1   The Coaching Schematic: Validation Through Expert Coach Consensus

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3   Running Head: Validation of The Coaching Schematic

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9   Abstract

10   Current research in coaching development infers that coaching is predominantly a

11   decision making process. The same and other research is not, however, informing the

12   coaching development process due to a lack of a big picture approach. Consequently,

13   there is a need for a model of coaching. In this paper we offer such a model in the form

14   of a schematic that reflects the coaching process from both a content and information-

15   processing stance. To assess the validity of the schematic 16 expert coaches were

16   interviewed to elicit a complete description of their coaching process. The coaches were

17   then shown a copy of the schematic and asked to comment on its design and content

18   with respect to its accuracy in reflecting their coaching process. Following analysis of

19   the interviews 6 general categories emerged; Roles, Goals, Typical Actions, Required

20   Knowledge, Support for the Schematic and Factors Influencing Development. The first

21   four categories clearly displayed an implicit support for the schematic. Furthermore, all

22   coaches offered explicit support for the schematic. Such a level of support confirmed

23   that the schematic was valid and could form the basis of focused interventions in

24   coaching development.

25

Introduction

Examination of recent research in the area of coaching practice and development reveals a position which directly (e.g., Abraham and Collins, 1998, Cushion et al., 2003, Lyle, 2002, Strean et al., 1997) or indirectly (e.g., Potrac et al., 2000, Côté et al., 1995b) infers that coaching is, fundamentally, a decision making process. However, while such a position has been reached, the same and other related research has yet to effectively inform coaching development. In short, work to date has been specific but too prescriptive (e.g., Krane et al., 1991), holistic but overly complex (e.g., Lyle, 2002, Lyle, 1999) or holistic but lacking a mechanism for development (e.g., Côté et al., 1995b, Côté et al., 1995a, Côté and Salmela, 1996). It is perhaps for this reason that current coaching development initiatives in America, Canada and the UK make no reference to any big picture plan or model in their development approaches. Indeed, it could be argued that their development programmes are somewhat eclectic in their approach to programme design (Potrac et al., 2000). In fact, coaching associations in both the UK and Canada (Canadian Coaching Association, 2005, SportscoachUK, 2004) are currently developing coach development programs using a competency based approach. While theoretical research is available that highlights the pros and cons of this approach from a generic perspective (Thomson, 2000), we are not aware of any empirical research in the area of coaching that would establish this approach as being optimal. Perhaps the current situation is best summed up by Vickers et al. (2004) who have suggested that "a model of coaching is required that has at its heart sound theoretical and research foundations, which are applicable to all sports, coaches and age groups" (p. 105). While we certainly agree with this statement we would suggest that, in fact, a schematic that is transferable across multiple situations and contexts through reference to relevant knowledge and information processing procedures is more

51 appropriate. Furthermore, such a schematic can inform coaching development and

52 practice more effectively as it should reflect the whole coaching process. It is worth

53 noting here though that the typical coaching process of 'plan, implement and review'

54 (Smith et al., 1997) maybe a little too simplistic to really reflect the dynamic nature of

55 coaching practice and development (NB. this statement does not preclude the use of this

56 idea as a starting point for novice coaches). We would argue that a schematic should

57 have more to do with Kolb's (1984) four stage experiential learning process cycle;

58 concrete experience, reflective observation, abstract conceptualisation, active

59 experimentation, since this process is more reflective of a dynamic and ongoing practice

60 and development cycle (Thomson, 2000). Consequently, the ultimate aim of this study

61 was to validate a coaching schematic that, through its design and content, would

62 accurately reflect the coaching process in its entirety. However, prior to outlining the

63 development and testing of the schematic there are, first, a number of philosophical and

64 theoretical issues worthy of consideration.

65 **Why Do We Need Schematics and What Characterizes a Good One?**

66 In contrast to the current situation in coaching, research examining practice and

67 development in similar but more established paradigms such as teaching reveal simple

68 conceptual models that characterize the qualities required in an effective schematic. In

69 short, these models have met a crucial goal in that they summarized current theoretical,

70 empirical and practical positions (Sternberg, 2003) in order to efficiently and effectively

71 inform the development of teaching and educational practice (e.g., Entwistle et al.,

72 2000, Berliner, 1991). Furthermore, research examining the definition of a profession[1]

73 would both support and add to these characteristics. For example, Carr (1999) states that

74 a defining characteristic of a professional practitioner is someone who has theoretically

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[1] In the UK, UK Sport developed a goal for coaching to be viewed as a profession by 2012. Similar developments are already underway in Australia and Canada.

75   as well as practically grounded expertise, allowing a high degree of individual

76   autonomy and independence of judgement resulting in effective practice. This, in turn,

77   identifies the need for a schematic to reflect a judgement process. Biggs and Collis

78   (1982) identify that quality judgement involves making multiple connections within a

79   knowledge domain (displayed by the arrows in figure 1). Furthermore Davies (1994),

80   Johnson et al. (1981) and Zeitz and Spoehr (1989) identify that experts refer to a broad

81   range of domains of knowledge when solving of problems. This would suggest that a

82   schematic should reflect an intra and multi/inter disciplinary decision making process

83   within a theoretical and practical framework. Finally a schematic needs to be

84   transferable, that is, a schematic should be applicable irrespective of the situation or

85   context. This may actually be simpler than it sounds. Given that current situations or

86   contexts increase the degrees of freedom (Abraham and Collins, 1998) that in turn affect

87   the way in which goals are achieved, these essentially represent problems for the coach

88   to overcome, e.g. player injury, keeping things fresh in the middle of the season.

89   Therefore, so long as the schematic is broad enough in its approach to allow for

90   judgement to deal with these degrees of freedom it should be transferable.

91   It is through considerations such as these that the need for a schematic becomes

92   essential, we suggest, as a structure for the operationalization and enhancement of the

93   coaching process; in short, unless you know how the process works, how can you

94   optimally develop it? Accordingly, a clear and appropriately simple schematic will

95   offer us the basis for genuine and scientifically supported performance enhancement in

96   coaching. Such ideas led us, in conjunction with other active coach researchers, to

97   summarize current sport science, coaching, educational and cognitive psychology

98   research relevant to coaching development to develop a coach decision-making

99   schematic that maps the knowledge, decision-making, concepts, and resulting

100 behavioural/observable output, requirements of all coaches. In essence, reflecting the

101 whole coaching process. This approach is summarized in Figure 1. While we have little

102 doubt that the schematic is comprehensive in its coverage and that its development is

103 theoretically, empirically, in that its development has referred to empirical research

104 (e.g., Rutt-Leas and Chi, 1993), and intuitively supported and therefore has content

105 validity, it is important for the model, indeed all academic models, to be considered and

106 judged for its ecological validity by 'quality' practitioners (Gilbert and Trudel, 2004a).

107 In pursuing such crucial validation however, there are three important methodological

108 considerations which must be addressed in order to ensure that the approach adopted is

109 appropriate to the stated purpose.

