

## Chapter 15 Effective Skill Development: How Should Athletes' Skills Be Developed?

Performance Psychology: A Practitioners Perspective

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### 3.4.1 Introduction – The Scope of this Chapter

From the moment we are born we engage in skill development moving from a set of involuntary reflexive and spontaneous movements to the development of grasping, posture control and locomotion to more complex linked movements such as running, jumping, throwing, kicking, hitting etc (Haywood & Getchell 2005). Much of this initial development occurs through trial and error, influenced by implicit copying behaviours, explicit guidance from significant others (e.g., parents, siblings etc.) and environmental factors, all of which are underpinned by physiological developments in the neuromuscular system. There are some very obvious influences on a child's early development through the provision of environmental stimuli such as mobiles, shape sorters, trolleys etc that parents can use to encourage children to develop skills.

Although this is correctly categorised as skill acquisition, we would be hard pushed to call this a planned skilled development programme! Furthermore, other than toddlers/children hitting broadly defined development goals it would be very difficult to identify if a child had gone through an 'effective' skill development programme, even if we wanted to, until several years after completion. By contrast, case history evidence from elite sports players (e.g. Côté et al 2003) would suggest that, at some point in an athlete's development, effective skill development becomes linked with, or even dependent on, a planned and deliberate skill development programme. Indeed, recent research examining the long term development of talent (Abbott & Collins 2004; Bailey & Morley 2006; Balyi 2002) would suggest that planned skill development programmes are important from as early as six or seven years if children are to gain the early motor, cognitive and emotional skills crucial for a successful lifetime association with physical activity. Unfortunately, as we will evidence later in this chapter, there appear to be real problems across the coaching spectrum of novice to expert in coaches' capacity to optimally plan for and implement effective skill development programmes.

Consequently, our aim in this chapter is to provide well evidenced and practical advice which can facilitate the development of effective skill development programmes. In delivering this aim, and in accordance with the principles presented, we provide reasons for (and sometimes against) the guidelines espoused, leaving you, the reader, to reach your own conclusions whilst also knowing WHY you have.

The first section sets out to explain why a coach is essential in developing an effective skill development environment. We go on to identify how effective/expert coaches are known to operate and deliver effective skill development environments through setting and solving problems. In effect we create an argument that skill development is an ongoing and goal defined decision making (DM) process. We conclude Section 1 with a *modus operandi* for coach DM. This displays that a thorough understanding and systematic consideration *of the athlete, the sport, and pedagogy (the learning environment)*, in combination with an effective integration of these three domains, can facilitate the design and implementation of effective skill development environments.

The second section focuses on helping coaches and practitioners gain an understanding of the most neglected of these three domains, namely *pedagogy*, and thus the factors that should be considered when setting up a *learning environment*. We begin by identifying the inherent dangers of learning solely through experience – a common source of pedagogical knowledge for many effective/expert coaches. We argue that, due to this method of developing pedagogical knowledge, expert coaches

often lack the essential ‘deep understanding’ of pedagogy. Consequently, even though expert coaches are generally ‘effective’ in developing the skills of their athletes, the lack of deep understanding in pedagogy ultimately limits their ability to be innovative within this domain. In order to provide some solution to these issues we offer an exemplar ‘Toolbox’ of ten coaching tools, which provides a framework to assist coaches in a deliberate DM.

To avoid unnecessary repetition, we will use the term “coach” throughout. Dance teachers, canoeing instructors, and martial artist sifus and senseis should please consider this as a blanket term!

### **3.4.2: Three components and two types of knowledge for more than one answer**

During the 20<sup>th</sup> Century, the Russian psychologist Lev Vygotsky wrote about a concept termed the zone of proximal development (ZPD - Vygotsky 1978). Central to this concept was the idea that a test of a learner’s ability will give the tester an account of current unaided completed learning. However, should a teacher offer advice, leading questions or potential solutions through feedback and instruction, the learner’s performance can quickly increase; the suggestion being that the new performance is indicative of the learning that can be achieved in the future, subject to the appropriate opportunities. We will show later how such rapid performance increments (improvements within a single session for example) are often mistaken for evidence of learning as opposed to learning potential i.e. very little if any learning may have actually occurred. This often leads to frustration for both coach and athlete when retrieval of a skill is expected but not forthcoming!

Implicit within the concept of ZPD, therefore, is the notion of ‘added value’ that an educator can bring to the development of skills (cognitive, motor or emotional) in a learner that they would not (or at least be less likely to) have achieved in their absence. Indeed, the need for input from a quality coach in order to promote improved performance has been confirmed by various authors (Abraham & Collins 1998; Côté et al 2003). The crucial issue here is what does effective practice look like? Is it just the outcome (i.e. improved performance) or must we consider aspects of the coaching process itself?

#### **1. The Coaching Schematic – Modelling Effective Practice**

Effectiveness is always difficult to define in such a subjective area as coaching simply because the outcome, athlete development for example, can be so variable. Indeed, it is possible for a ‘poor’ coach to work with a good athlete and vice versa and yet a simple assumption on coach effectiveness is often made on athlete performance. This point was made by Gilbert & Trudel (2004a) who identified that too much emphasis is placed on win-loss record when selecting coaches as models for investigation. Basing a judgement of coaching quality on performer outcome is a risky business, but is a trap which almost everyone falls into a one time or other. Another tacit but equally risky assumption is that expert/good coaching is a unitary concept; i.e. what works at one developmental stage or with one performer will be equally effective elsewhere (Côté et al 2007). In exposing such misapprehensions, we like the analogy of the maths teacher – will the same one take a primary school child all the way through to PhD? This is somewhat unlikely, so don’t expect Sir Alex Ferguson to be

an expert coach your child's under 7s football team, equally, youth soccer coaches should avoid trying to be Sir Alex Ferguson.

In an effort to bring some resolution to this problem, a number of coaching models have been developed. Lyle (2002) and Cushion et al (2006) categorised these models as being either 'for' or 'of' the coaching process. The 'for' models were generated through critical thought and review of literature but not necessarily tested against coaching practice, while 'of' models were grounded in practice but not always tested against previous theoretical ideas. In addressing this dichotomy, we took a 'middle way' (Abraham et al 2006); an approach that developed a model 'for' coaching and then tested the model through grounded then led interviews with expert coaches selected based upon recommendations of Gilbert and Trudel (Gilbert & Trudel 2004a; Gilbert & Trudel 2004b).

Our model drew on three major ideas that seemed to underpin effective coaching. The first was that effective coaching requires the application of knowledge from several linked domains to develop optimum learning environments (Berliner 1991), in order to develop and then achieve set goals. As such, effective coaches must draw from and balance often contradictory ideas derived from different theoretical and experiential perspectives. For example, experience and research suggest that many (but not all!) children like competition but equally experience and research can tell us that focusing on competition can create barriers for many children and/or develop inappropriate long term motivational associations (Chen & Hancock 2006). Consequently, the decision to introduce or remove competition is not as black and white as it is often painted.

The second was that effective problem solving and DM requires the development of high level thinking that enables several sometimes competing ideas to be considered, often leading to several potential solutions (Abraham & Collins 1998; Abraham et al 2006; Biggs & Collis 1982) that the coach will have to 'orchestrate' (Jones & Wallace 2006) into meaningful actions. Furthermore, the highest level thinking relates to selecting the best option from these several solutions and being able to commit to, take responsibility for and justify that decision, whilst also acknowledging that the solution is likely to evolve over time (Perry 1988).

Finally, in order to support such higher order thinking, the coach will need to develop at least a conceptual competence or, more preferably, a declarative<sup>1</sup> expertise in the range of required knowledge bases in order to more accurately identify, define and solve athlete development barriers through a DM process (e.g. Rutt-Leas & Chi 1993).

Consequently, the schematic was built on the premise that the design of effective coaching environments is based on an ongoing series of 'pros and cons', trade-off decisions taken at a micro, meso and macro (e.g. activity that minute, versus work in that session, versus programme for that month) level. The final schematic is displayed in Figure 3.4.1.

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<sup>1</sup> See the subsequent section for an explanation and application of this term

The design of the schematic was informed by categorising required knowledge in two ways. The first categorisation (columns one and two) focuses on required knowledge from a declarative or knowledge source point of view (column one) and application or procedural<sup>1</sup>/conceptual point of view (column 2). Within both of these columns is the second knowledge categorisation method, splitting knowledge into that which helps the coach to;

- understand the athlete (scientific disciplines - ‘ologies and their applications)
- understand the sport (sport specific, technique and tactics)
- understand the learning environment (pedagogy; drills, communication)

Finally, the set of arrows display the need to seek and consider links within and between domains of knowledge – i.e. the process and practice of coach decision making.

