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An Examination of the Professional Judgement and Decision-Making of Strength and Conditioning Coaches

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A thesis submitted in fulfilment of the requirements for the degree of Doctor of Philosophy

Moray House School of Education and Sport

The University of Edinburgh

August 2023

Author Declaration

I hereby declare that:

(a) that the thesis has been composed by myself

(b) except where stated otherwise by reference or acknowledgement, the work presented is entirely my own.

(c) the work has not been submitted for any other degree or professional qualification except as specified

(d) the subsequent publications were written with myself as first author and my supervisor, Professor Dave Collins, as co-author. On the subsequent Publications page are the details pertaining to what Chapter the previously published research refers to in the thesis. Specific details regarding the title of articles and where each was published are also clearly indicated.

Date: 30th August 2023

Signature:

Acknowledgements

First of all, I must thank my parents for their unconditional love and support. They have always encouraged me to grow and explore different opportunities. They have always been present for my achievements and have been a comfort in times of struggle. I certainly would not be where I am today without them.

To my sister Karen, thank you for your patience and appreciation. Our travels and love of life see us in different parts of the world, but I know that you are always there for me.

My driven, high-achieving, and loving wife Emily has been with me since the first moment of this crazy process. While it has been one of the toughest things I have ever done, I am thankful for the countless kicks up the backside, which have motivated me to keep going. There have been so many moments at which I have wanted to abandon the journey, but we made it and we are still intact – and our kids barely noticed!

Furthermore, I wish to express my sincere thanks to the participants of my research. They taught me many lessons throughout the journey and provided me with experiences that I will always carry with me.

Finally, I wish to thank my supervisors Professor Dave Collins and Dr. Amanda Martindale. Their time, energy, and counsel have enabled me to grow my knowledge and skills as a professional. In addition, they have certainly helped me to forge new levels of resilience in receiving feedback and striving for better outcomes. I feel very lucky to have had and continue to have such amazing people in my life, and I hope that this thesis makes them proud.

Abstract

Athletic coaching is a complex profession, and coaches must perform a wide range of tasks in a variety of environments. In high-performance sporting environments, strength and conditioning coaches (SCCs) must fulfil a variety of roles that are growing in importance. Despite a recent broadening of the scope of SCC research beyond their knowledge, practical skills, experiences, and training preferences, a lack of attention continues to be paid to the professional judgement and decision-making (PJDM) of SCCs. First, in recognition of this lacuna in research, this thesis examined the thought processes of SCCs who possessed varying levels of experience and analysed the rationales that informed their approaches. Second, this thesis constructed and tested an intervention using the empirical findings of earlier investigations to enhance the PJDM of SCCs. This qualitative study employed a constructivist paradigm and was based on relativist ontology and interpretivist epistemology. The initial research used applied cognitive task analysis (ACTA) to examine the respective decision-making processes of participants who were engaged in training programme design and difficult common tasks. These studies, together with a focus group approach, used reflective thematic analysis (RTA) to engage with data sets and identify new patterns of meaning. The results indicated that the roles of SCCs require them to apply their theoretical knowledge and practical experiences to a wide range of tasks. An indication of the cognitive demands associated with these tasks were also generated as a consequence of the ACTA. Furthermore, clear contrasts in the PJDM of high-level and early-career SCCs were discussed. The analysis of the focus group results was used to construct a revised model of thinking processes regarding training programme design. Crucially, this stage of the analysis identified the variables of context, collaboration, and communication as providing depth and breadth to the perceived impact of each proposed stage of the training programme design process. Considering the difficult situations that must be managed within strength and

conditioning (S&C) environments, the following three themes were identified as having the strongest impact on SCCs' decision-making processes: situational awareness, improvisation, and metacognition. Both the ACTA and cognitive apprenticeship (CA) research enabled this study to make a unique contribution to the literature, as it provided empirical findings on the PJDM of SCCs with both high and low levels of experience. The application of a constructivist philosophy to the design and implementation of online S&C learning materials constitutes a novel contribution to existing traditional strategies for SCC preparation in the workplace. This CA study provides valuable preliminary findings that can be used by educators in the field to produce authentic, relevant materials for those aspiring to work in the S&C sector. Throughout this thesis, a case was developed that demonstrates the importance of experience for SCCs of all levels to be able to evaluate their thought processes and overall S&C coaching performance. Lastly, a platform for future research to build on was constructed.