110

111   INSERT FIGURE 1 ABOUT HERE

112

113 **Consideration 1: Matching Schematics to Knowledge Objects**

114   Validating a schematic such as figure 1 is actually quite difficult since it is

115 unlikely that an exact match exists in the minds of expert coaches. The schematic is a

116 necessarily tidy and concise conceptual description of knowledge areas, concepts and

117 performance environments that, we suggest, reflects the coaching process. However,

118 research in parallel environments (e.g. teaching and learning processes in higher

119 education; (Entwistle and Walker, 2000) suggests such concepts are "experientially…

120 much too tidy", and that, when thinking about their behaviour, professionals more

121 usually make use of broader and more global structures known as *Knowledge Object*s

122 (Entwistle and Martin, 1994, Entwistle and Entwistle, 2003). Knowledge objects are

123 said to occur when there has been an integration of a breadth and depth of knowledge

124 that covers multiple related *concepts* and *conceptions* (we will explain the distinction

125 between concepts and conceptions in more depth later). Furthermore, such structures

126 don't underpin thoughts and decisions, but rather represent the mental workspace where

127 thoughts and decisions are made. Importantly, these objects are likely to be

128 idiosyncratic and this has major implications for testing the validity of the schematic.

129 Our argument would be that if the schematic were an accurate reflection of all expert

130 coaches' knowledge objects, the idiosyncrasy should only relate to the storage and

131 retrieval of knowledge as opposed to the broad content and use of the knowledge and

132 concepts identified in the schematic. Given this position and since we are trying to

133 generate (not force!) an agreement from coaches, we will have to guide the retrieval

134 process to the extent that we are, ultimately, going to have to show the coaches the

135 schematic. Both these methodological considerations would mitigate against the use of

136 the grounded theory approach typically employed (at least to date) to generate

137 "academic" models such as Côté et al's (1995b). Obviously we are not going to

138 deliberately lead, but if a "pure" grounded approach was taken we may get so many

139 varying accounts that developing a strong concise model becomes increasingly difficult

140 or even impossible. However, if we get a strong and implicit, "best fit" agreement from

141 expert coaches through demonstrable use of the schematic structures in their decision

142 making, and these coaches then give an explicit "thumbs up" to the schematic, and these

143 coaches come from a representative cross sample of sports, the schematic is supported

144 and a significant step towards forming a structure and basis for coaching development

145 will be taken. In short, we contend that the use of a "grounded then led" approach

146 offers the only practical pathway to validation studies such as the present investigation.

Consideration 2: Concepts and Conceptions: Probing for Knowledge that

Underpins Decision Making

We referred earlier to the existence of concepts and conceptions and the importance of understanding the distinction between the two. Concepts can be defined through the formality of their broad procedural categorizing/scaffolding system, their specific procedural knowledge, and the declarative knowledge which underpins them (Abraham and Collins, 1998, Anderson, 1982). Almost always communicated through structured, academic-style training, concepts are particularly useful in the professional development process since they both short circuit and direct experiential learning. As such, concepts are the goal of our examination of expert coaches, in order to generate a curriculum for coach education.

In contrast, conceptions often represent an internalising of concepts, applied to a particular context that is meaningful to the practitioner. In order to make sense of any factual concepts they possess, and to create meaningful new knowledge in memory, practitioners will look for and reflect on (Cushion et al., 2003, Gilbert and Trudel, 1999, Gilbert and Trudel, 2001, Gilbert and Trudel, In press-b) patterns, orders, links, similarities and conflicts with previous experiences in order to develop a conception or a group of conceptions to help them make sense of delivered material and/or experiences (Entwistle et al., 2000, Kolb, 1984). Such conceptions are generally organized and framed around beliefs or rules about how that conception is implemented in the field (Gilbert and Trudel, 1999). For example, Calderhead (1996) has stated that teachers' conceptions about learning have been shown to focus on two broad beliefs, namely the importance of active involvement and/or the need for an emotionally secure environment in which failure was non threatening. However, if these beliefs are provided "up front" as concepts through an educational process, teachers are both better

172 and more quickly prepared. Furthermore, the declarative knowledge provided with the

173 concept offers a structure to the professionals' subsequent critical reflection, generating

174 a higher quality and more consistent development from ongoing experience (Thomson,

175 2000). Consequently, a conception is produced that is "filing cabinet" like in its

176 organization, allowing for explicit reasoning and decision-making.

177 Unfortunately, formal educational processes such as the one suggested above are

178 comparatively rare, at least in the generation of coaches from whom experts would

179 (currently at any rate) be largely drawn. In the vast majority of coaches, progressing to

180 the level of expert will have involved experience as being the significant contributing

181 factor to the development of the conceptions required to be an expert (Cushion et al.,

182 2003). Accordingly, and as a direct consequence of the lack of explicit concept

183 teaching, conceptions are developed through trial and error and other typical *weak*

184 problem solving methods (Anderson, 1987) leading to tacit knowledge being developed

185 within the conception. The direct knock on effect is that there will be some actions

186 developed and taken because of a tacit decision achieved without any conscious

187 reasoning (Kerr, 1995, Sternberg et al., 1993). Furthermore, other decisions may be

188 based on semi tacit knowledge; that is, so long as there is a meaningful context the

189 practitioner will be able to describe the decision making process and knowledge

190 underpinning an action, or at least this knowledge can be probed for. However, in the

191 absence of a meaningful context and/or the guiding rule, it may well be impossible for

192 the practitioner to verbalize the knowledge used in a decision. In fact, the reasons

193 underlying a decision may only become obvious when the practitioner is asked to

194 describe why an alternative action wasn't taken. In the absence of such probing, asking

195 a practitioner to describe what they think, or what is occurring in a context may lead to a

196 situation where an incomplete description is given. For example, Côté and colleagues'

197   (Cote et al., 1995a, Cote et al., 1995b) work with expert gymnastic coaches, using a

198   grounded theory approach identified that training was an important context for these

199   participants. However, when Côté et al.'s "consequences for intervention" results are

200   examined there is no mention of *instruction* and yet this behaviour has been observed in

201   all levels of coaches in just about all behavioural observation studies e.g. (Claxton,

202   1988, Smith and Smoll, 1996). Of course this could mean that these coaches do not use

203   this behaviour. What is more likely, however, is that they do use it but their explicit

204   awareness, and thus their ability to access and retrieve this knowledge (c.f. our earlier

205   comments), of its use is quite low and/or its use gets clumped together with "feedback"

206   because of a lack of definition and differentiation to the verbal behaviours used during

207   coaching. Furthermore, we would argue that while the most significant work in this area

208   since Côté et al's work by Jones et al. (2003, 2004), provides excellent in depth insight

209   into the thoughts of elite coaches from a number of sports, it also suffers from similar

210   problems to Côté et al's work. Consequently, significant probing, alternative giving and

211   in depth discussion of decisions taken is essential if we are to generate the clear

212   conceptual knowledge that offers the best vehicle for developing coaching prowess in

213   others. Accordingly, this approach was employed with the participants in this study.