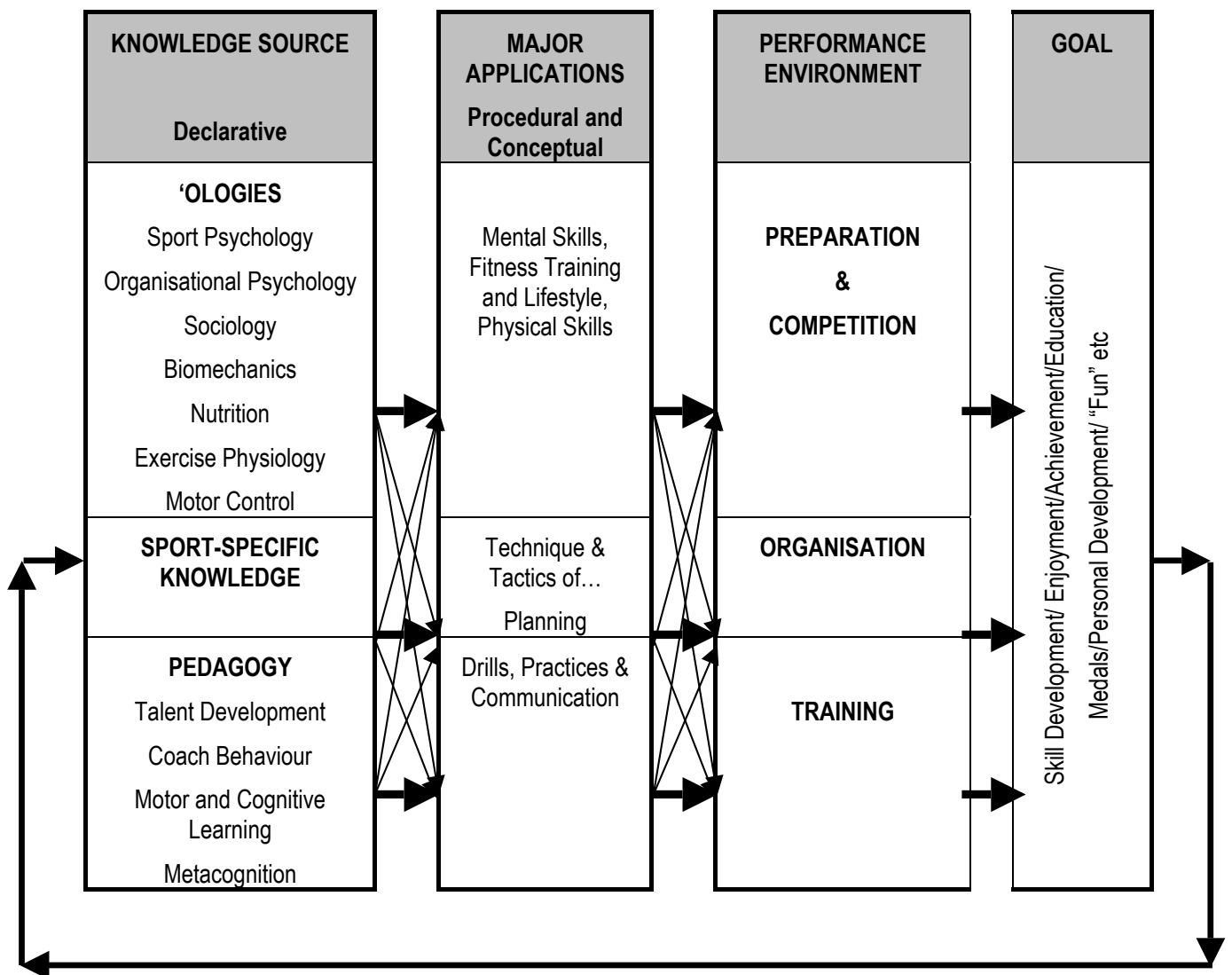


Figure 3.4.1: The Coaching Schematic, illustrating the comprehensive and required emphasis to establish and promote effective coaching practice in performance environments. Arrows indicate level of cross linkage within thinking and DM processes. (Adapted from Abraham et al 2006)

### **Potential Limitations of the Schematic....and other research on coaching**

Throughout this chapter we will challenge performance psychologists, coaches and performers to critically examine the way they coach or are coached, and to be equally critical about reading research based chapters/papers such as this one. However, if this is our goal we must be up to this task ourselves and practice what we preach when introducing ideas such as the schematic. Therefore, while Abraham et al (2006) provide strong evidence for the validity of the schematic it is important to acknowledge the limitations of this work. Indeed there has been criticism of using models in coaching in general (Cushion et al 2006) and the schematic in particular (Cushion 2007). The main thrust of the argument being that two dimensional models of coaching cannot accurately reflect the complexity of a coaching process that is underpinned by the three key ideas identified earlier (i.e. drawing knowledge from linked domains, effective problem solving and decision making, conceptual competence and/or declarative expertise etc), and including a coach, an athlete, other coaches, other athletes, and the environment within which all of these key people operate. Furthermore, there are significant others such as parents and teachers who can further impact on the coaching process (cf. Chapter 1.4). Such complexity led some researchers to conclude that coaching is not as planned and systematic (e.g. Saury & Durand 1998; Cushion et al 2006) as others would suggest, (e.g. Lyle 2002). In fact, coaching may well be similar to occupations such as social work which have to contend with the “swampy lowlands” of practice – where the randomness of human behaviour can lay waste to the best laid plans (Thompson, 2000).

While there is some truth in these interpretations, we would argue (and do so in the next and subsequent sections) that (good) coaching is, and indeed must be systematic. We just had/have to get better at identifying and developing the systems that can and do cope with the ‘swampy lowlands’. For example, how does an expert coach of youth athletes keep a session on track when one or two seem intent on disruption? How does an expert coach of elite athletes keep a group of headstrong performers focused when jealousy can quickly lead to confrontation? Expertise research in coaching would suggest that good coaches will spot these sorts of problems earlier, understand the problem better and draw on knowledge to solve the problem (Abraham & Collins 1998; Schempp et al 2006). However, such descriptions don’t actually describe the DM systems within each of these stages at both an explicit and implicit level (Nash & Collins 2006), making it difficult to pass this vital metacognitive activity on to less expert or even novice coaches.

Given that the schematic presented was validated by a group of expert coaches (Abraham et al 2006) and further pilot testing (Abraham & Collins 2006; Collins et al 2003) has supported the explanatory power of the schematic, we would suggest that the approach of explicitly considering;

- the athlete,
- the sport
- the learning environment

in a structured manner holds much for understanding and developing the coaching/skill development DM process even at the swampy levels<sup>2</sup>. In summary therefore, the outcome of a process based around the schematic leads to a holistic

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<sup>2</sup> See also the arguments built around Figure 3.4.4 later in this chapter.

approach to coaching and skill development that goes much further than drills and a pitch, track, court, pool or studio in or on which to execute them.

### *The Goal Driven Nature of Coaching*

To conclude the discussion relating to the original schematic, the work of Abraham et al (2006) and Smith & Cushion (2006) has shown that good coaches are constantly setting and solving goal-based problems, in line with the final column of the schematic. However, while there is a great deal of applied work examining goals from a ‘SMART’ perspective (e.g. Weinberg & Gould 2003. See also applied content in Section 4 of this book), goals should perhaps be more realistically viewed as our attempt to formalise a problem that then needs to be tackled. Reclassifying goals in this way identifies how professionals cope with the evolving nature and swampiness of their practice (Bowes & Jones 2006). As such, goals can occur on a moment to moment basis within a training session which are probably just as, if not more, indicative of a coaching process than a long term 5 year SMART goal. This does not mean that we feel long term plans are unnecessary or that SMART goal setting is not important. It is, however, recognition that effective coaching is NOT JUST the unchanging implementation of a carefully crafted and well considered set of plans (it’s March so the plan says you should be .....!). Rather, the whole process HAS to be flexible by the minute, session or month, with both goals and the means of achieving them subject to considered refinement throughout the process (it’s March so the plan says you should be, but you’re doing very well so .....). This need is echoed by the increasing recognition that physical preparation schedules must be flexible and varied according to individualised measures of progress (see Chapter 2.4).

Reflecting this imperative for a constant “test and adjust” approach, problem based learning has been identified as one way that education can begin to prepare professionals, such as coaches and doctors, for working in an environment where new problems and goals commonly occur (Jones & Turner 2006; O’Neill et al 2002). Consequently, a coaching process can be viewed as an ongoing series of goal related problem solving and DM that can occur on a macro, meso and micro level. Furthermore, these goal-pursuit process refinements can occur in both a systematic (e.g. Lyle 2002) and non systematic (e.g. Saury & Durand 1998) manner. We will exemplify how this process works in the *Modus Operandi for DM* section later in this chapter. The main point is that “goal-directed” should not mean stick rigidly to the plan; the best performances accrue from keeping the goals firmly in mind, but varying the route so as to fully exploit the challenges and opportunities which emerge along the way.

## **2. Optimising Coach DM - Providing a Theoretical Platform**

Thus far we have outlined our arguments about how and why effective coaching, and therefore skill development, should be viewed as an ongoing goal-led, problem solving and DM process. We have also identified a schematic designed to reflect this process. The next key issue is to consider how coaches can implement this work in their own practice. In order to answer this question it is worthwhile exploring some of the underpinning theory of DM further before concluding with a method for structuring this process in coaching.

### *Procedural and Declarative Knowledge – The Underpinning Theory*

In order to understand DM it is worth understanding ‘knowledge’, and how it is acquired and ultimately used within problem solving. Anderson (1982) developed a theory that identified how knowledge could be split into two broad domains; declarative knowledge and procedural knowledge. Declarative knowledge can be defined as the ‘why’ knowledge or the knowledge of understanding, while procedural knowledge is ‘doing’ knowledge or knowing how to do something (see Abraham & Collins 1998b for a more in depth discussion of this topic within the coaching environment). This separation is important since it explains how it is possible to have one without the other, i.e. the coach who does something (procedural) without knowing why (declarative), or the researcher who knows why (declarative) something works but cannot apply that knowledge practically. Similarities can be drawn here to the theory-practice link (or lack thereof) which SHOULD underpin all work in performance – indeed, all parts of this book.

In explaining his theory, Anderson (1982) further defined procedural knowledge into two categories; broad proceduralised knowledge and specific proceduralised knowledge. Specific proceduralised knowledge is knowledge specific to very few or just one situation(s). In contrast, broad proceduralised knowledge enables us to approach similar problems in a standard way (even if this standard way is not always particularly useful, i.e. trial and error). For example, in teaching English you could provide a general rule that to pluralise a noun requires the addition of ‘s’. However, there are specific occasions when this general rule does not apply, i.e. the plural of ‘sheep’ is ‘sheep’ while the plural of ‘coach’ is ‘coaches’. Similarly, in coaching you could provide the general rule that athletes should be taken out of their comfort zone, however there may be a specific occasion when this could be negative for performance and so a specific alternative approach may be required, (see Figure 3.4.2).

Returning to the schematic, therefore, it becomes more obvious why broad procedural rules are useful in structuring and understanding complex environments. For example, mental skills techniques and drills (see column two of the schematic) are obviously important broad procedural ideas in coaching. However, if the underpinning theory/declarative knowledge is absent, use by coaches is ultimately limited to doing without truly understanding. This situation arises because it is the declarative knowledge, or understanding of a situation that allows broad procedural rules to be used to search out the most appropriate action in each individual instance (i.e. specific procedural knowledge). The alternative is to rely on the same general approach in a catch all manner for a whole range of similar but not exactly the same problems (Abraham & Collins 1998b; Pennington et al 1995) and accept that things may be missed, i.e., ‘I seed lots of sheeps in the field daddy’ is cute from a 4 year old but indicative of poor English grammar education in a 36 year old! Or put another way, a smart coach knows why SMART doesn’t work for everyone.