Lay Summary

Through a critical overview of the literature regarding strength and conditioning (S&C), this study readily determined that there is no lack of access to information regarding various training principles, physiological theories, and associated training methodologies. However, there is a clear lack of research that supports the understanding of why strength and conditioning coaches (SCCs) decide to do what they do. A prevailing approach for focusing SCC preparation and within-role development strategies is to deepen and broaden learners' comprehension of various theoretical frameworks and practical delivery techniques. This direction has resulted in growing ambiguity concerning what underpins quality decision-making within S&C. Moreover, a lack of empirical research in this area seems perplexing given that SSCs are, within their role, frequently required to make decisions under different levels of stress.

The research conducted within this thesis provides a narrative that is intended to address a gap in the S&C literature. A qualitative research approach was used to determine the professional judgement and decision-making (PJDM) characteristics of SCCs with high and low levels of experience. A much-needed assessment of the thinking processes that SCCs engage in as part of their within-role tasks was possible through the methods applied in this thesis. The findings generated were used to design, test, and review an online learning strategy to support the development of PJDM in a group of postgraduate learners and to offer an extension to traditional methods of instruction and competency-based assessments.

The qualitative nature of this research provides an important contribution to the S&C domain, with novel findings that support a more holistic view of the role of SCCs being taken through the addition of PJDM to the already prevalent and emerging research on biophysical and psychosocial considerations. The empirical findings support future approaches to

developing SCCs that can detect, examine, and operationalize contextual information and reach outcomes through considering alternative approaches.

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List of Abbreviations

Abbreviation	Full Term
ACTA	Applied Cognitive Task Analysis
ASCA	Australian Strength and Conditioning Association
CA	Cognitive Apprenticeship
CDM	Classical Decision Making
CTA	Cognitive Task Analysis
DM	Decision making
ECC	Early Career Coach
HLC	High Level Coach
NDM	Naturalistic Decision Making
NSCA	National Strength and Conditioning Association
PJDM	Professional Judgement and Decision Making
TA	Thematic Analysis
RTA	Reflective Thematic Analysis
S&C	Strength and Conditioning
SCC	Strength and Conditioning Coach
UKSCA	United Kingdom Strength and Conditioning Association

Publications Originating From the Thesis

Downes, P., & Collins, D. (2021). Examining the roles and consequent decision-making processes of high-level strength and conditioning coaches. *Societies*, *11*(3), 76.

Downes, P., & Collins, D. (2021). Exploring the decision-making processes of early-career strength and conditioning coaches. *International Journal of Physical Education, Fitness, and Sports*, *10*(2), 80–87.

Downes, P. W., & Collins, D. (2022). Comparing and Contrasting the Perceptions of Strength and Conditioning Coaches Towards Within-Role Decision-Making Processes. *Advances in Physical Education*, *12*(3), 283–306.

Downes, P. W., & Collins, D. (2022). Developing strength and conditioning coaches: A case for cognitive apprenticeship. *Coaching: An International Journal of Theory, Research, and Practice*, 1–13.

Summary

The research from the above publications are explained within various chapters in this thesis. Chapter four focuses on the experiences of SCCs that have worked within the S&C domain for many years whilst Chapter five focuses on those SCCs in the infancy of their careers. The publication in Advances in Physical Education was drawn from Chapter six within which the results of this ACTA research were critically discussed and expanded upon through the focus group research. Finally, a conceptual article concerning how Cognitive Apprenticeship may support the development of SCCs' PJDM was produced in accordance with Chapter seven.

CHAPTER 1. Introduction: An Examination of the Professional Judgement and Decision-Making of Strength and Conditioning Coaches

1.1 Overview – Personal Motivations for the Research

Over the last 20 years, I have trained and developed as a strength and conditioning coach (SCC) and worked within various strength and conditioning (S&C) workplaces. As I explain in more detail in Chapter 2, the role of an SCC within high-performance sporting environments has grown in importance over the last 20 years. Consequently, there is a need to investigate and understand the knowledge, skills, and characteristics of SCCs. A burning question that I have as a high-performance professional focuses on what S&C coach developers need to be aware of when designing and delivering pedagogical content. This is a precursor to introducing and driving evolution within the programmes delivered to SCCs as part of preparing candidates for the S&C workplace as well as current SCCs. From my initial entry into the S&C workplace in 2003 through 2016, when I began my research journey, any venture into the S&C literature resulted in continued ambiguity regarding how and why SCCs of any level of experience think the way they do. Crucially, this lack of clarity concerning how I, as an SCC, could more effectively solve role-related problems was the genesis for this thesis.

