distinguished throughout this paper from
14 competency) to evaluate and facilitate capacities for more elaborative and adaptive thinking,
15 judgment and growth. Of course, this is inherently more complex (matching the situations it
16 is designed to test for) but the complexities are both lower on difficulty and higher on reward
17 than staying with the existing, albeit well established system of competency-based
18 evaluation.

19 Finally, we should stress that the differences between competence and competency
20 evaluations are far from simple semantics. The first has a well-grounded and theoretically
21 consistent basis while the second seems to have emerged from administration-heavy
22 assessment systems (see, for example, the criteria applied by the UK Coaching Certificate,
23 BASES sport science accreditation, or SESNZ sport science accreditation) [1, 2, 53], with
24 little or no theoretical or empirical support.

1 Accordingly, we hope that this paper has presented a strong case for change. From a
2 sports perspective, expertise and professional judgment and decision making have already
3 been well examined in sport psychology [54, 55], coaching [26], and strength and
4 conditioning [56] and therefore provide a strong base from which these approaches can be
5 exploited. There are also, notably, training and evaluation methods already available in the
6 public domain [27]. As a consequence, we hope that bodies responsible for professional
7 development and evaluation recognize and harness this evidence-base and lead the long
8 overdue, widespread shift from competency-driven to expert practice across the spectrum of
9 science, medicine and coaching in sport.

10

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14 **References**

- 15 1. British Association of Sport and Exercise Sciences. Supervised experience
16 competency profile. 2013 [online]. Available from URL: <http://www.bases.org.uk/SE-Application-Documents-and-Guidelines> [Accessed 2013 Nov 11]
- 17 2. UKCC Level 1 Guide. 2013 [online]. Available from URL:
18 <http://www.sportscoachuk.org/sites/default/files/UKCC-Level-Guide.pdf> [Accessed
19 2013 Nov 12]
- 20 3. Hoffman RR, Andrews DH, Feltovich PJ. What is “accelerated learning”? Cogn
21 Technol. 2012;17(1):7–10.
- 22 4. Girot EA. Graduate nurses: Critical thinkers or better decision makers? J Adv Nurs.
23 2000;31:288–97.
- 24

- 1 5. van der Vleuten C, Schuwirth L. Assessing professional competence: from methods to
2 programmes. *Med Educ.* 2005;39:309-17.
- 3 6. General Medical Council. Tomorrow's Doctors. 2009 [online]. Available from URL:
4 http://www.gmc-uk.org/TomorrowsDoctors_2009.pdf_39260971.pdf [Accessed 2013
5 Oct 22]
- 6 7. Sports Coach UK. Level 1 generic mapping template. Internal planning document
7 applied to UK Coaching awards. 2011.
- 8 8. Fletcher D, Maher J. Toward a competency-based understanding of the training and
9 development of applied sport psychologists. *Sport Exercise Perform Psychol.* 2013;2:
10 265-80.
- 11 9. Martindale A, Collins D. But *why* does what works work? A response to Fifer,
12 Henschen, Gould, and Ravizza. *Sport Psychol.* 2010;24:113-16.
- 13 10. Jones RL, Wallace M. Another bad day at the training ground: coping with ambiguity
14 in the coaching context. *Sport Educ Soc.* 2005;10(1):119-34.
- 15 11. Hatano G, Inagaki K. Two courses of expertise. In: Stevenson H, Azuma H, Hakuta
16 K, editors. *Child development and education in Japan.* New York: WH Freeman;
17 1986. pp. 262-72.
- 18 12. Kiely J. Planning for physical performance: the individual perspective. In: Collins D,
19 Button A, Richards H, editors. *Performance psychology: A practitioner's guide.*
20 Oxford: Elsevier; 2011. pp. 139-60.
- 21 13. English K, Amonette W, Graham M, et al. What is "evidence-based" strength and
22 conditioning? *Strength Cond J.* 2012;34(3):19-24.
- 23 14. Kaslow NJ, Bebeau MJ, Lichtenberg JW, et al. Guiding principles and
24 recommendations for the assessment of competence. *Prof Psychol Res Pr.* 2007;
25 38(5):441-451.