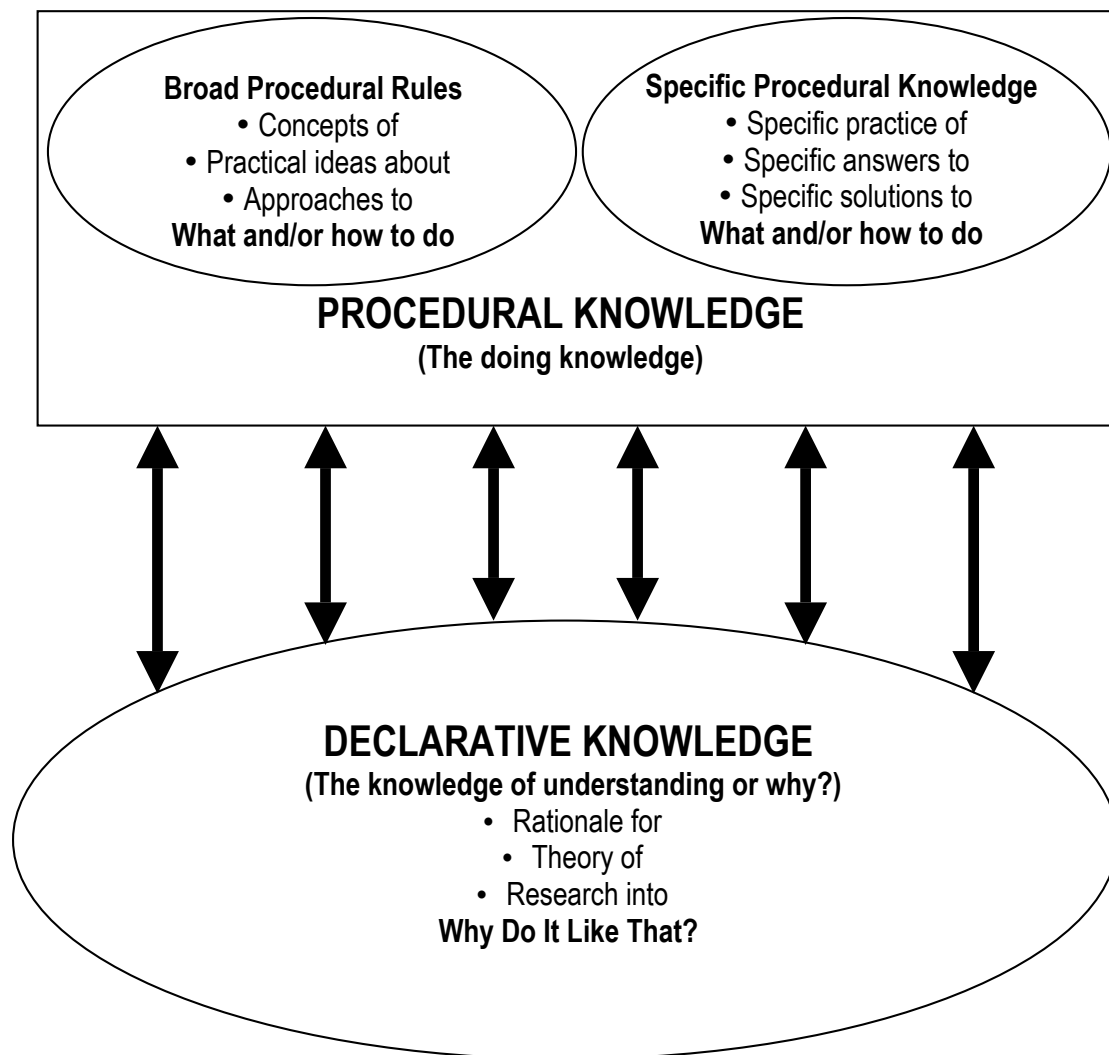


Figure 3.4.2: Summary of the Anderson's (1982) theory of procedural and declarative knowledge and the relationships between them

Perhaps crucially, declarative knowledge strongly contributes to our ability to transfer learning from one environment to another (Pennington et al 1995). In fact, taken to its extreme, declarative knowledge ultimately underpins our ability to be consistently innovative (as opposed to getting lucky once or twice) since this is the ultimate form of transfer, i.e. coming up with an idea that is completely new to us that hasn't been provided by someone else. Thus, as a current and pertinent example, consider the theoretical content (declarative knowledge) we are presenting; hopefully with useful exemplar applications (i.e. procedural knowledge) but certainly lacking a completely comprehensive set of implications for your own specific environment, even if such a thing were possible. In essence, innovation is the goal of this chapter by providing the reader with declarative knowledge that provides the basis for new ideas and practice.

A useful analogy actually comes from gastronomy. The innovative chef is the one with a full declarative knowledge of why different foods, spices and herbs taste like they do and why different cooking approaches change the final flavour and texture etc of the food. This enables the chef to create new dishes and sell recipe books to exploit this creativity! By contrast, the willing, enthusiastic but lower level cook who goes

out and buys the book, can follow a procedural recipe to recreate a dish like the innovative chef so long as everything goes smoothly. However, if even a small part of the procedural recipe starts to go wrong in practice, the enthusiastic cook is soon at a loss as to what to do since they lack the declarative knowledge needed to solve the problem. To complete the analogy in coaching therefore, beware the book of drills unless you understand where they come from and why they work – or know someone who does!

Finally, it may appear that we are claiming that theory and empirical knowledge (i.e. research) **IS** declarative knowledge – but this would be inaccurate. In fact our personal declarative knowledge is best developed through our own explicit cognitive elaborations of experience (Pennington et al 1995), albeit that reading is one of those experiences. What we are saying is that theory and research represents an existing, comparatively valid and reliable source of declarative knowledge which, if experienced through use, challenged, reflected and elaborated upon, can result in a highly effective knowledge base for practitioners to use in future decisions. This theory-practice link is perhaps most eloquently and succinctly summarised by Lewin (1952) who stated that “There is nothing more practical than a good theory” (cited in Vansteenkiste & Sheldon 2006, page 63). Indeed, this approach would suggest that the concept of a ‘theory-practice gap’ doesn’t actually exist, at least for coaches who reflect since they will have reasons (theory) for doing what they do. The gap is probably better explained as lying between the *academic theory* of research and the *personal theory* of the practitioner. Consequently, really critical reflective practice should involve being aware of and reflecting on personal theory against the ‘standards’ that academic theory brings (Strean et al 1997).

To conclude the discussion on knowledge, we must consider the role of tacit knowledge in action. Thus far we have referred to good coaching as an explicit and thought through process that is learned through an explicit manner: i.e. reflective practice is an explicit and conscious activity which encourages the development of new declarative knowledge and so on. In contrast, implicit learning “is the acquisition of (tacit) knowledge that takes place largely independently of conscious attempts to learn and largely in the absence of explicit knowledge about what was acquired” (Reber 1993 page 5) (cf. Chapter 3.2). There is little doubt that much of human behaviour is directed by tacit knowledge acquired through implicit learning that occurs by simply operating and immersing ourselves in social settings. Indeed, this learning underpins many of our assumptions and deep seated beliefs that we are, consequently, not particularly aware of (Strean 1997). It is also why, almost unconsciously and automatically, social norms are developed i.e. footballers act like footballers, dancers act like dancers etc., and ‘boxes that should be thought out of’ are cast in stone. Given such a theoretical standpoint, there is an argument that explicit education has only a limited impact on behaviour until it actively links and engages with these beliefs and assumptions gained, in part, through implicit learning (c.f. our earlier comments about academic theory needing to link with personal theory). One of the keys to this is for coaches to understand and critique the way they think about their athletes, their sport and learning, indeed even themselves! In fact, this is why coach educators should understand their coaches, subject matter and the learning process **equally** well. Accordingly, as pointed out by Strean (1997), it is not until we become aware of these assumptions (tacit knowledge) that we become truly critically reflective and consequently more able to think through our explicit decisions. In short,

while tacit knowledge is unavoidable in any setting not least coaching, it is those coaches who gain an explicit awareness of, and critically reflect on, this tacit knowledge who are best able to make the most use of it – declarative knowledge is still key.

#### *Linking Academic Theory to Personal Theory to Practice*

It is from this theoretical position that we believe a more complete understanding can be developed of learning and practice within coaching. Coaching has often been viewed as being defined through ‘doing’ (Abraham & Collins 1998b) which can, in turn, be conceptualised through competences. Consider, for example, the British application of National Vocational Qualification (NVQ) systems developed in bricklaying and hairdressing to the assessment and certification of coaches. Such an assessment process would evaluate knowledge of, say, health and safety, by confirming that the coach completed a series of pre-session checks in the environment (e.g. checking the surface for slippery or damaged sections, inspecting equipment, etc.). Consequently, and expanding on this comparatively simple but easily justified approach, the focus has been on what coaches behaviourally do – we only need to look at the vast number of books that are based around drills. While such outcome-based coaching competences, i.e. the ability to produce a session plan, manage a group or demonstrate a skill are obviously important, it has meant that other, probably more key characteristics, such as reflective practice, problem solving, DM and innovation have been missed in the education and evaluation of coaches (see Thompson 2000 for a more in depth review of the competency vs professionalism debate). In essence the focus has been on what, and to a lesser extent, how coaches do (procedural) as opposed to why (declarative) they do it.

This dichotomy between what (how) and why is exemplified by an unexplored key point made by rugby coach Ian McGeechan (within Jones et al 2004) which linked the practice and personal theory of coaches against academic theory. During the reported interview, McGeechan identifies his frustration in teaching tactics to coaches which are already out of date. In essence, his frustration appears to be born out of telling what he did, i.e. out of date procedural knowledge. So the answer is to teach more up to date tactics? Maybe; however, Anderson’s theory would suggest that it would be more beneficial to identify what broad procedural rules Ian adheres to in critically thinking about tactics and why those procedural rules work so effectively – in short, revealing the underpinning declarative theories that structure his problem solving and DM. We would argue that this would be far more beneficial to coaches in enabling them to develop their own tactics in the future.

In simple terms, therefore, any educational sessions with a ‘master’ (or mistress) coach must explore the whys (not least because this may reveal that the master coach doesn’t know why because their behaviour is based on tacit knowledge) as well as the wherefores. You can listen to, watch and apply the methods of a successful coach, assuming of course that what s/he is doing is genuinely causing the high quality achievements of their performers (cf. our earlier comments). Unless you know why this, and why not that, method was used, however, you lack the knowledge to adapt the advice to your own circumstance. Consequently, a whole series of problems will accrue from uncritical and uninformed acceptance of advice from someone who has, by definition, been successful in a different set of conditions with a different type of performer. Declarative knowledge structures, and their application and elaboration,

are a coach's best protection against such problems AND the way in which they can grow their own creativity so that they can design their own new answers to their own pertinent questions.