Compounding this silence was a lack of attention to cognitive processes within the accreditation programmes for the three most prominent S&C governing bodies. In order of origination, these are the National Strength and Conditioning Association (NSCA), the Australian Strength and Conditioning Association, and the United Kingdom Strength and Conditioning Association (UKSCA). Through speaking to my peers, I felt confident that I was not alone in wanting to understand more about the decision-making (DM) processes of experienced SCCs and how such knowledge could elevate both their and my own current and future levels of performance in the workplace.

To satisfy my curiosity, I trawled through various literature both within and outside of the S&C domain. During this exploration, I encountered professional judgement and decision-making (PJDM). While it was a new concept to me, it resonated deeply with both my experiences to date and my orientation as an SCC and developer of SCCs. Notably, it is a term that is not located in the current S&C literature or preparation materials. In the next section, I introduce PJDM and its application in other domains. I consider it crucial to translate PJDM and its associated terminology from work in other domains if it is to be comprehended, appreciated, and employed by the S&C community.

1.2 Professional Judgement and Decision Making

Martindale et al. (2017) suggested that PJDM can grow our understanding of how practitioners 'think' in action. This prospect has an obvious appeal to me given my stance as a researcher within S&C. Through examining the literature pertaining to PJDM, this became apparent in domains such as crime scene investigation (Martindale et al., 2017), teaching (Entwistle & Peterson, 2004), and – encouragingly – coaching (Abraham et al., 2006). Within the domain of sports psychology, PJDM has been investigated in adventure sports (Collins et al., 2016; Collins & Collins, 2016) however, when I embarked upon my thesis journey, there was an absence of PJDM research within the S&C domain. Previous research (Zsambok & Klein, 1997) has described PJDM as a dual process of classic DM (CDM) and naturalistic DM (NDM) approaches. Next, I briefly introduce the terms CDM and NDM, since SCCs' DM likely occurs across a continuum of these two approaches.

Lipshitz et al. (2001) researched CDM and considered it a deliberative DM process, where individuals have sufficient time to form balanced appraisals of a context through the consideration of various pros, cons, and alternative choices. Within the coaching literature, scholars such as Cushion (2007) and Abraham and Collins (2011) have discussed how coaches are not always afforded the time to evaluate a range of considerations, especially in

the delivery aspect of coaching; as such, the DM process occurs in more dynamic, ill-defined contexts. Earlier work of Montgomery et al. (2005) proposed that decisions that are made through a combination, for example, of ill structured problems, uncertain dynamic environments and time stress cannot be adequately explained by CDM.

To this end, NDM has been proposed as a more appropriate option. Klein and Hoffman (2008) stated that NDM was recognised as part of the research vocabulary in 1989 to understand how decisions are made in applied settings. The features of such environments where NDM is required include dynamic contexts with continually changing conditions, ill-defined tasks, and constraints imposed by time pressure.

Thus far, NDM research has been conducted in high-stakes domains, including manned space operations (Fischer & Mosier, 2015), healthcare (Clark, 2014) and landmine detection (Staszewski, 2001). The S&C workplace is representative of similar conditions, albeit with less dramatic workplace consequences. Previous authors, such as Lyle and Cushion (2010), have described NDM as taking rapid actions based on what feels right. Notably, however, the aforementioned either–or split has been challenged, an example being example Collins et al. (2022), with empirical studies demonstrating how 'in the field' research is almost always a balance across the two extremes on a continuum. An example of this was provided by Crowther et al. (2018). This interaction of fast and slow DM (Kahneman, 2011) within PDJM has parallels with the earlier work of Collins and Collins (2013), who proposed that PJDM involves both logical/analytical and intuitive DM processes. As an SCC, I resonate with these descriptions in terms of how I might alternate my approach according to what I am required to do.