214   **Consideration 3: Are the Participants really Expert and is the Schematic actually**

215   **needed?**

216   In their groundbreaking study, examining all of the current research in coaching

217   science, Gilbert and Trudel (2004a) identified that too few studies developed findings

218   from coaches who exhibited styles or practices that should be copied. Consequently,

219   there is a need to exhibit just 'how good' coaches used in studies actually are. This is

220   actually very difficult in the absence of a gold standard, meaning that the confirmation

221   of "expert" status is always a thorny issue. Importantly, the development of such a gold

222   standard is one of the goals of the current UK Coaching Certificate (SportscoachUK,

223   2004) development in the UK. However until this development is complete we had to

224   resolve this problem through identification and development of criteria and then finding

225   people to fit the criteria. For example, Gilbert and Trudel (2004b) identified a model

226   youth team coach as someone who demonstrated interest in the theory and practice of

227   coaching, was respected in the local sporting community, was a good leader, teacher

228   and organizer, and who kept winning in perspective while encouraging children to

229   respect the rules of the game, competitors and officials. Once these criteria were set,

230   coaches were selected using a reputational case selection sampling procedure (Miles

231   and Huberman, 1994). Consequently, in the present study the criteria used for peer

232   identification of coaches considered to be experts were a) recognised as being expert

233   coaches b) their consistent use of a critical thinking approach (Strean et al., 1997), c)

234   their roles as mentors to developing coaches and finally d) those currently working with

235   both elite and developmental athletes. The peers who were asked were members of the

236   UK Sport Institute coach development team, performance directors and sport scientists.

237   By choosing these criteria we are relying to a certain extent on an intuitive feel of

238   people 'in the know' to identify expert coaches. To support this selection process we

239   also provided more explicit criteria that would support this intuitive feel to ensure an

240   expert is selected.

241   Of course our selection procedure used to access expert coaches is open to

242   debate but we would argue that the selection criteria used was rigorous enough to ensure

243   that expert coaches were selected. We would, however, encourage an open debate in the

244   literature to discuss what, explicitly, constitutes an expert coach so that more explicit

245   criteria can be used in future studies.

246   Once the coaches have been identified as being expert we can then meet the final

247   check on the validity of the schematic. Even if we get agreement from the coaches that

248   the model does reflect their job, if the coaches became expert without the schematic is it

249   even needed? This will actually depend on how these coaches became expert. If the

250   coaches have developed through a clear developmental pathway then the model's

251   importance will be diminished, however, if there appears to be no coherent pattern to

252   their development and the schematic can provide this coherent basis then its importance

253   will be enhanced. Although this study will, obviously, be delimited by the

254   demographics of the coaches selected, we will go on to examine issues relating the

255   transferability and relevance of the schematic across the coaching spectrum in the

256   Discussion and Conclusion section.

257   **Summary and Research Questions**

258   Returning to the question originally set, we hope that the importance of an

259   ecologically valid schematic has become obvious, in that it can codify experts'

260   knowledge and decision making, both explicit and implicit, enabling their effective

261   communication to other coaches. However, in order to effectively achieve this goal

262   there needs to be a methodology that takes account of theoretical and empirical research

263   examining knowledge storage and retrieval as identified in the three considerations.

264   Taking account of these considerations led to the design of a methodology that reflected

265   the objectives of the investigation. For our present purpose, this related to exploring the

266   match between a theoretically derived schematic with the knowledge objects used by a

267   sample of representative practitioners. Accordingly, we used open-ended and

268   subsequently more direct questions to address three issues pertaining to the veracity and

269   applicability of the schematic as follows:

270 1. What are the typical rules, processes and content of a knowledge object required

271   for expert coaching?

272   a. What are the roles and objectives set by/for the elite coaches?

273   b. What are the decision making process used

274   c. What knowledge is required to perform these decisions and, therefore, to

275   achieve these roles and objectives?

276 2. Does the content and flow of the model accurately match the thought process

277   and decision making of expert coaches?

278 3. Does the model represent a good basis for focused development of these

279   processes?

280

281 **Methods**

282 *Participants*

283 Based on the selection procedure outlined above, sixteen expert coaches working within

284 the UK took part in this study. To ensure that the quality of coaches involved in this

285 study remained high across all sports, the coaches must have been coaching for a

286 minimum of 10 years whilst also meeting the following criteria:

287 ❖ United Kingdom Sports Institute Coaching Team and/or Performance Director

288   and/or Sport Academic were asked to recommend coaches who they thought

289   displayed the following characteristics

290   o Respected within their own sport for being top quality expert level

291   coaches

292   o Evidence of a critical thinking (will challenge norms and assumptions,

293   Strean et al, 1997) approach to their coaching

294   o Actively mentoring coaches within their own sport

295   o   Currently working with elite and developmental (i.e. those who have

296   aspirations of becoming elite) athletes

297 In response to Gilbert and Trudel's (2004a) call to more clearly describe who the

298 coaches are, the sixteen coaches, 14 male and 2 female, covered thirteen different sports

299 as follows; athletics, canoeing, curling, cycling, equestrian, soccer (2), hockey, judo,

300 netball, rugby (3), shooting, swimming, triathlon. Four of these coaches were non-UK

301 nationals; 2 of the coaches were European while the other 2 coaches were Australasian.

302 All of the coaches were recruited by personal contact by one of the research team. After

303 an explanation of the purposes of the research, and assurances of anonymity, all coaches

304 consented to take part in the study

305 ***Procedures***

306   In order to answer the research questions each coach underwent an interview lasting

307 between 75 – 100 minutes. The interview took place at a time and place convenient to

308 the coach. Each coach was sent a copy of the basic questions that were to be asked at

309 least 5 days in advance of the visit by the interviewer. The original set of questions were

310 deliberately broad so that the original answer given to each question was not led in any

311 way. By taking this approach we were allowing for the scope of each coaches'

312 conceptions within the knowledge object to emerge. Following this original question

313 and answer, follow up probes and prompts were used in order to ensure that a complete

314 description was given. The original broad set of questions are outlined below. In

315 addition to the reasoning supporting the questioning approach outlined above, questions

316 1 – 7 also allowed the development of the meaningful context so important to getting

317 complete descriptions of knowledge objects and conceptions. In a further attempt to

318 develop the meaningful context, each coach was interviewed prior to or just after a

319 coaching session allowing the coach to be in an environment s/he would already be in

320 the knowledge object mind set being examined.

321   1. Could you tell me about your role as an elite coach and therefore the goals and

322   priorities that brings?

323   2. Are there any other goals that <u>you</u> bring to the role?

324   3. Could you tell me about where your aims/goals come from and who's needs do

325   you try to fulfil/prioritise?

326   4. Could you tell me about the types and levels of planning that you do

327   5. Could you take me through the process you go through when you plan from start

328   to end

329   6. Once you have your various plans (e.g., long, medium and short) what do you

330   do with them?

331   7. Could you tell me about the complexity of what you are trying to achieve?

332   8. What bodies of knowledge (e.g. physiology for a cycling coach) do you need to

333   know about to be effective as an elite coach, and in what ways does it help you?

334   9. At this point in the interview we will show you a model. We will give you a few

335   minutes to have a look at and consider the model and then we would like to

336   comment on it.

337   10. Could you tell me about where all your knowledge has come from?

338   We took the decision to delay showing the model to the coaches until after we had

339 explored all aspects of the coaching process. This was implemented for two reasons;

340 firstly, we could check if the coaches implicitly and explicitly supported the schematic.

341 Secondly and consequently, the knock on effect of this implicit then explicit would be

342 to act as a further check on whether the coaches were giving "impression managed"

343 responses (Leary, 1992).

344   Two interviewers conducted interviews. Prior to commencement, both interviewers

345   ran through pilot interviews with expert coaches who were made aware of the aims of

346   the project. Feedback was then sought from these coaches as to the efficacy of the

347   interview script and interview process and also to check on whether the coaches had felt

348   led to a conditioned response. Both coaches suggested that the questions with

349   supporting prompts and probes did lead them to giving a full and complete response.