- 1 15. Dooley KE, Lindner JR, Dooley LM, et al. Behaviorally anchored competencies:
2 evaluation tool for training via distance. *Hum Resour Dev Int.* 2004;7(3):315-32.
- 3 16. Boon K, van der Klink M. Competencies: the triumph of a fuzzy concept. Proceedings
4 of the Academy of Human Resource Development Annual Conference: 2002 Feb 27-
5 Mar 3;1:327-34 Honolulu HA.
- 6 17. Winterton J, Delamare-Le Deist, F, Stringfellow E, research report for CEDEFOP
7 (European Centre for the Development of Vocational Training). Typology of
8 knowledge, skills a competencies: Clarification of the concept and prototype. 2005.
- 9 18. Epstein RM, Hundert EM. Defining and assessing professional competence. *J Am*
10 *Med Assoc.* 2002;287(2):226-35.
- 11 19. Schön DA. *The reflective practitioner: how professionals think in action.* New York:
12 Basic Books;1983.
- 13 20. Hoffman RR. How can expertise be defined? Implications of research from cognitive
14 psychology. In: Williams R, Faulkner W, Fleck J, editors. *Exploring expertise.* New
15 York: Macmillan; 1998. pp. 81-100.
- 16 21. Carr D. Professional education and professional ethics. *J Appl Philos.* 1999;16(1):33-
17 46.
- 18 22. General Medical Council. Assessment in undergraduate medical education: advice
19 supplementary to *Tomorrow's Doctors* (2009). 2009 [online]. Available from URL:
20 http://www.gmc-uk.org/Assessment_in_undergraduate_web.pdf_38514111.pdf
21 [Accessed 2013 Oct 22]
- 22 23. British Psychological Society. Key role competency checklist grid. 2013 [online].
23 Available from URL: [http://www.bps.org.uk/careers-education-training/society-
24 qualifications/sport-exercise-psychology/current-candidates/curre](http://www.bps.org.uk/careers-education-training/society-qualifications/sport-exercise-psychology/current-candidates/curre) [Accessed 2013 Oct
25 22]

- 1 24. Sport and Exercise Science New Zealand. SESNZ accreditation criteria and
2 competencies. 2014 [online]. Available from URL:
3 <http://www.sesnz.org.nz/Accreditation/> [Accessed 2014 April 29]
- 4 25. Bolden R, Gosling J. Leadership competencies: time to change the tune. *Leadersh.*
5 2006;2:147-63.
- 6 26. Abraham A, Collins D. Taking the next step: ways forward for coaching science.
7 *Quest.* 2011;63:366-84.
- 8 27. Martindale A, Collins D. The development of professional judgment and decision
9 making expertise in applied sport psychology. *Sport Psychol.* 2013; 27: 390-398.
- 10 28. Carroll B, Levy L, Richmond D. Leadership as practice: challenging the competency
11 paradigm. *Leadersh.* 2008;4:363-78.
- 12 29. Mintzberg H. *Managers not MBAs: a hard look at the soft practice of managing and*
13 *management development.* London: FT Prentice-Hall; 2004.
- 14 30. Stein, M. When does narcissistic leadership become problematic? Dick Fauld at
15 Lehman Brothers. *J Manag Inq.* 2013;22:282-93.
- 16 31. Cooper D. *Leadership risk: a guide for private equity and strategic investors.*
17 Hoboken, NJ: Wiley; 2010.
- 18 32. Schön D. *Educating the reflective practitioner.* San Francisco: Jossey-Bass; 1987.
- 19 33. Collins D, Trower J, Cruickshank A. Coaching high performance athletes and the
20 high performance team. In: De Bosscher V, Sotiriadou P, editors. *Managing high*
21 *performance sport.* Abingdon, Oxon: Routledge; 2012. pp. 205-220.
- 22 34. Collins D, Cruickshank A. Preparing Team GB for London 2012. In: Girginov V,
23 editor. *Handbook of the 2012 London Olympic and Paralympic Games.* London:
24 Routledge; 2012. pp. 114-129.