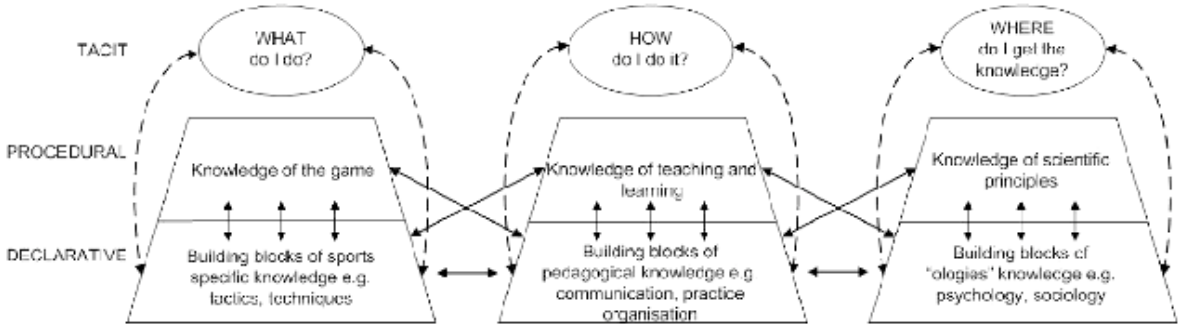
Referencing the work of Anderson (1983), procedural knowledge can be located (in the context of S&C) as what SCCs do and how they perform various elements of their role. Declarative knowledge underpins these behaviours and outcomes, which is – simply put – the

why (and why not) underpinning SCCs' decisions. With a specific lens on the S&C domain, examples of procedural (i.e., what and how) knowledge would include isolated exercise techniques and sport-specific drills. By contrast, declarative (i.e., why) knowledge would include SCCs completing deeper explorations of contextual factors, which may include the athlete, social dynamics, and environmental factors, before they select a course of action. A third component is tacit knowledge, which is largely acquired through practical experience and problem solving in authentic contexts. In the literature, tacit knowledge has also been referred to as implicit knowledge, practical intelligence, and working knowledge (Nash & Collins, 2006). It is crucial to acknowledge that experts, or indeed any learner, cannot be assumed to be able to readily and accurately articulate what they have learned or how they have decided on a particular course of action within their role. An inability to recall one's declarative knowledge has strong implications for coach development and what experienced others consider the most effective strategies for passing on their knowledge and experiences to others.

To illustrate the connection between declarative, procedural, and tacit knowledge, Figure 1.1 presents the interaction model of coaching knowledge by Nash and Collins (2006). This model acknowledges the need to understand the domain that one is in; specific principles (procedural knowledge); and the interaction between this form of knowledge and deeper rationales (declarative knowledge). When considering this model and the interactions within it, we can understand declarative knowledge to be a critical component through its role in supporting accurate, in-the-moment DM. The elevation of tacit knowledge and the stated 'what,' 'how,' and 'where' considerations offer an introduction to metacognition and PJDM.

Figure 1.1

Interaction Model of Coaching Knowledge (Nash & Collins, 2006)



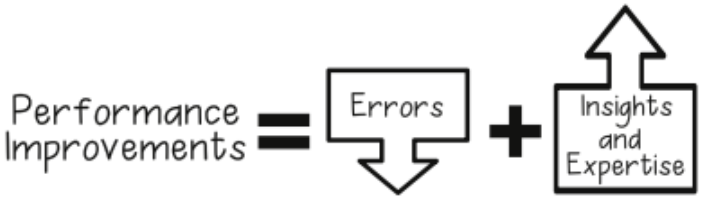
Through my own experiences while completing the three accreditation processes of the NSCA, ASCA, and UKSCA, as well as a deeper examination of their frameworks, it became evident that SCC preparation materials are oriented towards the development and assessment of procedural knowledge with little to no attention paid to declarative knowledge. This focus on procedural knowledge is also evident across the published S&C literature, where the focus is predominantly directed at advancing current biophysical approaches (Szedlak et al., 2020). Both early (Dorgo, 2009) and recent (LaPlaca & Schempp, 2020) research studies that have investigated the characteristics of expert SCCs have reported them to possess a comprehensive procedural knowledge base.