350   Importantly, neither coach felt that they had been led to give a response that did not

351   reflect their own ideas or thoughts. Consequently, each interviewer had an interview

352   script with the same questions and each question had a list of potential probes and

353   prompts. This enabled both interviewers to make sure that the same prompts and probes

354   were used in all interviews. Copies of the full interview transcript are available upon

355   request.

356   *Analysis of Qualitative Data*

357   The analysis of the interviews was based on sound qualitative research techniques,

358   through inductive followed by confirmatory deductive techniques (recommended by

359   Patton, 1990 and Scanlan et al., 1989). Interviews were analysed using Atlas ti 4.2. data

360   analysis software. Raw data themes were identified and built up into meaningful themes

361   and categories (see Figure 2). The analysis involved three researchers independently

362   familiarizing themselves with all of the data by reading transcriptions and listening to

363   interview tapes. After analysing the data, raw data themes and categories were verified

364   and checked through triangulation.

365   Following the approaches suggested by Krane et al. (1997), transcripts within

366   each category were content analysed by the one member of the coaching team who had

367   completed the interviews. Consequently, data were examined both inductively then

368   deductively, with this deductive analysis based on the precepts of the coaching

369   schematic presented in figure 1. Subsequently, samples of these data sets were re-

370   examined by the other members of the research team, with questioning and debate used

371   to explore any issues of contention.

372   Finally, once the analysis was completed a draft report with results, discussion

373   of results and conclusions was written and circulated to all of the participants. All

374   participants were requested to read through the report and respond via email or

375   telephone if they felt that the report did not accurately reflect the events or their

376   thoughts. No such modifications were requested.

377

378   **Results**

379   *Overview of results*

380   INSERT FIGURE 2 ABOUT HERE

381   The typical method of displaying results from interview-based fieldwork/research is

382   through developing a table of 1st, 2nd and 3rd order themes that become progressively

383   more hierarchical. These themes and hierarchy "dropped out" of the raw interview data

384   following the analysis procedure already discussed. In order to make it easier for the

385   reader to get to the point these data are presented in Figure 2. To summarise figure 2 we

386   will present and describe the results in an order to provide answers to each of the

387   research questions in turn. As we describe the results it should become obvious to the

388   reader that implicit support was generated prior to showing the schematic to the

389   coaches. This support is then made explicit in the responses of the coaches once they

390   had a chance to view the schematic.

391   ***What are the roles and objectives set by/for the expert coaches?***

392   *Roles.*

393   Upon analysis of the data there were no surprises that one of the major roles that these

394   coaches take is exactly what it says on the tin; namely acting as a *coach* in its purest

395   sense and helping athletes achieve their potential as described by this individual sport

396   coach. 'So my job is to get them to achieve what I see as being their particular model

397   technically, but it fits with what I see as clearly to be the right model.' In addition to

398   this role, one further aspect emerged; namely, that these coaches very much saw

399   themselves as being a programme leader/manager. However, their descriptions of

400   leadership go beyond the definitions typically applied by researchers in sport (e.g.,

401   Chelladurai, 1990). The following quote displays how these expert coaches are leaders

402   of a team of support staff and a team/group of athletes and therefore take on the

403   responsibility for all the human resource issues that brings.

404   The major input, obviously I'm a facilitator first and foremost because I run

405   the whole programme and I bring…it's like anything, you want to bring in a

406   psychologist. Unless you know a little bit about these things, you're maybe

407   not necessarily going to get the best person to suit the team.

408   *Goals and objectives.*

409   In line with much of the research examining goals and their development, the coaches in

410   this study are setting both process and outcome goals. All of the coaches involved in the

411   study were fully aware that the bottom line measure of their performance was

412   eventually results achieved. For example, the following quote displays how this team

413   sport coach's job depends on achieving medals since the financial support for his job is

414   tied in with the job specification.

415   Well if I want to keep my job we have to win medals at major championships.

416   So no matter what other ideas you have when you come into a job that is,

417   focused around that, you need to win medals. It's money for medals and we

418   are a core sport funded by lottery.

419   In order to achieve these goals, however, all of the coaches recognised the

420   importance of setting individual performance goals that, if they are achieved, will

421   support the achievement of the outcome goal. For example, the following quote from an

422   individual sport coach identifies that individuals have to be developed in order to meet

423   the overall goal.

424   I try to think, and most of my colleagues try to think that it (the program) is

425   centred around the athlete because if the athletes don't win medals, we have

426   got no programme and we are out of a job. We try to satisfy the athlete's

427   needs.   It's like an athlete centred approach.

428   In order to support this athlete-centred, performance approach six different types

429   of process goals were commonly set by the coaches. The first four of these relate

430   specifically to performance and are often referred to, or classed by, using the following

431   terms; technical, tactical, physical and mental goals. Typically, there were goals

432   emphasized by the coaches that reflected the sport that they were coaching. So for

433   example, the quote below comes from a throwing coach where having good technique

434   and the power to implement that technique is very important. The second quote comes

435   from a individual continuous skill sport (Schmidt and Wriseberg, 1999) sport where

436   technique was considered to be already developed by the time this coach took on

437   athletes. The final quote comes from a team sport coach where all aspects of

438   performance are considered.

439   Yes, yes. It's very process goal. If I was honest and I sat down and thought

440   and wrote a thesis about it the way that the (technical performance) model sits

441   in me is a series of positions which can only be achieved if you have a

442   physical capability of achieving this. So what we're training fits snugly into

443   what I want to achieve. And the process by which that's achieved is this and

444   it's all in there. If you can't do it like this I can make you do it better because

445   I can see what you're doing.

446

447   "Yes, it can be physical it can be psychological. It can be tactical."

448

449   …the priority is just the continued development of the player and in whatever

450   area he needs to be supported, whether it is his skill or his confidence or his

451   decision-making ….but I think in a team game there are so may variables,

452   speed, strength, power, skill, timing, decision-making and so on and so on.

453

454   In addition to these process goals the some of the coaches were setting

455   value/learning and lifestyle goals that are behavioural and metacognitive in their

456   underpinnings as exemplified by this quote from a team sport coach

457   When we bring a team in to the Institute we sit down with them and we,

458   before we get any contracts out we look for commitment from them and they

459   can challenge us for the same amount of commitment going the other way.

460   Irrespective of the types of goals being set, one thing is already becoming

461   apparent. All of the quotes used so far demonstrate how coaches very rarely consider

462   one aspect of their job or goal in isolation highlighting the interdisciplinary nature of the

463 process. This is something we will return to when we present the results relating to

464 decision-making.

465 *Conflict between winning and developing*

466 While there will be a later section on decision making, it is worthwhile considering the

467 issue of the conflict between winning and developing at this point to keep within the

468 context of the situation. The issue of conflict between goals was brought up by several

469 of the coaches. There was a recognition that, ultimately, winning is the bottom line as

470 already described and that they have to work within the constraints of the system.

471 However, greater conflict occurs when the expectations placed on the coaches from

472 external sources go beyond what the coaches' think is reasonable, such as this team

473 sport coach.

474   Yes there's conflict because you know, you don't get time. That's the thing.

475   People will say, even now, people say that's okay but we want you to bring

476   some young players through. And you go okay, give me five years and I'll

477   bring some young [country] players through. I can't bring them through in six

478   months and win. I don't give them time to learn.

479   The method of dealing with this type of conflict irrespective of the level of

480 incompatibility is normally through resetting goals and working within the constraints

481 of the system. Such methods begin to display the decision making process that occur to

482 support *typical* actions by expert coaches. The next section of results will go on to

483 display the typical range of actions taken across all sports and the types of decision

484 making used to develop these actions.