### 3. A Modus Operandi for DM in Coaching

To facilitate the theory to practice process, there is a need to 'operationalise' all these ideas into an approach which can be used practically. This process usually benefits from thinking through, and often simplifying, the advice to generate a set of procedures/guidelines for practice. Coaches and performers typically like such 'clear cut and practical advice', and question more complex approaches as 'academic' or 'impractical'. Be careful though, simplification is seductive; often what practitioners crave but, unless you understand the nuances and qualifications underpinning the bland statements, you can fall into the same trap of blindly following a recipe. This won't inevitably be wrong, but it will inevitably provide you with sub-optimum answers AND limit your own development by inhibiting your ability to generate new wrinkles to more effectively meet your own challenges. So beware unthinking acceptance of simple straightforward models – "that way lies danger" (Master Yoda, Star Wars Part IV).

So, remembering this caveat but in pursuit of clear advice, let's start by developing a simple version of the coaching schematic in Figure 3.4.1. Figure 3.4.3 presents the essence of the original in simple form; note that:

- This whole process is goal-directed; a combination of one goal for the total process (session, programme, etc) and desired outcome goals which accrue from the various options from each domain and combinations thereof.
- The coach's behaviours are based on decisions which draw on a blend of three domains of knowledge.
- The three are distinct, and may offer different or differing answers.
- The science of coaching lies in knowing and understanding the implications of each domain, AND their interactions.
- The art lies in developing, refining and deploying the optimum 'blend' from these domains.

In fact, redrawing the schematic in this manner is in keeping with the tone of this chapter in that Figure 3.4.3 reflects what research says about effective problem defining and solving. Anderson (1987) has described how, as humans, we can rely on a range of weak problem solving methods such as trial and error or heuristic approaches such as working backwards from the solution in the absence of more effective and efficient methods. They are termed weak because these methods lack a coherent strategy to DM, and can lead to people working hard but not necessarily smart. In contrast to these approaches, research in disparate DM environments such as coaching (Abraham et al 2006) computer programming (Davies 1994; Zeitz & Spoehr 1989) and medicine (Johnson et al 1981) display how experts who are strategic in their thinking take a similar, breadth first and hierarchical approach that deliberately draws on knowledge from several interrelated domains in order to understand and solve a problem. As eloquently described by one of the coaches in the Abraham et al (2006) study:

*"Are you familiar with the move towards synoptic papers at A level (an optional national examination taken in England and Wales by 18 year olds – Ed)? Synoptic papers basically draw knowledge from all areas to answer a*

*central question. That is what the good coach does. They have to be good at the synoptic work. They have to be able to draw things from different sports. They have to be able to bring different sciences etc to answer the central question or problem. That's what good coaches can do. You can't pigeon-hole things for a coach and if I was looking for an elite coach that's what I would be seeing, somebody who could bring a whole lot of different knowledge to solve problems”.*

(Team Sport Coach - Abraham et al 2006, page 558)

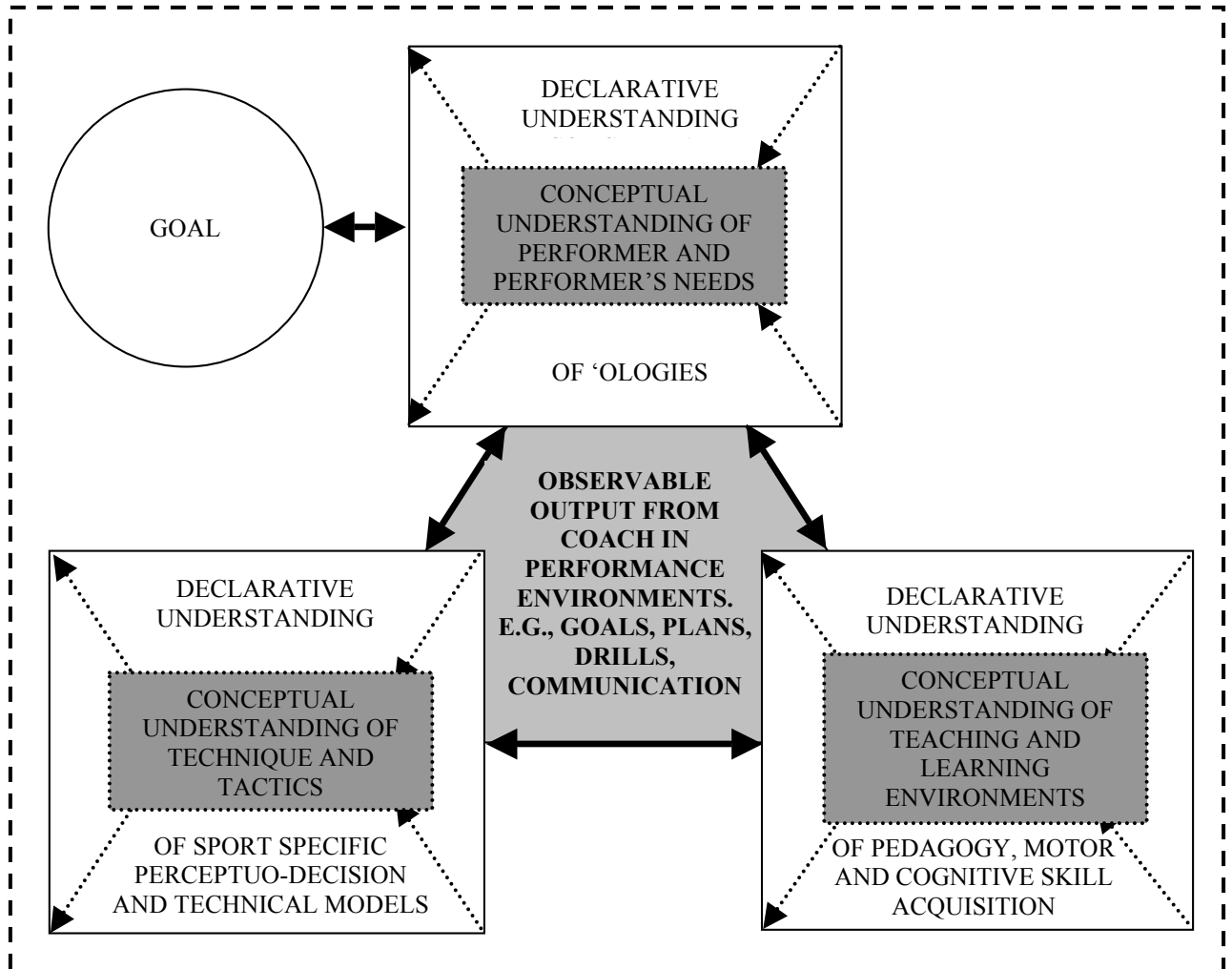


Figure 3.4.3: The Redrawn Coaching Schematic showing a conceptual view of goal based coach problem solving and decision making. N.B for the sake of brevity the term ‘conceptual’ has been used in place of ‘broad procedural’.

Consequently the redrawn schematic in Figure 3.4.3 represents a breadth first approach to coach problem solving and DM. There is, however, one further bonus of drawing the schematic in this fashion. The centre of the triangle shows the observable output from the DM process. These outputs are essentially solutions to problems, or specific procedural knowledge. As such, these outputs become a knowledge source in themselves that can be called on again in the future to answer similar problems, a process termed tactical learning by Anderson (1990). These ‘personal favourite’

solutions are different to the recipe approach we described earlier, as they are arrived at through critical reflection and are justifiable against theory. Even here though, regular revision is important if the coach isn't to fall into the comfort trap of unthinkingly providing the same set of sessions off pat.

So how is this approach deployed in practice? Clear guidelines are both possible AND extremely useful, but please remember the cautionary approach highlighted at the start of this section. Practically, the coaching process can be viewed as a series of decisions, initiated by and then finally checked against a goal, which generate the best fit option plan for that particular setting. This process is repeated ad infinitum, as aspects of the situation change, across any timespan, micro, meso or macro. So, Figure 3.4.4 displays how this DM process is one that occurs constantly and which is both cyclical and linear in nature. Thus, this DM cycle is repeated many times within a session, in developing then ongoingly refining a programme of work on a weekly/season/quadrennial basis, or in planning/refining a development plan across the performer's total lifespan.

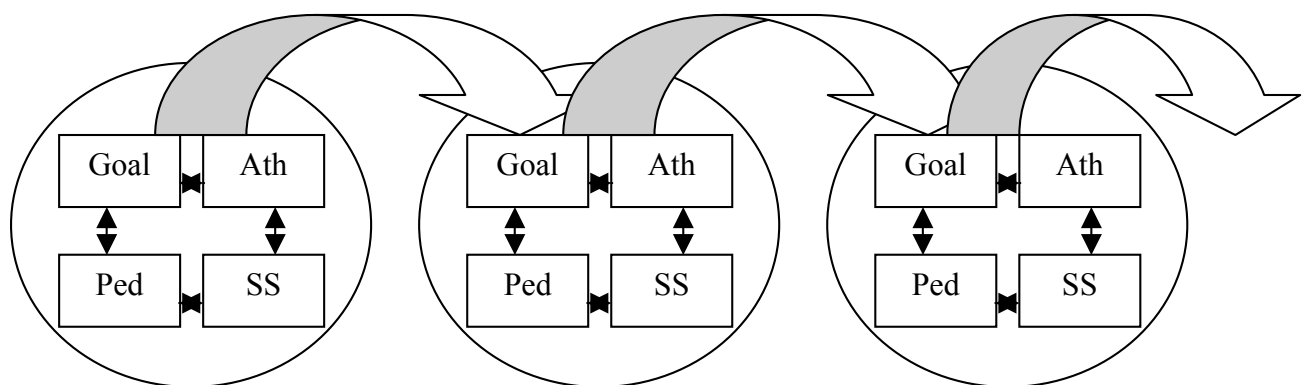


Figure 3.4.4: A holistic view of an ongoing series of goal based DM based on the three knowledge domains (Ath – athlete, SS – Sport Specific, Ped – Pedagogy).