While I acknowledge the crucial investment into establishing sound theoretical underpinnings in various sport science disciplines and practical S&C technical frameworks, I found myself lacking both self-awareness and authentic S&C domain experience when I first entered the S&C workplace. During those early years as an SCC, I was constructing knowledge about how to approach and solve various problems within my role based on how I experienced each context. Each time a problem emerged, I became better placed to reflect on previous experiences as well as to interpret the present context, and any new information using pre-existing knowledge before deciding on a response. My confidence and impact as an

SCC increased the more I was able to develop workplace experiences. This resonates with the formulation for performance improvement proposed by Klein (2013) (Figure 1.2), which suggests that a reduction in errors, together with an increase in insights and expertise, will lead to an individual's improved performance. Based on my personal experience, I can how well these fits within the PJDM of SCCs.

Figure 1.2

Conditions for Improving Performance (Klein, 2013)



The abovementioned descriptions regarding how my personal beliefs and experiences have influenced and shaped how I understand my role and philosophies as an SCC have had critical implications regarding my ontological and epistemological positions as a researcher. These are described more in Chapter 3. At this early stage of the thesis, I state simply that my beliefs are synonymous with a constructivist approach. The notion that individuals actively construct the knowledge they possess is fundamental to constructivism. Elliott et al. (2000) defined constructivism as 'an approach to learning that holds that people actively construct or make their own knowledge and that reality is determined by the experiences of the learner' (p. 256). In support of the appropriateness of constructivism within the S&C domain, Mills et al. (2018) stated that an SSC's knowledge is socially constructed and, more recently, Gearity et al. (2021) claimed that S&C practice has been recognised as a social process.

However, recent findings from psychosocial research by Szedlak et al. (2020) brought attention to a separation between how SCCs are currently educated and what is believed to be

required to demonstrate effective S&C coaching practice. The authors recommended that future materials produced by S&C coach educators should employ constructivist approaches to develop psychosocial behaviours in SCCs as a means of focusing on the learner and their experience. With a parallel rationale, I postulate that an opportunity resides in using constructivist approaches as part of developing the PDJM of SCCs. However, with reference to Figure 1.2, research is required to provide empirical findings regarding the declarative and tacit knowledge of SCCs before any such development materials can be produced.

1.3 Knowledge Elicitation in Other Domains

A crucial period of my preparation for the S&C workplace, in addition to being an area of growing research, was my workplace internship. While I acknowledge that learners can gain access, to varying degrees, to the expression of procedural knowledge by experienced SCCs within an internship, they do not automatically access the declarative knowledge or the processes that resulted in the observed expression being chosen. In other words, the learner may gain a false perception of their understanding or comprehension of a context, and thus, be ill-equipped to respond when presented with the same problem as the responsible SCC. Indeed, novices have little experience by default (Kahneman & Klein, 2009) and therefore have not yet developed skilled intuition. According to my experience within the S&C domain, SCCs and those who prepare them have a narrow focus on gaining and elevating procedural knowledge and practical skills, largely from a physio-mechanical perspective that is focused on practical elements, such as what exercises to do and how many there are. However, this is accompanied by the absence of exploring and understanding declarative knowledge and thinking processes as part of supporting SCCs of all experience levels - in understanding why they think and behave as they do. In short, the training involves trainees being told ‘what’ to do, rather than being provided with some principles and being guided in ‘how’ they might differentially apply them.

Contributing to this conundrum is that the PJDM processes of SCCs are currently unclear across a range of experience levels. To understand how to access the cognitive processes and tacit knowledge of SCCs effectively and appropriately, various qualitative approaches that can offer the potential for richer insights need to be considered. Accordingly, I examined literature outside of the S&C domain to obtain an enhanced understanding of how to access the tacit knowledge of professionals, and to consider the different forms of qualitative analysis to critically examine any data gathered. This process is discussed in Chapter 3. Wider reading revealed that such research has been successfully conducted in other domains using applied cognitive task analysis (ACTA) (Militello & Hutton, 1998) and focus groups (Gould et al., 2008; Granito, 2001). Such research from domains outside of S&C provides valuable insights that can inform future practice and has, in my opinion, forged a path for original S&C research to follow.