485   ***What are the Typical Actions and Decision Making Processes Used by Expert***

486   ***Coaches?***

487   *Typical actions: Planning.*

488   The previous section identified that the coaches involved in this study set process and

489   outcome goals and this therefore would represent the first set of typical actions taken by

490   them. Further to this, long, medium and short time periods are placed on goals produced

491   and the planning required for their achievement. However, depending on the

492   competition structure, these time frames differ between sports and the language may not

493   be used or even liked. For example the next quote is a typical response from a coach

494   who is preparing athletes for major competitions that are based a four yearly cycle; 'but

495   when she has her goal setting next month, her annual goal setting and review, we will

496   definitely be looking 3 or 4 years ahead, you know we are talking about a pathway to

497   the Olympics'. This would represent a long-term goal setting approach. Identifying

498   medium and short-term goals as a road map to the long-term goal then supported this

499   approach. In contrast, sports where there is a weekly competition the time frame

500   decreases as displayed by the next quote from a team sport coach. 'If you've been true to

501   what you've said you're going to do and continue true to it, then there's no reason why

502   you can't retain your intensity right to the end (of the season). So that's the long-term

503   planning over the season.'

504   *Typical actions: Goal development through performance analysis*

505   In addition to setting goals, all of the coaches identified that they consistently used

506   performance analysis to support this development. The major methods used by the

507   coaches' are, typically, ongoing performance analysis and end of season reviews. In

508   completing these tasks some of the coaches appeared to be relying solely on their expert

509   eye and memory (Chase and Simon, 1973), for example, a team coach stated 'Again

510   you see, I think in these more difficult things, psychological or whatever, you get a feel

511   as you work with the player week in week out. Sometimes it is just what you see, you

512   know, your eye that is better'. In contrast, other coaches were using the expert eye but

513   with the aid of video playback while other coaches were using very objective levels of

514   analysis such as this team sport coach; 'what we're really doing here is collecting a lot

515   of data on the players so we can try and highlight the areas of inconsistency or

516   weakness by using different software programmes that we've written up with an

517   institute analyst'.

518   *Typical actions: Effective use of support staff*

519   All of the coaches made use of support staff in athlete development. This support could

520   come from either assistant coaches and/or sport science/medicine support. In either case

521   the coach would identify how to make best use of the support to achieve set goals.

522   The reason I've worked closely to sports psychologists is because they are the

523   specialists and because I think it's important that the athlete has a third party so

524   that if there are really serious doubts, issues or problems, they can talk through

525   it. It doesn't matter how much they trust me, if they have a third party they can

526   work through it actually helps my coaching role because I then don't get bogged

527   down in things which then start to impede me from working with a larger group

528   *Decision making processes: Hierarchical, consequence considered, integrated*

529   As identified in the methodology section, one of the aims of the interview design was to

530   develop a context that was meaningful to the coaches. By doing this we were able to

531   identify the thinking and decision-making methods used to carry the actions identified

532   above. The most apparent mode of thinking used by the coaches was both hierarchical

533   and nested in nature. That is, the coaches would start off with an idea to deal with the

534   problem and further ideas would drop out of this as evidenced by the defining of roles

535   and development of goals and plans outlined above and further outlined by the quote

536   from individual sport coach below.

537   At the moment with the elite coaching of the (Sport) team I'm looking at all of

538   those things, I'm doing administration, organisation and certainly all of the

539   technical stuff and the detailed technical coaching for those guys. I'm doing

540   all the other back-up support work and acting as the conduit really for the

541   other support guys we've got working with those (performers).

542   In essence, this approach breaks a complex situation down into meaningful chunks. A

543   phenomenon identified in experts in other domains such as chess (Chase and Simon,

544   1973) and teaching (Entwistle and Walker, 2000). Furthermore, this breaking down of

545   problems follows the breadth first approach to problem solving observed in experts in

546   medicine (Johnson et al., 1981) and computer programming (Zeitz and Spoehr, 1989).

547   The second approach identified from the analysis was that the coaches were

548   making decisions based on an integration of different knowledge sources, c.f. our

549   comments about knowledge structures being developed by and integration of concepts

550   and conceptions, as evidenced by the quote below.

551   Are you familiar with the move towards synoptic papers at A level? Synoptic

552   papers basically draw knowledge from all areas to answer a central question.

553   That is what the good coach does. They have to be good at the synoptic work.

554   They have to be able to draw things from different sports. They have to be

555   able to bring different sciences etc to answer the central question or problem.

556   That's what good coaches can do. You can't pigeon-hole things for a coach

557   and if I was looking for an elite coach that's what I would be seeing,

558   somebody who could bring a whole lot of different knowledge to solve

559   problems.

560   The final decision making consideration to emerge was the idea that decisions

561   could only be "best fit", and that in order to make these decisions the consequences of

562   the decisions were considered. This process is exemplified by the following quote from

563   an individual sport coach*;*

564   All the other 'ologies and isms and all the rest of it, well my personal view is

565   that you need to have as broad a background as you can and have a broad

566   range of knowledge. It's very rare that you push a button that says psychology

567   or you push a button that says physiology or technical. Everything that you

568   do has an implication psychologically or physiologically or whatever and you

569   need to know how things work, the 'what ifs' so if you press that button what

570   happens to that, what happens to that?

571   In summary, process goals such as technical, tactical, physical, mental, lifestyle

572   and attitudinal are typically set. When deciding on these goals the coaches were taking

573   account of several factors including the outcome and process, the individual and where

574   applicable the individual within a team, external expectancies, and the short medium

575   and long term requirements. In order to arrive at these goals, the coaches were all using

576   some level of performance analysis in order to develop meaningful targets. All of these

577   actions are underpinned by a hierarchical, integrated and consequence considered

578   decision-making process.

579   ***Required Knowledge***

580   When responding to the question asking about what the coaches needed to know to

581   perform their role effectively it became apparent that a broad range of knowledge was

582   required.

583   *Sport Specific*

584   Far and away the first stated required knowledge source was that the coach needed to

585   have an extremely good level of sport specific knowledge as exemplified by the next

586   quote from an individual sport coach; "I would say that your sport specific knowledge is

587   your biggest knowledge base." It may seem obvious but you can't make decisions about

588   performance if you don't understand performance.

589   *Pedagogy: Communication and skill acquisition*

590   The next most frequently mentioned required body of knowledge was pedagogy. The

591   term *pedagogy* was never directly used by any of the coaches prior to seeing the model.

592   However the terms *skill acquisition* and *communication* were widely used and we

593   deductively placed them within the category of pedagogy. The following two quotes by

594   two different team sport coaches are typical of the responses given by all of the coaches;

595   'You've got to be able to understand how to construct the practice and increase the

596   information load appropriately 'til it becomes realistic and full on'. 'You have to be able

597   to communicate with players in a way that they believe in the, you know, they believe

598   in your knowledge'.

599   *'Ologies*

600   The next level of required knowledge can be put under the heading of 'ologies. These

601   are the three basic components of sport science. The most often referred to 'ology was

602   physiology; the next being psychology and the least often referred to required

603   knowledge was biomechanics. While no explicit reason was put forward for this, it is

604   likely that user friendliness and typical setting up of support (i.e. getting the fitness guy

605   in first) has led to this situation. The following quotes are typical of the responses

606   gained, the first and third quote are team sport coaches while the second is from an

607   individual sport coach.