A quick word about the genesis and scope of this model. We have already shown how research in several professions is increasingly focussing on the cognitive and metacognitive strategies of experts as a means of informing the development of novices and intermediates. For this cyclic approach, research suggests (Abraham et al 2006) that thinking through options in this way **IS** a characteristic of expert thinking in planning a coaching session or programme. When expert coaches think through plans in slow time (as opposed to using tacit knowledge as described earlier) they demonstrate this three domain approach rather than merely thinking through things in a chronological flow. Accordingly, and reflecting the 'expert thinking' approach we would suggest that novices or intermediates benefit from exposing their thinking and reasoning based on this structure, and talk through the DM process, as a structured part of their development. Applying this approach in a 'whole-part-whole' fashion is particularly valuable for ensuring the ongoing development of already proficient practitioners. When 'forced' to critically consider and choose between options, experienced coaches are encouraged to expand their repertoires and explore the applicability of new ideas. In fact, we would suggest that this style of 'critical reflection' should be a consistent part of the repertoire for any aspiring expert coach. Without it, they won't stay expert for long!

### **3.4.3 : A specific focus on pedagogy**

Thus far we have focused on a holistic or ‘whole’ approach to examining coaching. However, as indicated in the overview at the start of this chapter we would also like to focus on the pedagogical ‘part’ of this holistic picture. Our reasoning for this is that pedagogy and its application represents an area which is both ripe and overdue for further attention within coach education and practice. In short, our research suggests that, as the weakest area, attention here may provide the greatest gains, at least in immediate return.

Perhaps a good place to start therefore would be defining what pedagogy actually is. At its simplest, pedagogy is the science and art of teaching (Reber 1985). Given such a broad definition it could be argued that the schematic presented in Figure 3.4.1 is a ‘pedagogical’ model as it has been designed to reflect a teaching and learning process. Indeed, such a broad approach is used by Armour (2004) who calls for pedagogical environments to consider coaches, learners, knowledge and the learning environment. For the purpose of this chapter, however, we would like to delimit pedagogy to focusing on the science of learning and the subsequent impact this knowledge can have on coaching.

Some authors (e.g. Potrac et al 2000) have questioned the role and impact of sport sciences in coaching, due perhaps to its reductionist nature and narrow view of athlete development. There is little doubt, however, that many coaches have made use of research in the parallel domains of physiology, psychology and biomechanics e.g. strength and conditioning, fitness, periodisation, technique analysis, mental skills and nutrition (Abraham et al 2006). In so doing, coaches have attempted to make judgements and decisions (Martindale & Collins 2007) that are more objective and less prone to the vagaries of trial and error or other ‘weak’ problem solving approaches (Anderson 1987). However, there are real and empirically justified concerns that similar advances haven’t been made in breaching the theory-practice gap in skill acquisition and learning (Abraham & Collins 1998b; Collins et al 2003; Morgan 2006; Potrac et al 2000; Potrac & Cassidy 2006; Vickers et al 2004; Williams 2006). Given the somewhat self-evident relevance of learning to the coaching process, this represents a serious concern since knowledge derived from empirical studies (e.g. Chambers & Vickers 2006) and conceptual work (Vygotsky 1978) in the area of learning offers the opportunity to plan deliver and review learning opportunities against a valid and reliable knowledge base. In short, the declarative knowledge base can drive both innovation and personal development.

#### **1. The Problem of Only Reflecting On Experience**

So, if knowledge derived from learning research isn’t being used, what is? We know from various studies (e.g. Gilbert & Trudel 2001; Gilbert & Trudel 2005; Nelson & Cushion 2006) that experience is the major source of coach learning and that this learning often occurs through a process of reflection. However, work in sport psychologist development by Martindale & Collins (2007) highlights the dangers of learning solely through experience, since the reflective practice underpinning experiential learning is only informed by a set of conditions distinctive to that individual’s own experience. In other words, there is no opportunity for reflection back on theoretical and empirical standards (Strean et al 1997) to challenge and understand the experience, a method that is the basis of development in other professions such as medicine (O’Neill et al 2002). Or put even more simply...how can

you know what you have never experienced or been shown?! Consequently, problem setting, solving and DM with respect to learning environments for many coaches is likely to be based on experientially gained knowledge at best or, at worst, on an unthinking, implicit and/or direct copy of how the coach was coached as an athlete.

The lack of awareness of this issue is fairly far reaching. For example, Abraham et al (2006) noted that, on examination of the work by Côté et al (1995a), there was an apparent lack of awareness of communication behaviours used by the expert gymnastic coaches interviewed in their study. Such a lack of awareness has also been supported in behavioural observation studies displaying that coaches have poor recall of behaviours which they have used during a coaching session (Smith & Smoll 1996). However, what is not clear from these studies is whether this is poor recall or just a lack of awareness, i.e. it is very difficult to recall an event if you were not even aware one had occurred. In the case of very experienced but infrequently self reflective coaches, the fact that DM is mostly tacit serves to almost completely eliminate opportunities for self-development, or even a structured contribution to others through mentoring. It's hard to suggest what you don't know you do! More recent work, however, has begun to reveal the issues involved in whether or how coaches consider the development of learning environments.

#### *Evidencing the problem*

Potrac & Cassidy (2006) discuss the unfortunately common coach who can't understand why their athletes are not picking up the skills being taught; one who often refers to the athletes as being uncoachable. This infers that the coach does not consider or is not even aware of their role in the athlete's development. Whilst Potrac and Cassidy offer only anecdotal evidence of the problems caused by coaches who lack pedagogical knowledge, other work offers some level of empirical evidence. For example, when investigating the DM of expert coaches in planning and running a coaching session, Collins et al., (2003) found that, out of a sample of 13 coaches, only one explicitly referred to considering the educational environment when describing how they planned a recorded coaching session. Interestingly and more positively however, when talking through their sessions, all of the same coaches did refer to at least one of the following learning-focussed constructs; retention and transfer, player understanding and/or the need to introduce difficulties to the learner. This would suggest that the pedagogical element in session planning is being considered in a tacit or semi tacit manner – i.e. the need for these forms of learning environment is so automated the coaches do not actively consider them in planning a session. While it is important to note that the pedagogical practise of these coaches was being directed by learning ideas that would equate well with learning literature, the lack of explicit thinking about the area would make it difficult to reflect on this element of their practice, or discuss it with other coaches.

A further study by Abraham & Collins (2006) investigated the problem solving skills of a group of athletics coaches. In this study, groups of event specific coaches were given the following scenario, with the scenario contextualised to the specific event;

*You have a situation where a talented 14 year old athlete has an ongoing technical problem causing poor:*

- *stride rate in the 800M, or;*
- *take off and sequencing in the triple jump, or;*



- *start out of the blocks and first 20 metres in a 100 sprint/ sprint hurdles, or;*
- *consistency in throwing distance in the javelin.*

*What would you do to resolve the problem?"*

Initial approaches to solving the problem were focused on what the athlete was doing wrong and why, with justifications made through reference to sport specific and 'ology models. In contrast, however, there was very little reference to examining the role subsequently to be played by the coach in developing and administering an appropriate learning environment – findings which support the anecdotal evidence from Potrac & Cassidy (2006). When each of the focus groups were specifically prompted to discuss what they would do in a typical session designed to resolve the problem, there was once again a lack of declarative reasoning to drill design and communication methods. The interventions discussed would often rely on constraining the environment in a way that would logically lead to and behaviourally reinforce the correct technique but not, significantly, on what active interactional strategies could be used with the learner. While there is evidence that supports the use of a constraints based approach (e.g. Davids et al 2008) in designing practices, the depth of understanding revealed by these coaches was more based on treating the athlete as a passive participant who was part of an 'if-then' relationship that would lead to the required behaviour. These approaches had more to do with the consistent and solution focused drills discussed by Schmidt & Wrisberg (2004) than a process where the athlete would be an active self determined participant in their own discovery learning.

Of course, at a certain level these methods are effective. For example, they can often lead to short term and rapid changes in behaviour (c.f. our earlier comments regarding the difference between learning potential and learning) but they can also prolong ongoing technical problems as little genuine learning (a relatively permanent and observable change in behaviour) actually occurs (Schmidt & Bjork 1992). This didn't seem to be a consideration for the coaches in the Abraham study described above, however. In fact, some coaches wanted to go straight to drill design before any real consideration of the factors underpinning the scenario provided: in essence trying to solve the problem before they had understood it. Again, this would be reflective of our own experiences in coach education where novice and even some quite experienced coaches often want to dive straight in, designing drills before spending any significant time working on the aims and goals of a session, a series of sessions or even a longer term plan from an individual, sport specific or pedagogical point of view.

A further series of studies completed by Morgan (2006) with football academy coaches identified a number of pertinent findings. For example, Morgan found that the content of feedback provided to players was delivered on a 2:1 ratio of general non informational to specific informational feedback. While similar findings have been found in behavioural observation literature, the more important finding from Morgan's work was that, irrespective of the skill acquisition value (or lack thereof) of their feedback, coaches were not even aware of their differing use of the different types. Furthermore, while significant probing did reveal that the coaches had a semi awareness of the effect the differing approaches to feedback could have, (mirroring Abraham et al's 2006 ideas that much of a coach's behaviour operates at a semi tacit

level), there was certainly no explicit planning relating to the use of feedback or the impact that this would have on an athlete's development. Interestingly, most of the coaches had a greater awareness of their use of questioning; however, only a minority had a specific understanding of how and why this tool could enhance athlete learning. The remaining coaches viewed questioning as a method to test players as opposed to encouraging problem solving, cognitive development and transfer. Irrespective of their understanding of how and why questioning works, none of the coaches referred to any strategic approach to planning for, delivering and critiquing learning environments.