1.4 Aims and Objectives of the Thesis

The content in this chapter so far has illuminated the opportunity for research regarding PJDM within S&C. To this end, the thesis was centred on the aim and objectives outlined below:

Aim

To investigate the nature of PJDM processes of SCCs of various experience levels, to access this cognition, and to make it visible through qualitative research. The findings were intended to inform the design and testing of learning content to support the development of PJDM in SCC learners as part of preparing for the S&C workplace. This aim was to be achieved through attention toward the following objectives.

Objectives

1. To use qualitative research to identify and explain the PJDM characteristics of SCCs with both high and low levels of experience within the S&C domain. This research is evident across Chapters 4,5 and 6.

2. To apply the findings from qualitative research to conceptualise a learning approach to elevate PJDM of SCCs and is presented in Chapter 7.

3. To test an approach intended to introduce and elevate PJDM with learners intending to work within the S&C domain and is presented in Chapter 8.

I believed that this research would be valuable to those responsible for producing S&C educational content through providing them with a greater appreciation of how the knowledge that underpinning SCCs' PDJM is constructed as well as how SCCs of different experience levels approach solving within-role problems. Although I accepted that this form of research was not common within the S&C domain, I passionately felt that this research would open up future research opportunities and stimulate discussion regarding the inclusion of PJDM within accreditation programmes and other forms of SCC development materials.

1.5 Structure of the Thesis

The remainder of this thesis is organised as follows:

Chapter 2

This chapter provides a deep dive into the S&C literature that pertains to SCCs. I introduce the various governing bodies and existing professional standards established by them as part of determining what an SCC is expected to do in their role. Furthermore, I critically examine the current evidence that describes the skills, knowledge, and behaviour of SCCs. Through doing so, I present a clear narrative for the development of SCCs as well as an opportunity to conduct research into the PJDM of SCCs.

Chapter 3

In this chapter, I focus on the methodological considerations. This begins with an outline of the ontological and epistemological perspectives that shaped my approach as a researcher. I then describe the research design process and crucially provide the reasons that underpin the choices made. Moreover, various means of data collection and analysis are discussed, and reasons are provided for selecting the approaches.

Chapter 4

This chapter examines the roles and consequent decision-making processes of high-level SCCs. The ACTA research presented in this chapter was conducted with a cohort of SCCs who met specific criteria, with the intention of making a novel – and much needed – contribution to the S&C literature regarding PJDM. This contribution informs the within-role problem solving associated with common tasks.

Chapter 5

This chapter examines the roles and consequent decision-making processes of early-career SCCs. The same ACTA research process as presented in Chapter 4 was followed with a cohort of SCCs who were considered to represent SCCs at the infancy of their careers. The findings generated offer additional insights into the similarities and differences concerning the approach of SCCs with a low level of domain experience in within-role problem solving associated with common tasks.

Chapter 6

This chapter describes how perceptions were gathered from experienced SCCs from the Northern hemisphere and then explored to further examine the ACTA findings from previous chapters. Focus group research was conducted to access more diverse opinions on specific aspects of the S&C domain and the cognitive strategies implemented by experienced SCCs. Thus, an operationalised model of PJDM is presented and

explained in this chapter specifically regarding training programme design, and the influence of situational awareness, improvisation, and metacognition within the PDJM of SCCs is introduced.

Chapter 7

In this chapter, as part of exploring the inclusion of PJDM within future S&C learning content, the concept of a cognitive apprenticeship (CA) is introduced as a possible solution. The domains and subcomponents of CAs are described and a conceptual model is provided to illustrate how the application of CAs could support SCCs' learning. The principles for designing CA environments within S&C are also discussed.

Chapter 8

This chapter presents the application of an online CA model aimed at facilitating the professional development of aspiring SCCs through elevating their PJDM. The delivered approaches are explained and critically reflected on before recommendations are offered regarding future directions for S&C learning strategies.

Chapter 9

This chapter provides my concluding reflections on the thesis and offers more direction for future research.

CHAPTER 2. Critical Review of Literature: A Deep Dive Into the Role of Strength and Conditioning Coaches

Through describing the professional context of the thesis, this chapter provides an overview of the role of SCCs within a sporting context. Furthermore, it explores the S&C research that has offered insights into the characteristics of coaches within this domain. To begin, I define S&C and explain how the domain has developed since the conception of the first accreditation body in 1978 (Shurley & Todd, 2012). Next, I examine the research concerning the skills, knowledge, and behaviour of SCCs as well as how they vary among different levels of professional experience. This chapter also discusses the psychosocial aspects of SCCs' roles and responsibilities as well as highlights the need for research that clearly identifies SCCs' PJDM as part of their role.