608   You do have to have a knowledge of physiology, you do have to have a

609   knowledge of nutrition. But not as much as you used to have because most

610   clubs now have nutritionists, sports scientists, certainly physiotherapists with

611   a sports science background, whatever. So a lot of that is taken away from the

612   coaches. A lot of that is taken away. But when I first came in you had to go

613   ***** fitness, physiology and nutrition. But I went and done a years course at

614   college on food, food and nutrition. And when you're doing the various

615   coaching courses that you do, parts of physiology and stuff and you gain

616   minimal knowledge I suppose in comparison to proper sports scientists,

617   proper physiologists very minimal but maybe enough to just give you an idea

618   of what's required.

619

620   As I said, whether it's sport psychology or just psychology in general, man

621   management, call it what you like but basically that, that psychology aspect of

622   the knowledge of players and how to handle players, how to deal with

623   performers and the sport specific knowledge are the most important things.

624

625   Also with biomechanics we've got to be able to make up a clear model as far

626   as what makes up a good technique, whether it be kicking or passing or

627   tackling. There needs to be a clear expectation that if something goes awry

628   you know what to look for straight away.

629 The final two areas, only mentioned to a small extent, were management and life skills.

630 ***Does the content and flow of the model accurately match the thought process and***

631 ***decision making of expert coaches?***

632 *Implicit support*

633 One of the reasons behind the interview design was to see if support for the model "fell

634 out" of the responses given by the coaches before they were even introduced to it. We

635 would suggest that the results reported thus far do support the model. That is, coaches

636 do develop goals that are applied in nature (i.e. *technical* goals as opposed to

637 *biomechanical* goals), they analyse and plan for performance, they make decisions from

638 a hierarchical, integrated consequence considered approach, and they do all of this from

639 a knowledge base. However, while that was our consideration, an individual coach

640 summed this up very well.

641   This isn't much different to what we've been talking about is it? You've got

642   your "ologies", your mental skills, fitness training that sort of stuff which is

643   what you're talking about whatever, and the coaching bits and the drills and

644   the practices.

645 *Explicit support*

646 While it was important to get a level of implicit support for the model, the real crux of

647 the validation of the schematic would come when the coaches could comment

648 specifically on the model: specifically whether they thought the model accurately

649 reflected the requirements and decision making of expert coaching. This exemplar

650 quote, from a team sport coach, displays that the coaches thought the Model did reflect

651 content process and complexity of coaching process.

652   It does (reflect what I do) but because it reflects what I do and I have done it,

653   hands on and I am doing it and improving on it, I can understand that.

654   Someone who doesn't, wouldn't necessarily quite so easily. Because it is

655   complex, how does all that come together and I suppose I liken it to, when

656   someone says to you what do you do. I find myself having to make a fairly

657 kind of unrelated explanation because it is not a simple thing. Pulling in this

658 support and that support and focussing on the player and what does that mean

659 and before you know you spend half an hour telling someone what you have

660 done. You can't just say I am a [sport] coach and just leave it at that. That

661 here (referring to the schematic), that's it. I just think that if this was

662 something that you were producing for coaching, league coaches, whatever,

663 that some sort of examples, this is what this means this is what that means

664 would just clarify it but it sums up what is done, what I do. It is complex

665 though isn't it.

666 What this quote also clearly identifies is the non-systematic manner in which these

667 coaches have organised their knowledge, highlighting the concerns put forward in

668 *Consideration 2*. While this clearly does not affect their decision-making in context it

669 does create problems if these coaches are put in a position of being 'gatekeepers to

670 knowledge' (Cushion et al, 2003) for other coaches, such as mentors or tutors, in a

671 coach education context.

672 ***Does the model represent a good basis for focused development of these processes?***

673 There were a variety of development methods acknowledged by the coaches when they

674 were asked where their knowledge had come from. However what quickly becomes

675 clear is that their development has occurred through serendipitous methods as opposed

676 to a structured program – in short, these coaches are magpies and not filing cabinets as

677 clearly identified within the previous quote.

678 *Knowledge sources and development: Experience, courses, other coaches,*

679 *serendipitous*

680 It will be of no surprise that performing and coaching experience represent two of the

681 biggest sources of knowledge for the coaches. It was clear that all of the coaches had

682   learned from their experience because of their self-reflective nature as exemplified by

683   the following quote from an individual sport coach.

684   I think again it's just that raw brush with knowledge and having been there,

685   you've seen so many situations and you've had to deal with them that if you've

686   got half a brain you learn how to deal with them. Sometimes it doesn't work

687   so at least you know you don't do that again, and you think that, "perhaps I

688   should have done this," etc so the feedback is important.

689   In addition to learning from experience, formal coach education qualifications

690   were also cited as being a source of knowledge, although, as the next quote from an

691   individual sport coach suggests, some reservations were expressed about the usefulness

692   of some of these courses. This finding would complement the findings of Jones et al.

693   (2003) when interviewing an expert football coach.

694   Whilst I'll probably be the first person to criticise the governing body award

695   courses I suppose they give me a grounding, just a very very basic grounding.

696   I think they were key. Unfortunately that's all they gave me was a very very

697   basic working knowledge to start with in the employment.

698   Furthermore, academic qualifications were perceived to be important by several

699   of the coaches; however, they were recognised as only being part of the overall

700   development picture. The quote below from an individual sport coach also reinforces

701   the need for a reflective and critical thinking approach to ensure the most is made of

702   experience.

703   Two definite pathways. First of all the degree. Well, going back before that,

704   the club level Coach Award I took before the degree, the Sport Science

705   degree. That was the basic understanding - anatomy, exercise physiology and

706   then almost a distinct pathway actually in the job. Some of the stuff didn't

707   apply; some of the stuff was outdated. There are some different ideas for

708   training. For example, endurance work for a ****** was frowned upon on

709   my degree and yet in the field the sprinter, a ***** needs it. Yes I think the

710   two distinct pathways, the degree - I don't think you could do this job without

711   the Sport Science background, the Sport Science degree and yet it isn't the be-

712   all and end-all. There is a lot in the job, learning. Trial and error, once you

713   are I the job, trial and error with the athletes.

714   Gaining knowledge from others was another method of development described

715 by the coaches and was very often seen as being invaluable as described by this team

716 sport coach.

717   I would think that [coach's name] influenced me a great deal. With the work

718   that he did and the way that he did it. In other words making the practices

719   more enjoyable and going both ways. In other words it wasn't attack versus

720   defence and you all walk out and go again like phases of play which is how

721   I've been taught to coach, but he went maybe down the right side and back up

722   the right side or end to end so the practices flowed more. They were still

723   practices but they flowed more. And also with the detail. The little details

724   and little things he was doing I learnt all the time from him.

725   All of the coaches identified the importance of constantly trying to search out

726 information that could enhance their coaching and that, consequently, much of their

727 development had come through serendipitous means such as reading books, encounters

728 with sport scientists, other coaches and experiences outside sport. This approach is

729 typified by the following quote from an individual sport coach.

730   I read a lot of research stuff and I read a lot about sports, I listen to a lot of the

731   guys. I'm just picking up ideas from people who know a lot more about it

732   than I do. I just find that fascinating. I'm just like a sponge like that,

733   everywhere absorbing and picking up all the stuff and sometimes I think I'll

734   try it. Other people take away things that I do, what goes around comes

735   around. I like to think I'm reasonably open-minded and I just keep listening

736   and watching.