More encouragingly, Smith & Cushion (2006), in a similar fashion to Morgan (2006), investigated the behaviours and cognitions of academy football coaches in the UK. In this instance, however, the setting was in-game as opposed to training behaviours. This study displayed that these coaches had considered the effect their behaviour would have on the learning of their athletes, providing excellent insight into the way good coaches are very rarely cognitively silent even if their behaviour is! Smith & Cushion (2006) deductively ascribed the behaviours and cognitions of these coaches to taking a constructivist approach to athlete learning, such that athletes must be allowed to develop their own knowledge and skills through a structured and lived learning process. However, in common with the Collins et al (2003) study, there are no reported findings relating to the DM used by the coaches to shape the learning environment and whether their approach would change dependent on the context of the games. Irrespective of this, any lack of a priori DM would reduce the likelihood of self analysis after the event. In fact a contradiction is revealed in the reported cognitions and behaviour. The coaches reported a wish to get players to “work things out for themselves and to learn through the experience”. Yet a level of importance was attached to using pre-instruction in order to pre-empt mistakes happening, essentially limiting the athletes' ability to learn from their mistakes. Interestingly, coach participants from Martindale et al's (2007) study examining effective talent development environments reveal an opposite inclination, to try and avoid using pre-emptive instructions, in order to more effectively achieve this “think for yourself” goal.

While such contradictions are always going to be observable in coaching as in other non-exact sciences (Abraham & Collins 1998b), we should not necessarily be trying to work out who is right and who is wrong. Rather, the focus should be on examining the DM processes and underpinning rationale that led to such behaviour. In general terms, where there is an obvious and explicit DM process that draws on a knowledge base influenced by relevant theory, evidence and experience, then the solution and resulting behaviour is likely to be of higher quality than if the solution was informed by only one or two of these sources (Streat et al 1997). Furthermore, an explicit DM process is more likely to be associated with the use of a more critically informed approach. For example, even though a constructivist approach was ascribed to the coaches' approach in the Smith & Cushion (2006) study, at no point did the authors suggest that such a philosophical/theoretical underpinning was identified by the coaches – so was there a thorough DM process and rationale leading to the behaviour of the coaches or was it guess work or experientially gained, belief led DM?

### *Is this problem really a problem?*

An obvious question at this point may be; does it matter what approach is being taken so long as goals are being reached? The evidence supplied so far suggests that the coaches from the Smith & Cushion (2006) study were certainly using a worthwhile and conscientious approach to athlete development, which appeared to tie in with pedagogical ideas of constructivism or empowerment/athlete centred learning (Kidman et al 2005). In the light of this double whammy of clear progress and commitment to empowerment, it may seem a little churlish to criticise/critique the practice of these coaches. In response, however, we would return to the argument that, in the absence of an explicit DM process and an accessible theoretical and empirical knowledge base, reflective practice must rely heavily if not exclusively on experientially based interpretations, thus limiting the explanatory power of that reflective process. Furthermore, as referred to earlier, the absence of such declarative knowledge also limits the coach's ability to develop their own innovative new teaching and learning approaches.

Finally and as previously mentioned, we are promoting the metacognitive (i.e. thinking about why you think/behave the way you do!) approach, and associated/consequent cognition and behaviour, which is increasingly acknowledged as a characteristic of superior performance. Coaches involved in both the Smith & Cushion (2006) and the Collins et al (2003) studies all identified general approaches that sit well with theoretical ideas of learning, albeit there was an apparent lack of depth to their explanations. However, these were all high quality coaches, most of whom were graduates, which led (Smith & Cushion 2006) to eloquently ask;

...whether their behaviour and their ability to “intellectualise” the coaching process in this way would be common to all coaches working at this level within sport? (p 364)

As revealed at the beginning of this section, we are by no means the first to recognise the problem of transferring pedagogical theory into coal face practice. However, we would hope that by examining this problem within a holistic structure, we can gain a better understanding of the challenges facing practitioners and researchers involved in coach education and coaching practice. In summary, while there is still a lack of peer reviewed studies examining the development of learning environments in situ (almost certainly exacerbated by the difficulties in achieving methodological consistency and/or transferable messages from both quantitative and qualitative studies), the weight of evidence available suggests a generic problem in the pedagogical reasoning, problem solving, planning and delivery for coaches across the spectra of activity, qualification level and athlete age/abilities.

## **2. Addressing the Pedagogy Problem**

Given such a problem, our intention is to transfer research from the skill acquisition domain into a usable form for coaches. To do this we often utilise a “Toolbox” of applied learning tools. The goal being that when a coach plans a session (micro) a month of sessions (meso) or a longer term plan (macro) they have an explicit DM process that can integrate the pedagogical element to the sport specific and athlete elements of Figures 3.4.3 and 3.4.4. In short, the toolbox offers a ‘rough guide’ on what to do AND WHY in the pedagogy area.

### *Structuring the toolbox*

Bowes & Jones (2006) identified that coaches spend a great deal of their time working at the edge of chaos. The coaching environment is impacted by so many factors that developing a systematic, 'production line' like approach is simply impossible. In our experience, coaches typically take one of two approaches to dealing with this problem; control the chaos through a very rigid and autocratic approach or, as advocated by Jones & Wallace (2006), work with the chaos to facilitate an optimised pathway. Ultimately, the second of these two approaches must surely be the goal of coach education. The first does offer a quieter life but only the second approach will develop athletes who are equally able to deal with the chaos encountered in performance environments. In order to work with potentially chaotic environments, coaches must be able to make decisions that are based on a fine balance of pros and cons. As previously referred to, we know from expert coaches (Abraham et al 2006) that their courses of action are always based on a compromise or 'best fit possible'. So, when making coaching decisions, all coaches should be aware of the pros and cons, and be prepared to justify what they are doing against an awareness of other alternatives.

But how is this complex and intricate metacognitive skill achieved? We have already discussed how a number of broad procedural rules or concepts can be used to structure educational environments to guide planning and reflective practices. It is into this structure that more in depth declarative knowledge gained from experience and other sources (written text, workshops etc) can be integrated, thus establishing an understanding that links theory and research to a coach's own beliefs and ultimately the chaotic 'swampy lowlands' of practice. So for example, Figure 3.4.3 is designed to give a theoretically valid, broad procedural overview to the coaching process that is designed to guide the initial planning and reflective (both in and on action, Gilbert & Trudel 2005) processes of coach DM. The Toolbox (Figure 3.4.5) offered below has been designed to take this overview to a deeper level of knowledge, by structuring a tool within the pedagogical domain that is based around three further broad rules;

1. Make the content as **personally relevant** for the performer as possible – for example, how does it tie in with their development plan?
2. Promote **understanding** whenever you can, especially when working towards long term development. For example, does the performer know why they are doing what they are doing? Do you need to check?
3. For **rapid short term** results make the session (mentally) easy for your performer, for **long term development** make it harder.

Each of these rules is then associated with further in depth procedural and declarative knowledge in the form of the coaching tools.

Several key ideas were used to identify the tools that should be included within the Toolbox. The first returns to Figure 3.4.3, which identifies how the skill development process should consider the sport specific requirements and individualisation of the coaching process. Reflecting this link, Tools 1-3 in Figure 5 relates to how a coach can develop a positive and individualised coach athlete relationship through knowing and understanding the player and planning programmes that are relevant to their needs through appropriate assessment and goal setting.

Tools 4-10 relate much more to the actual skill development environment that a coach will establish. From an experiential and empirical point of view, we know that coaches communicate verbally and non-verbally with athletes and that they design

drill and practices (Côté et al 1995b) which draw on these two modalities. Consequently, it is these two approaches, communication and physical practice, that form the basis of a coach's approach to skill acquisition in training settings. In keeping with the message throughout this chapter, though, we needed to declaratively unpack these two ideas. What is communication? What is physical practice? How do they relate to athletes acquiring skill and learning?

A review of coach behaviour research (e.g. Claxton 1988; Smith & Smoll 1996) reveals that coaches use a large range of verbal and non verbal communication methods. We chose to condense these verbal and non verbal behaviours into tools 4-9 identified in Figure 3.4.5. The additional declarative information included with tool is sourced from research examining how communication strategies facilitate the acquisition, learning, retention and transfer of cognitive and motor skills. There is obviously only a limited amount of declarative information but this is deliberate. There is a host of additional information that can be found to further inform a coach's DM process; some is listed as additional reading at the end of this chapter and in essence serves as the bibliography used to develop the content of the Toolbox.

The final tool, Practice, is probably the most important tool to get right for any coach. It also means that if an athlete consistently practices a 'wrong' technique that is what will be learned – PRACTICE MAKES PERMENANT. Only perfect practice makes perfect. As coach educators we have watched novice and experienced coaches preside over coaching sessions where incorrect technique or and/or DM has gone unnoticed and unremediated. Again, therefore, we have provided various options for the coach to choose from, dependent on what they want their players to achieve from a particular session or set of sessions. It is worth noting here that we have used language associated with the skill acquisition work of authors such as Magill (2007) and Schmidt & Wrisberg (2004). However, there are other approaches to understanding the practice environment such as the games for understanding approach (e.g. Oslin & Mitchell 2006) or dynamical systems approach (e.g. Davids et al 2008) that coaches should investigate in order to identify areas of agreement and difference between the approaches. It is our contention that the information included within this chapter focuses on areas that are broadly agreed upon across the approaches.

Whilst using these tools try to remember the **three golden rules** of developing a learning environment:

1. Make the content as **personally relevant** for your player as possible – for example, does it tie in with their development plan?
2. Promote player **understanding** whenever you can, especially when working towards long term development. For example, does the player know why they are doing what they are doing? Do you need to check?
3. For **rapid short term** results make the session (mentally) easy for your player, for **long term development** make it harder. Consider the continuum overleaf.