2.1 Strength and Conditioning

2.1.1 Role of Strength and Conditioning Coaches

This section examines the purpose and characteristics of SCCs that have been demonstrated by research over the last 20 years. As part of detailing the origins of S&C, Shurley and Todd (2012) reported that Boyd Epley was hired as the University of Nebraska's first full-time SCC in 1969. Within the S&C domain, this role is acknowledged as the catalyst for other organisations to replicate the development. In 1978, 77 SCCs met at the University of Nebraska and founded the National Strength and Conditioning Association (NSCA), which has grown continuously ever since (Waller et al., 2023). According to research, SCCs have two primary purposes – namely supporting sport performance enhancement (Gilbert & Baldis, 2014) and reducing the likelihood of injury for athletes (Stewart et al., 2017). Gillham et al. (2017) agreed that designing and implementing training programmes for reducing athlete injuries are essential responsibilities of SCCs.

As more research has been conducted, greater insights have been provided regarding the evolving role of SCCs. Gamble (2015) argued that the role of an SCC does not exist in isolation, and that these coaches must collaborate with other departments as part of a multidisciplinary team. Although Vernau et al. (2021) found that S&C has become popular within the private and commercial sectors, this thesis focused on SCCs preparing for the sporting workplace. The next subsection discusses the three primary governing bodies within S&C; their orientation towards preparing, developing, and supporting SCCs; as well as potential candidates for these roles.

2.1.2 Professional Standards in the Strength and Conditioning Domain

Within their roles, SCCs have been supported by the emergence and growth of professional organisations that exist to provide governance to SCCs, offer guidance on professional standards, and develop materials and courses that support the advancement of practices. The NSCA was established in 1978 (Vernau et al., 2021) in the United States. This was followed by the Australian Strength and Conditioning Association (ASCA), which commenced in 1992, and the United Kingdom Strength and Conditioning Association (UKSCA), which began in 2004 (Bishop et al., 2019a). Today, these three organisations are the leading global accreditation bodies for S&C, and their membership numbers are increasing due to the recognition of SCC roles as viable and successful career pathways within sport. For example, as of 2019, the NSCA had 45,000 members across 72 countries (NSCA, 2018), which reflects significant growth from the 77 founding SCCs in 1978 mentioned earlier. Similarly, Bishop et al. (2019b) found that the number of accredited SCCs within the UKSCA had risen from approximately 400 in 2011 to approximately 850 by the end of 2018.

However, within these organisations, a global consensus is lacking regarding what knowledge, experience, and practical competencies should be assessed to determine the

readiness to perform in various workplaces. In the UKSCA's accreditation process, Bishop et al. (2019b) identified the following four assessed components: (1) a weightlifting assessment; (2) a practical plyometrics, agility, and speed coaching assessment; (3) a case-study presentation; and (4) a multiple-choice theory exam. This four-stage assessment was designed to create a profile of candidates' practical proficiency for describing, from a resistance-training perspective, the technical frameworks of common techniques for explosive movements applied within a sport-specific domain. Furthermore, requiring candidates to prepare, present, and defend a case study allows assessors to consider candidates' ability to critically reflect on their coaching experiences and provide a rationale for their actions. However, the multiple-choice exam limits the ability to confirm that individuals can work effectively across multiple contexts compared with open-ended questions, which can stimulate deeper engagement and responses. Nevertheless, UKSCA accreditation (for which only one level is currently available) is required to apply for roles that range from working with primary school-age children to developing athletes and working with professional teams.

Like the UKSCA, the NSCA requires candidates to read and recall theories and frameworks under multiple-choice conditions and in the absence of context. However, while the UKSCA does not require any prerequisite qualifications or experiences, the NSCA requires candidates to have at least a bachelor's degree or to be enrolled in a recognised equivalent course. The NSCA exam is divided into scientific foundations and practical/applied domains, and the questions are categorised as recall, application, or analysis based on the level of cognitive demand. While many questions are offered within the exam, the lack of contextualisation fails to determine candidates' contextual transference, as does the UKSCA approach. Examples may include multiple choice questions requiring participants to consider "which of the below are not…", "what is the most appropriate exercise to develop…" or "what is the correct term for…" as a means of assessing the extend

of theoretical knowledge held in S&C specific disciplines including; anatomy and physiology, program design and training techniques.