- 1 35. Knowles Z, Gilbourne D, Cropley B, et al. Reflective practice in the sport and
2 exercise sciences: contemporary issues. Abingdon, UK: Routledge; 2013
- 3 36. Naudhaug O. Human capital in organisations. Oslo: Scandanavian University Press;
4 1993.
- 5 37. Alimo-Metcalfe B, Alban-Metcalfe J. Leadership in public sector organizations. In:
6 Storey J, editor. Leadership in organizations: Current issues and key trends. Milton
7 Park: Routledge; 2004. pp. 173-202.
- 8 38. MacNamara Á, Button A, Collins D. The role of psychological characteristics in
9 facilitating the pathway to elite performance. Part 1: identifying mental skills and
10 behaviours. *Sport Psychol.* 2010;24:52-73.
- 11 39. MacNamara Á, Button A, Collins D. The role of psychological characteristics in
12 facilitating the pathway to elite performance. Part 2: examining environmental and
13 stage related differences in skills and behaviours. *Sport Psychol.* 2010;24:74-96.
- 14 40. Martindale, RJJ, Collins D, Abraham A. Effective talent development: the elite coach
15 perspective within UK sport. *J Appl Sport Psychol.* 2007;19(2):187-206.
- 16 41. Martindale, RJJ, Collins D, Douglas C, et al. Examining the ecological validity of the
17 talent development environment questionnaire. *J Sports Sci.* 2012;
18 doi:10.1080/02640414.2012.718443
- 19 42. Stozkowski J, Collins D. Communities of practice, social learning and networks:
20 exploiting the social side of coach development. *Sport, Educ Soc.* 2012;i-first:1-16.
- 21 43. Smith K, Shanteau J, Johnson P. Psychological investigations of competence in
22 decision making. Cambridge: Cambridge University Press; 2004.
- 23 44. Collins A, Brown SJ, Holum A. Cognitive apprenticeship: making thinking visible.
24 *Am Educ.* 1991;6(11):38-46.

- 1 45. Ross KG, Pierce LG. Cognitive engineering of training for adaptive battlefield
2 thinking. Proceedings of the Human Factors and Ergonomics Society Annual
3 Meeting: 2000 July; 44(11):410-413 Santa Monica, CA
- 4 46. Ericsson KA. Development of professional expertise. Cambridge: Cambridge
5 University Press; 2009.
- 6 47. Nutall G. Learning how to learn: The evolution of students' minds through the social
7 processes and culture of the classroom. Intern J Educ Res. 1999;31(3):139-256.
- 8 48. Kahneman D, Klein G. Conditions for intuitive expertise: a failure to disagree. Am
9 Psychol. 2009;64(6):515-26.
- 10 49. Yates JF, Tschirhart MD. Decision-making expertise. In: Ericsson KA, Charness N,
11 Hoffman RR, Foltovich PJ, editors. The Cambridge handbook of expertise and expert
12 performance. Cambridge: Cambridge University Press; 2006. pp. 421-38.
- 13 50. Collins L, Collins D. Integration of professional judgment and decision making in
14 high level adventure sports coaching practice. J Sports Sci. In press.
- 15 51. Kassebaum DG, Eaglen RH. Shortcomings in the evaluation of students' clinical
16 skills and behaviours in medical school. Acad Med. 1999;74:842-848.
- 17 52. Braillovsky C, Charlin B, Beausoleill, et al. Measurement of clinical reflective
18 capacity early in training as a predictor of clinical reasoning performance at the end of
19 residency: an experimental study on the script concordance test. Med Educ.
20 2001;35:430-436
- 21 53. Sport and Exercise Science New Zealand. SESNZ accreditation criteria and
22 competencies. 2014 [online]. Available from URL:
23 <http://www.sesnz.org.nz/Accreditation/> [Accessed 2014 April 29]
- 24 54. Martindale A, Collins D. Professional judgment and decision making: The role of
25 intention for impact. Sport Psychol. 2005;19(3):303-17.

- 1 55. Martindale A, Collins D. Enhancing the evaluation of effectiveness with professional
- 2 judgment and decision making. *Sport Psychol.* 2007; 21(4):458–74.
- 3 56. Collins D, Moody J. Role and competency for the S & C Coach. In: Moody J, editor.
- 4 The UKSCA handbook of strength and conditioning. In press.