<p><b>1 Knowing Your Player-K</b></p> <ul style="list-style-type: none"> <li>• Aids development of an effective coaching relationship</li> <li>• Helps coach understand desires and wants of the player</li> <li>• Used in an ongoing fashion helps coach understand lifestyle and circumstances of player</li> <li>• Individualisation of information - therefore greater effect</li> <li>• Enables information to meet the expressed needs of learners</li> </ul>	<p><b>2 Assessment-A</b></p> <p><b>Formal assessment best when:</b></p> <ul style="list-style-type: none"> <li>• Objective - quantifiable</li> <li>• Specific to goals</li> <li>• Individualised</li> </ul> <p>Informal assessment is a constant process, so good for:</p> <ul style="list-style-type: none"> <li>• Keeping coaching directed towards player's needs</li> </ul>
<p><b>5 Verbal Instruction-I</b></p> <ul style="list-style-type: none"> <li>• This is the preferred approach for many learners as they are used to being told what to do.</li> <li>• When instructing a technique emphasise:             <ol style="list-style-type: none"> <li>1. Sequencing of the technique</li> <li>2. Timing of the technique</li> </ol> </li> <li>• When instructing on game play/tactics emphasise:             <ol style="list-style-type: none"> <li>1. Structure/whole game sense</li> <li>2. Where current tactic fits in</li> </ol> </li> </ul> <p><b>But</b></p> <ul style="list-style-type: none"> <li>• Be careful not to always provide a constant 'answer' to problems</li> <li>• Consider using <b>Tool - QA</b></li> </ul> <p><b>If used incorrectly</b></p> <ul style="list-style-type: none"> <li>• Overload of <b>I</b> can confuse your player</li> <li>• Keep to a <b>maximum</b> of 3 or 4 key points</li> </ul>	<p><b>6 Demonstration-Expert Demo DE</b></p> <p>Performed by coach, and good for</p> <ul style="list-style-type: none"> <li>• Short term effect and rapid skill acquisition – gives an overall idea of what is required</li> <li>• Focusing attention, and motivation</li> </ul> <p><b>Negative Demo DN</b></p> <p>Demo of wrong technique, good for:</p> <ul style="list-style-type: none"> <li>• Increasing awareness of weakness.</li> <li>• Improving understanding of what was done well and what needs to be changed.</li> <li>• Consider using with QA instead of Feedback to promote problem solving</li> </ul>

<p><b>3 Goal Setting-G</b></p> <p><b>Recognised as being a major tool to improve motivation</b></p> <p>Goals should be</p> <ul style="list-style-type: none"> <li>• Short and intermediate term goals which provide a logical progression toward a realistic long term goal.</li> </ul> <p><b>Any goal set should be:</b></p> <ul style="list-style-type: none"> <li>• Objective and/or quantifiable</li> <li>• Individualised – Is your player able to achieve the goals set? Are there sub goals that also need setting? Does the player agree with the goal?</li> <li>• Situation Specific: Time of year, practice or match, matched to developmental requirements</li> <li>• Consistently reviewed so that progress is reinforced</li> </ul>	<p><b>4 Physical Guidance-PG</b></p> <p><b>Good for</b></p> <ul style="list-style-type: none"> <li>• Getting the idea of a movement</li> <li>• Developing the 'correct feel'</li> <li>• Prevents information overload</li> </ul> <p><b>Against</b></p> <ul style="list-style-type: none"> <li>• Provides a crutch for the player</li> <li>• Inhibits the player's problem solving</li> <li>• Little use if the player is totally passive when being guided, ask them to resist the movement a little</li> </ul> <p><b>BE CAREFUL</b></p> <ul style="list-style-type: none"> <li>• Be aware of child protection issues</li> </ul>
<p><b>6 Coping Demonstration CD</b></p> <p>Players watch each other, with a structured purpose and attention directed to specific elements of a technique or section of play.</p> <ul style="list-style-type: none"> <li>• Useful when coaching groups</li> <li>• Helps promote and check the understanding of the observer</li> <li>• Can increase confidence in non-threatening environment</li> <li>• Encourages self and peer coaching (buddy coaching)</li> <li>• Consider use in conjunction with QA, i.e. direct the player to a certain aspect of the demonstration and ask them for a description of what they saw</li> </ul>	<p><b>7 Question and Answer-QA</b></p> <p><b>Obtaining a considered and accurate answer from your player can:</b></p> <ul style="list-style-type: none"> <li>• Test and improve understanding</li> <li>• Provide an alternative to tools I and KR/KP</li> <li>• Emphasise and improve the DM process</li> <li>• Increase player self-confidence</li> <li>• Promote problem solving</li> <li>• Focus attention</li> <li>• Generate, secure and use player's own 'language'</li> </ul> <p><b>But avoid excessive and inappropriate use.</b></p> <ul style="list-style-type: none"> <li>• Can the player provide an answer?</li> <li>• Do you have time to ask?</li> </ul>

<p><b>8 Command Words-C</b>  <b>Word/phrase association with a movement or series of movements.</b>  <b>Good for</b></p> <ul style="list-style-type: none"> <li>• Reducing complex instructions</li> <li>• Being used in association with <b>Tool-PP</b></li> <li>• Can be used by coach and or player</li> <li>• Increasing understanding and so learning</li> </ul> <p><b>Against</b>  When used as feedback - not specific enough - reduces learning.</p>	<p><b>9 Feedback-KP/KR</b>  <b>Informational (Can be verbal, visual or 'feel' based)</b></p> <ul style="list-style-type: none"> <li>• About what he or she is doing <b>correctly</b> (try to avoid only saying good, excellent etc. Why was it good or excellent?)</li> <li>• Provides reinforcement to continue making successful attempts</li> <li>• About what he or she is doing <b>incorrectly</b></li> <li>• becomes the basis for trying to make some adjustments on the next practise attempt through the use of <b>Instruction</b></li> <li>• enhances acquisition of the skill</li> <li>• Time saver = increased efficiency</li> <li>• Can address whole or part of the skill</li> </ul> <p><b>Motivational</b></p> <ul style="list-style-type: none"> <li>• Lets the learner know that they are improving/progressing towards set goals <b>Tool G</b>, even when improvement is not detectable by the learner watching their own performance = Continue to Practice.</li> <li>• Provides Competence information - helps to increase self-esteem</li> </ul> <p><b>BUT</b> Consider <b>how much</b> feedback is given and <b>when</b> it is given</p> <ul style="list-style-type: none"> <li>• <b>More</b> feedback encourages quick improvements as the coach solves performance blocks</li> <li>• <b>Less</b> feedback may slow acquisition but can encourage player problem solving (especially if prompted by the coach). Good for retention and transfer.</li> <li>• <b>Immediate</b> feedback allows for quick change</li> <li>• <b>Delayed</b> feedback can promote considered thinking by the player</li> </ul> <p>Consider using Tool 5 <b>QA</b> as an alternative (i.e. instead of telling the player how well they did ask them how well they thought they did and even what they think they need to do next time)</p> <p><b>Problem</b>  Too much feedback results in overload (the learner feels too busy) and may cause dependence on the coach, thus discouraging problem solving</p> <ul style="list-style-type: none"> <li>• Keep to a <b>maximum</b> of 3 or 4 key points</li> </ul>
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<p><b>10 Practice-P</b>  <b>WPW - Whole Part Whole</b></p> <ul style="list-style-type: none"> <li>• Try to make sure the player knows where the part fits in with the 'big picture' to maintain meaningfulness</li> <li>• Practice whole skill early in process.</li> <li>• Break down the skill only into meaningful units</li> </ul> <p><b>Random/Distributed./Variable PRDV (More Challenging for Player)</b>  <b>Random:</b> several skills practised randomly in one drill  <b>Distributed:</b> skill practised in short bursts – i.e. 10 mins on drill 1 then 10 mins on drill 2 then return to drill 1; encourages players to retrieve from previous attempts. Intervening time can be increased to make retrieval process harder  <b>Variable:</b> one skill practised in a variety of ways  All three can be mixed to create one drill – often forming constrained games</p> <p><b>Good/Appropriate for</b></p> <ul style="list-style-type: none"> <li>• Long term development as it encourages the player to think for themselves and/or develop skills that are adaptable and transferable</li> <li>• Talented or experienced players</li> <li>• Training for match play/transfer</li> </ul> <p><b>Blocked/Massed/Structured PBMS (Mentally Easier For Player)</b>  <b>Blocked:</b> several skills practised in blocks (1-1-1, 2-2-2, 3-3-3)  <b>Massed:</b> skill practised for long period of time  <b>Structured:</b> skill practised in a very controlled way</p> <p><b>Good/Appropriate for</b></p> <ul style="list-style-type: none"> <li>• Rapid improvements as the player can get in a 'groove' but note that if they fall out of the groove or have even small amounts of time where the skill isn't practiced the rapid improvement can disappear quickly</li> <li>• Beginners &amp; younger players</li> <li>• Early gains provides motivation</li> </ul> <p><b>BUT</b></p> <ul style="list-style-type: none"> <li>• Can quickly become boring</li> </ul> <p><b>Overlearning PO</b>  Continued practice after a skill has been learnt</p> <ul style="list-style-type: none"> <li>• Grooves Technique</li> <li>• <b>Possibly</b> Stress resistant techniques</li> </ul> <p>N.B. Overlearning = up to 100% of learning time</p>
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<b><i>SHORT TERM</i></b>	CONTINUUM	<b><i>LONG TERM</i></b>
Expert Demonstration	Versus	Coping Demonstration
More	versus	Less feedback
Instruction	versus	Question and Answer
Consistent	versus	Varied practice
Massed	versus	Distributed practice

Figure 3.4.5: The Coaching Toolbox. Identifying 3 golden rules of pedagogical rules to guide pedagogical DM and ten coaching tools to support the DM process and subsequent practice. NB. The version of the Toolbox reproduced in here was designed for use in Tennis. Coaches and coach educators should feel free to modify to for their own performance environment.



### *Working with the Toolbox*

Even though we went through a ‘condensing process’ prior to its development, the toolbox deliberately provides a number of methods of interacting with the athlete in a skill development environment. This is because we know that coaching is a complex process (Bowes & Jones 2006) where there is rarely one right answer (Abraham et al 2006). Consequently, the Toolbox needs to help coaches cope with such a dynamic environment, encouraging them to at least consider broader alternatives rather than falling back on the same traditional answer of “it’s worked for me in the past”. However, the sheer number of tools available makes this process potentially daunting to coaches who are new to both coaching and/or the approach espoused by the Toolbox. Therefore, and in keeping with the ideas presented earlier in this chapter, we help coaches make sense of this complexity through the provision of three broad procedural rules to guide the selection and use of the tools. We’ll go through each of these rules in order to display how they can be applied and how they link to the tools.