737 **Discussion and Conclusions**

738 Before discussing results in the context of answering the research questions posed, it is

739 worth revisiting some issues that dropped out of the introduction and, therefore, the

740 methodological approach adopted. We obviously took an approach that could be

741 interpreted as leading the participants during the interview. We were keen therefore to

742 display that this approach actually generated meaningful focused responses as opposed

743 to forced answers. Having completed the study we would certainly assert our belief that

744 the former was the case, and this contention would be supported by the response given

745 in the pilot interviews where the participants were explicitly asked if they felt they had

746 been led to give a response that did not reflect their thoughts and understandings. In

747 fact, we would argue that the approach taken, especially the alternative giving

748 questions, led to more focused interviews where a full exploration of conceptions was

749 achieved and misunderstandings were quickly addressed and resolved. Additionally,

750 and as previously stated, following the draft report being sent to them, none of the

751 coaches reported that, the results and their interpretation did not reflect their thoughts

752 and understandings of the coaching process. The next question, therefore, is how

753 transferable are the results to expert coaching in elite and pre elite settings in general?

754 Given the representative spread of sports, nationality and number of coaches we would

755 argue that the transferability of the findings is strong. Consequently, the following

756 discussion of the results is assumed to be representative and valid.

757 ***What are the typical rules, processes and content of a knowledge object required for***

758 ***expert coaching?***

759 *Coaches identify and develop outcome and process goals taking a hierarchical*

760 *approach.*

761 The coaches within this study considered themselves to be leaders of a group of

762 performers and support staff whose combined job it was to achieve an outcome goal

763 that was either externally set or expected. In order to achieve the outcome goals, the

764 coaches all adhered to a number of hierarchical rules that would deliver the goals. In

765 general, one rule centred on the need to develop the performance of the athletes through

766 the identification and setting of individual performance goals in technical,

767 tactical/strategic, physical, mental, lifestyle, and metacognitive areas. In order to

768 achieve these performance goals, the coaches were all planning for the short and

769 medium and long term. Within this planning, coaches planned how to make best use of

770 their physical and human resources within competition and training, and the athletes'

771 time away from these environments.

772 *Coaches use a hierarchy to make decisions in an integrated fashion.*

773 This use of a hierarchical set of rules helps organize the coaches' decision making. This

774 appeared to be crucial to the coaches because of the complexity of achieving the goals

775 outlined. By taking a hierarchical approach the coaches take account of a broad range of

776 information relating to identifying the problem and then developing a solution to the

777 problem. Such a process has been referred to as being a breadth first approach to

778 problem solving (Abraham and Collins, 1998, Zeitz and Spoehr, 1989, Johnson et al.,

779 1981). Indeed, even with the process mapped out the coaches were making decisions

780 within this structure that called upon several, sometimes competing knowledge bases, at

781 once in order to make a best fit decision. Such a situation would tie in with the work of

782 Biggs and Collis (1982) who have identified problem solving procedures with school

783 children. In this work they noted that children with higher level problem solving skills

784 would connect a greater number of concepts within a domain to first understand and

785 then solve problems. While this work has not yet been extended to coaches it would

786 appear that these coaches are using similar approaches. Furthermore, this appears to be

787 not only within domains but also between domains of knowledge. Finally, the coaches

788 also acknowledge that one decision can have multiple consequences in terms of

789 achieving the set goals. Obviously examining the decision making processes of coaches

790 was not the sole objective of this paper. However, we do believe that there is sufficient

791 evidence here to suggest that the number and interconnected nature of the arrows in

792 figure 1 are representative of the methods of decision making used by expert coaches.

793 Therefore the explicit development of problem solving and decision making must be

794 part of coach development programmes. We would suggest though that further work

795 such as Gilbert et al (1999) is needed to get a more in depth understanding of expert

796 problem solving and decision making within a coaching context.

797 *Coaches use a broad range of knowledge sources to underpin their decision-making.*

798 The two most important sources of knowledge identified by the coaches were Sport

799 Specific and Pedagogic in nature. Simply put, it is very hard to develop performance if

800 you don't know the make up of that performance and you don't know how to teach that

801 performance. This finding reflects research in teaching by Berliner (1991) who suggests

802 that an effective teacher needs a knowledge of *content* (i.e. the subject to be taught) and

803 *pedagogy*, methods of teaching and learning. However, the incomplete nature of these

804 ideas for coaching is brought to light by the idea that the coaches further identified the

805 need to have knowledge of physiology, psychology, and biomechanics. The level and

806 depth of knowledge in these disciplines varied between sport and coach, based on their

807   perceived efficacy. However, the stated importance of having at least a working

808   knowledge acknowledges that sport science is now an important factor in the decision

809   making of coaches developing pre elite and elite athletes. But it is important to note that

810   this knowledge is used to understand their athletes better, supporting Potrac et al's

811   (2000) notion that teaching the sport sciences to coaches must go beyond a technical

812   rationality in order that this knowledge is fully understood and integrated to the

813   coaching process.

814   ***Does the Content and Flow of the Model Accurately Match the Thought Process and***

815   ***Decision Making of Expert Coaches?***

816   The conclusion developed to the questions above clearly supports the schematic at an

817   implicit level. That is, on the basis of the results discussed so far, a schematic not

818   dissimilar to figure 1 could easily be developed. However, as stated in the introduction

819   to the paper we were never going to get anything other than a best fit through interview

820   because of the idiosyncratic nature of knowledge development. It was, therefore,

821   important that there was also a high level of explicit support for the schematic from all

822   of the coaches. Indeed some of the coaches found that the model actually allowed them

823   to get a better understanding of what they were doing. Such an explicit level of support

824   confirms that the schematic does indeed accurately match the thought process and

825   decision making of expert coaches.

826   ***Does the model represent a good basis for focused development of these processes?***

827   It is clearly apparent from the results that there were a broad range of methods of

828   development across the coaches, such as coaching courses, academic qualifications,

829   playing and coaching experience, reading etc., and that there was a genuine desire

830   amongst all of the coaches to become better and continually improve. However, what

831   was equally apparent was the lack of any underlying structure that brought all of these

832 development methods together. Consequently, the interdisciplinary nature of the

833 decision making of these coaches has developed through their own diligence as opposed

834 to an explicit, "big picture" approach. In short, these coaches are knowledge magpies

835 and not filing cabinets! Therefore, since the schematic is an accurate match to the

836 knowledge, thought processes and decision making of expert coaches, it does represent

837 a good basis for the focused development of expert coaches working with elite and sub

838 elite athletes. However, to be truly useful the schematic must be able to transfer to the

839 development of an 'intermediate' volunteer coach or the development of the expert

840 coach working with young pre pre-elite athletes etc. Our argument would be that, given

841 the broad range of concepts and conceptions and knowledge within the schematic it

842 should represent a good starting point, through context specific targeting of the most

843 relevant factors, for the design of effective coach development curricula and practices

844 for volunteer through to expert coaches. This is especially important when the,

845 admirable, idea of current coach education practice in the UK is that a Level 1 (novice)

846 coach should be able to progress all the way through to level 5 (expert)

847 (SportscoachUK, 2004). Ideally then, this progress would be mapped out from the same

848 big picture. Our future work will look to exploit this training potential across the ability

849 spectrum.

850

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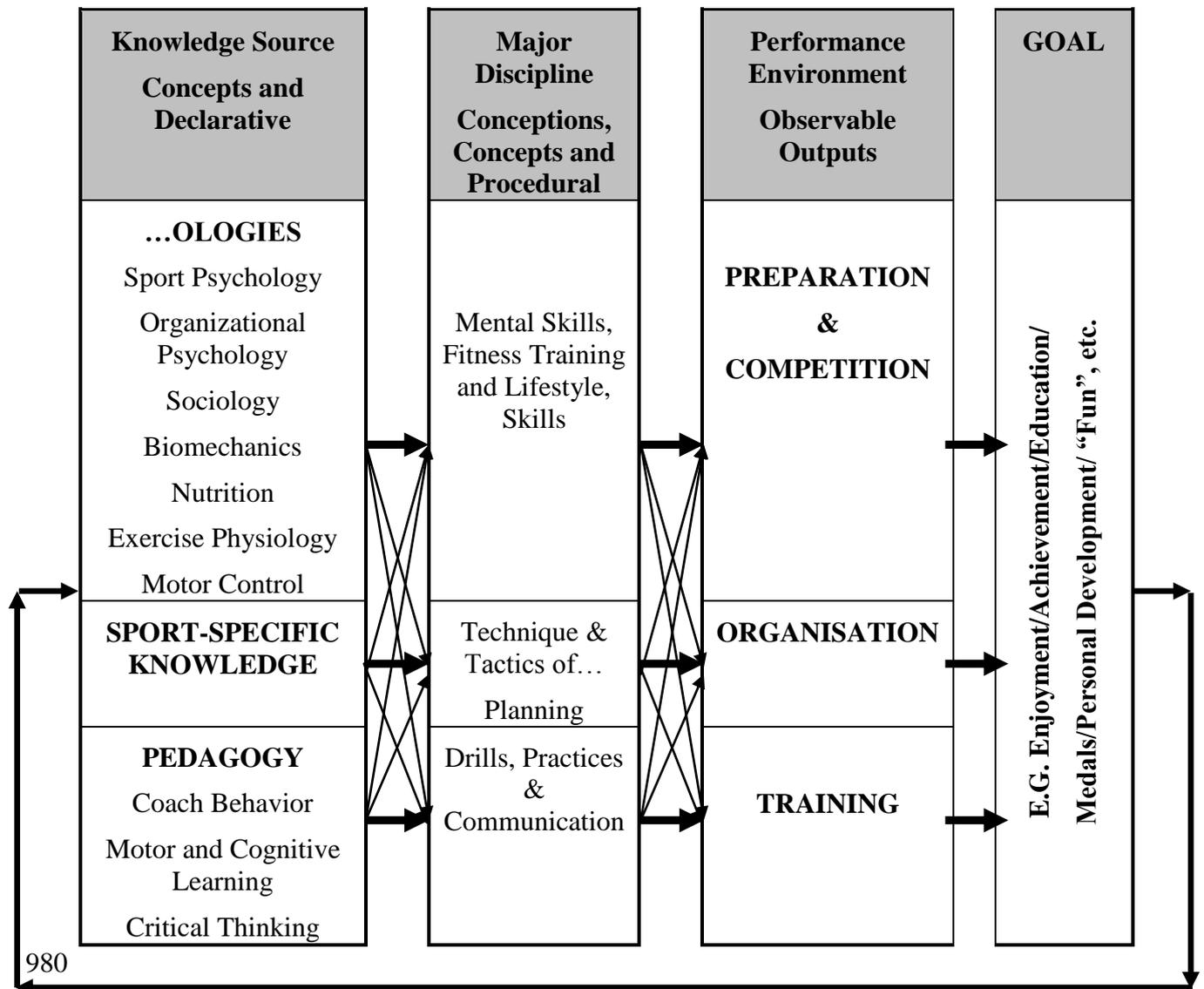895   **64,** 161-178.

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Knowledge Source Concepts and Declarative		Major Discipline Conceptions, Concepts and Procedural		Performance Environment Observable Outputs		GOAL
…OLOGIES Sport Psychology Organizational Psychology Sociology Biomechanics Nutrition Exercise Physiology Motor Control		Mental Skills, Fitness Training and Lifestyle, Skills		**PREPARATION & COMPETITION**		
SPORT-SPECIFIC KNOWLEDGE		Technique & Tactics of… Planning		**ORGANISATION**		E.G. Enjoyment/Achievement/Education/ Medals/Personal Development/ "Fun", etc.
PEDAGOGY Coach Behavior Motor and Cognitive Learning Critical Thinking		Drills, Practices & Communication		**TRAINING**		

980

981   Figure 1: The Coaching Schematic illustrating, at a conceptual level, the coaching

982   process. This is achieved through referral to the required knowledge, concepts, decision-

983   making and resulting behavioural/observable output, of all coaches. Bolded Arrows

984   display how major contributions are made directly across the cycle. The smaller arrows

985   indicate how each area can make a contribution to the thinking and decision making

986   processes in each other area.

987

Raw Data	1st Order Themes	2nd Order Themes	3rd Order Themes	Category
Role as developing performers (15)	Role as coach			
Role as role model (9)	Role as leader			Roles
Role as coordinator and leader(13)				
Improve Performance (13)	Improve Performance	Process		
Technical (12)	Player and Team Development			
Tactical/Strategical (11)				
Mental (13)				
Physical (14)				Goals,
Winning (15)	Outcome			
Position (13)				
Values (5)	Professionalism			
Lifestyle (7)				
Organizational (10)	Organizational			
Long Term (16)	Time locked			
Medium Term (10)				
Short Term (12)				
Observational (16)	Expert Eye	Ongoing Performance Analysis	Goal Development and Checking	
Notational (5)	Evidenced based			
Biomechanical (4)				
Expert eye video analysis (13)				
Periodic performance reviews (16)	Periodic performance reviews			Typical Actions
Long term (15)	Planning			
Medium – Short Term (16)				
Passed to player (6)				
Hierarchical (16)	Thinking and Decision Making			
Integrated (16)				
No Right Answer (6)				

Raw Data	1st Order Themes	2nd Order Themes	3rd Order Themes	Category
Sport Specific (15)	Sport Specific	Must Have and/or Need working knowledge of		Required Knowledge
Creating Understanding (4)	Pedagogy			
How people Learn (5)				
Skill Acquisition (10)				
Communication (6)				
Physiology (16)	'Ologies			
Psychology (16)				
Biomechanics (6)				
Management (4)	Management			
Lifeskills (9)	Lifeskills			
Roles (16)	Implicit Support of Schematic			Support for Schematic
Goals (16)				
Typical Actions (16)				
Required Knowledge (16)				
Explicit Support of Schematic (16)	Explicit Support of Schematic			
Importance of continuing to learn (16)	Importance of continuing to learn	Importance of continuing to learn		Factors Influencing Coach development
Playing Experience (13)	Experience			
Coaching Experience (16)				
Coach education (10)	Courses			
Academic (12)				
Other Coaches/Mentoring (14)	Serendipitous			
Books (15)				
Sport Scientists (9)				
Barriers to development (10)	Barriers to development			

989   Figure 2. Results of qualitative analysis of interviews displaying hierarchical themes

990   developed through to categories (numbers in brackets display how many coaches

991   contributed to each raw data).