#### ‘Rule’ 1: Make the content as personally relevant as possible

While this is to a large extent self explanatory, it is worthwhile considering some of the issues delivered in this book. Section 1, for example, emphasises the individual nature of development and performance. In short it is extremely unlikely that the learning and development needs of two athletes are going to be exactly the same. Obviously, true individualisation of coaching is extremely difficult unless there is a low coach-athlete ratio. However, the more individualisation of coaching is set as a goal, the more successful the skill development process will be (Martindale et al 2007; Smith et al 2001). In order to achieve personally relevant content, the coach must know and understand the individuals. There are obvious means of achieving this goal, for example simply talking to the athlete about their goals, lifestyle, likes and dislikes, i.e. Tool 1; Knowing Your Athlete. Furthermore, there are more complex methods within the broad realm of performance analysis (e.g. Hughes & Franks 2004). However, the usefulness of performance analysis is ultimately limited by the knowledge of the coach undertaking this analysis. It is fortunate therefore that there is a whole host of texts, both research and practice based, that can accurately enhance assessment process (i.e. talent development models - Abbott & Collins 2004; Martindale et al 2007), and performance specifics i.e. psychology (Orlick & Partington 1988), physiology (Bompa 1999), technique (Knudson & Morrison 2002) and sport specific (Bangsbo & Peitersen 2004) etc see Tool 2). Finally, formulating the ideas gained from this assessment process into SMART goals, Tool 3, will promote motivation, optimise progress and help to develop the open and honest relationship which typifies most good coach-athlete teams.

#### ‘Rule’ 2: Promote performer understanding whenever you can

We have previously identified that declarative knowledge is the knowledge of understanding, and that understanding is crucial for coaches. However, research in sport performance reveals that the same is true for athletes. The most effective athletes have a thorough understanding of their own performance and its effect by and on team mates or opponents (McPherson 1994; Williams & Davids 1995). While there will obviously be times when the coach needs to take control, be authoritarian and tell the player what to do, coaches should mostly, and especially in coaching for long term development, aim to ‘educate’ the athlete as much as possible, emphasising his or her understanding of what is involved and why this is the better option. Such an approach can be achieved through open question and answer (Tool 7) sessions, or

enhanced by encouraging buddy coaching using athletes to demonstrate the required skill and asking the watching athletes to learn from and provide feedback on the skill observed (Tool 6 Coping Demonstration).

Rule 3: For rapid short term results make the session (mentally) 'easy' for the player; for longer term development focused on retention/transfer make it 'harder'.

This golden rule is probably the one that requires most explanation in order for the linked tools to make sense. In order to achieve this goal we will draw heavily on a piece of work by Schmidt & Bjork (1992) that was written to summarise key findings in skill acquisition research and stimulate the reader to critically think about how they design learning environments.

Based on a synthesis of varied research findings, Schmidt & Bjork (1992) identified that skill acquisition can (apparently) be speeded up by providing a learning environment that allows repeated attempts at a skill with high levels of feedback. However, retention and transfer tests display that these performance increments don't last. In contrast, learning environments that;

- decreased repetition
- increased unpredictability
- reduced feedback

slowed the acquisition rate of skills but produced better performance in retention tests (cf. decision training ideas in Chapter 3.3). The underpinning rationale is that learning occurs through active involvement in a challenging environment where learners are required to think through and solve problems for themselves and/or recall similar solutions to previous problems. In contrast, the rapid performance increments seen in environments characterised by high levels of skill repetition and feedback are more due to the coach setting easy 'questions' and/or providing the answers. There are, however, five important points of clarification required that reflect the 'no right answer' basis to the toolbox.

First, even though easy practice with lots of coach led problem solving may not encourage learning, the rapid changes in skilled behaviour may provide a useful confidence boost or to display the athlete's potential (Vygotsky 1978) to a novice or athlete anxious for a quick fix when there isn't time for the athlete to discover the answer for themselves. By contrast, if things are too easy in the early stages of development, the learner is likely to receive a nasty (and demotivating) shock when the fan clogs up and the genuine difficulties involved become obvious. A 'problems early' approach can often eliminate the low motivation 'play at it' individuals whilst facilitating the genuinely interested and committed performer who is there for the long haul.

Second, the term 'challenging environment' needs careful consideration since what is challenging for one athlete may be easy or even anxiety producing for another. This becomes a much easier decision once the coach has spent time getting to know their athlete, as suggested in Rule 1.

Third, and following on from the previous point, coaches should consider the variety and intricacy of skills required in their sport, the type and number of decisions required, and the randomness of conditions (task, environmental and personal, Davids et al 2008) under which all of these skills and decisions are produced and made. This

should lead the coach to question and consider how much variety and randomness is required in the practices they employ. Furthermore, since learning does not happen immediately, this consideration should take account of the learning environments required over a long period of time and sessions not just one or two sessions. Perhaps just as importantly, the coach should stick to this plan and avoid, as far as possible (bearing in mind our earlier comments that plans should not be set in stone), fire fighting problems that may arise from competition settings, especially if they are working with children or developing athletes. If a programme has been planned properly, the problems that occur in competition settings should already be catered for and will be taken care of in the completion of a programme of learning.

Fourth, developing a random and variable skill environment often means that game like situations are developed. However, the coach will need to be careful that all participants in these practices actually get to practice the skills required – especially in team sports. For example, Fenoglio (2007) identifies how asking young football players to engage in games any larger than 5 v 5 will lead to many players not actually getting enough touches of the ball to effect learning. In fact Fenoglio (2007) recommends that, for children under 12, small sided games of; 3 v 3, 4 v 4 or 5 v 5 are probably optimal in terms of developing an environment where a balance of technical and tactical skills is developed. It may also be worth asking if one or two sessions a week are enough for skill development to occur or whether homework is required.

Fifth, research in talent development (Abbott & Collins 2004; Martindale et al 2007) clearly identifies that expert coaches are concerned with developing their athletes' ability to become effective, self aware and self reinforcing learners. Consequently, the long term approach to skill acquisition refers as much to developing learning and mental skills in the athletes as it does to getting the athlete to practice the full range of skills needed to cope with variable and random performance environments, be they a game of tag or an Olympic final.

To summarise therefore, the third golden rule should lead to coaches asking questions of themselves along the lines of:

- “what and how many problems am I providing in this learning environment”;
- “are the problems specific to the needs of my athletes”;
- “who is solving the problems, me or the athletes”, and;
- “have I taught my athletes how to solve problems?”.

If there are few problems in the practice environment (i.e. a structured practice) and lots of problem solving being done by the coach through feedback and instruction, a ‘short term benefits’ environment is likely to be in place. If, by contrast, there are multiple problems in the practice environment (i.e. random and variable practice) with minimal help from the coach then a long term learning environment will result.

Finally, while we have identified ‘short term’ and ‘long term’ approaches to skill development there is, as identified in Figure 5, a continuum between short and long term approaches. The application of this continuum can, in essence, become the ‘art’ of coaching that mixes and matches communication strategies with approaches to practice design in order to set a learning environment that is appropriate for the athlete and the achievement of their individual goals. For example, a random practice supported with lots of problem solving feedback from the coach, or using a

previously successful practice with only minimal input from the coach thus encouraging the athletes to recall prior successful performances (distributed practice), are both examples of how a coach can mix and match ‘short term’ tools with ‘long term’ tools in order to decrease and/or increase the challenge or ‘mental workload’ on the athlete. In an ideal world, such decisions should/would be made in accordance with the goals of that athlete, the state of the athlete and the time frame within which a change in skill is required. Typically however, we would hope that coaches, especially those working with athletes who are not operating at an elite level would be guided by a need to encourage learning as opposed to meet short term performance goals. Our experience would suggest that this may require a substantial change in coaches’ attitude and behaviour.

### Common Vocabulary

The final consideration within the design of the Toolbox is that, even though most behavioural studies display that coaches are already using most of the tools described, research (e.g. Côté et al 1995a) has also highlighted that coaches may not actually be aware of these tools beyond the idea of ‘communication’, (c.f. the work of Morgan 2006). The toolbox is, therefore, also useful in deciphering between different methods of communication and practice design and the effects that these methods can have. While educating coaches in the functional jargon included in the Toolbox may seem to be intuitively good practice, there is another powerful knock on effect. If all coaches begin to plan the ‘pedagogical’ aspect of their sessions using the same vocabulary they can also reflect/think critically using the same vocabulary. This becomes all the more powerful if the reflection is based on the reality of their practice. Our experience has been that getting coaches to analyse their own behaviour through video, using the golden rules and the individual tools of the Toolbox, can prove to be a truly enlightening and developmental experience. In addition to this form of self analysis, the Toolbox can also prove effective in coaches checking ideas and practice with colleagues. At present this is difficult for coaches to do in the pedagogical area since there is currently no comprehensive and accurate common vocabulary used by coaches in this domain (Lyle 2002). As a result, discussions between coaches referring to coaching performance tend to centre on ‘drills’ and the content of drills i.e. techniques or tactics developed. In addition these will almost certainly be judged heavily on the successfulness of athlete performance in the drill leading to a short term approach. Encouraging a philosophy of peer critiquing against the framework of the Toolbox can aid the development of a truly functional community of practice amongst coaches (Culver & Trudel 2006).

### **3.4.4 CONCLUSION**

Our aim at the beginning of this chapter was to offer some procedural advice in tandem with declarative explanations in order to help practitioners understand and better develop learning environments so as to subsequently achieve more effective skill development. In section 3.4.2 we provided three linked models of the coaching process in Figures 3.4.1, 3.4.3 and 3.4.4 to display how having and applying a knowledge of the athlete, the sport and the learning environment can lead to holistic approach to problem setting and solving. Our argument is that taking such an approach can lead to a more comprehensive approach to skill development – this would certainly be backed up by the coaches in the Abraham et al (2006) study.

In section 3.4.3 we provided evidence from a number of sources that identified how there was an apparent problem with the problem solving and DM of coaches within the ‘understand the learning environment’ domain. So, while very good coaches appeared to be working to useful conceptual ideas, their lack of declarative knowledge in this area was probably limiting their capacity to be innovative in developing their own bespoke effective learning environments. The logical conclusion from this finding was that this problem is even worse with not so good coaches. All of this evidence pointed to the need for some level of intervention that introduced declarative knowledge in the area of skill acquisition that didn’t simply resort to suggesting that coaches should read a range of journal articles or text books. Consequently, we provided a Toolbox of behaviours that coaches are known to use but linked these with introductory declarative ideas of skill acquisition and associated ‘golden rules’ to guide the use and implementation of these tools. The suggestion being that once coaches have become comfortable with this level of theory they may then wish to engage more with journal articles and text books identified in the bibliography of the Toolbox.

Consequently, our ultimate aim is to encourage coaches and athletes to improve their own declarative understanding of skill development such that they develop their own procedural guidelines and maybe even critique those supplied by us as authors. In fact our aim is very much in keeping with proverb; ‘give a man a fish and feed him for a day, teach a man to fish and feed him for a lifetime’. We hope you don’t starve as a result of reading this chapter!

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