On reflection, the ASCA provides the most balanced approach for preparing SCCs for the S&C workplace. This governing body delivers a six-level accreditation programme, which begins with a no-prerequisites-required course for those older than 15 years of age with an interest in S&C. Each subsequent assessment stage depends on age, experience, academic qualifications, and successful performance to determine whether candidates are adequately prepared to provide S&C services in contexts with predefined parameters. These parameters can include the size of the group, the experience of the athletes, and the complexity of the role requirements concerning planning, delivery, and the review of practices.

As the role of SCCs has grown in prominence within the sporting domain, specific tertiary education courses have provided learners with a level of underpinning theory and, in some cases, practical competencies to prepare them more effectively for the S&C workplace. Massey (2010) highlighted tertiary education as a traditional means of instructional practice and preparation for SCCs, while Grant and Dorgo (2014) recommended that novice SCCs pursue this education when preparing for the S&C workplace. As context for the state of the industry, the UKSCA (2018), 44 available S&C tertiary education courses were available at the undergraduate and postgraduate levels. Moreover, based on a 2018 survey, the NSCA reported that 38% of SCCs held a bachelor's degree, while 57% held a master's degree in a relevant discipline (NSCA, 2018). More recently, after investigating the preferences of S&C employers, Vernau et al. (2021) emphasised the possession of theoretical knowledge as an essential requirement for employment within S&C workplaces. Furthermore, they found that holding a BSc degree and accreditation from one of the three aforementioned professional governing bodies was a general minimum requirement for S&C employment.

However, according to Grant and Dorgo (2014), obtaining degrees and certifications is not adequate for achieving a successful professional career as an SCC. In addition to these qualifications, some SCCs are informally (and often unknowingly) prepared for the S&C workplace through previous experiences as high-performance athletes. In recognition of S&C practice being recognised as a social process (Gearity et al., 2021), it would be remiss not to acknowledge the value of accumulating the years of practice and dedication associated with being a high-level competitive athlete, which is also a preparation pathway for some SCCs. Such a pathway, while possibly lacking in underpinning procedural knowledge if no tertiary education or accreditations are held, may contribute to creating stronger interpersonal skills in SCCs than the completion of current academic courses. Under such circumstances, it may be that neither is superior but rather, that a blend of procedural knowledge and a range of experiences to reflect on could be optimal. However, this remains anecdotal due to the absence of research in this area.

Furthermore, various authors have identified the domain-specific skills that SCCs require in the workplace (Dorgo, 2009; Grant & Dorgo, 2014; Jones, 2015; Magnusen & Petersen, 2012; Szedlak et al., 2015). These are described further in this chapter. Below, Figures 2.1 and 2.2 illustrate the foundational knowledge skills and applied practical skills, respectively, as defined by Dorgo (2009). These foundational skills remain relevant and, as this thesis will demonstrate, a large proportion of the skills required within an SCC role must be developed and practiced outside of a classroom or textbook.

For example, with reference to Exercises and Techniques (Figure 2.1), a learner may be able to recall a large range of exercise derivatives regarding key movement patterns of squat, push and pull. Notably, however, this does not guarantee whether they could determine if the exercise selection is indeed suitable to an individual in a practical session. In the case of initially prescribing a Back Squat to a novice athlete, a SCC may observe a lack of adequate

depth in the lift and decide whether to change the lift to maybe a box squat, front squat or something unilateral in order to achieve the intended outcome of the initial lift: *but* in a different manner depending how the context unfolds. Such a scenario can be conceptualised but not practised authentically. Similarly, the psychosocial variable associated with the Athlete dimension of Figure 2.1 would again necessitate a learner to experience the impact of differing coaching styles and decisions on various athlete attitudes and the coach-athlete relationship. For this development, the literature has recognised the value of workplace S&C internships in addition to the theoretical and conceptual foundations installed in tertiary education and accreditations.

Figure 2.1

Foundational Practical Knowledge (Dorgo, 2009)

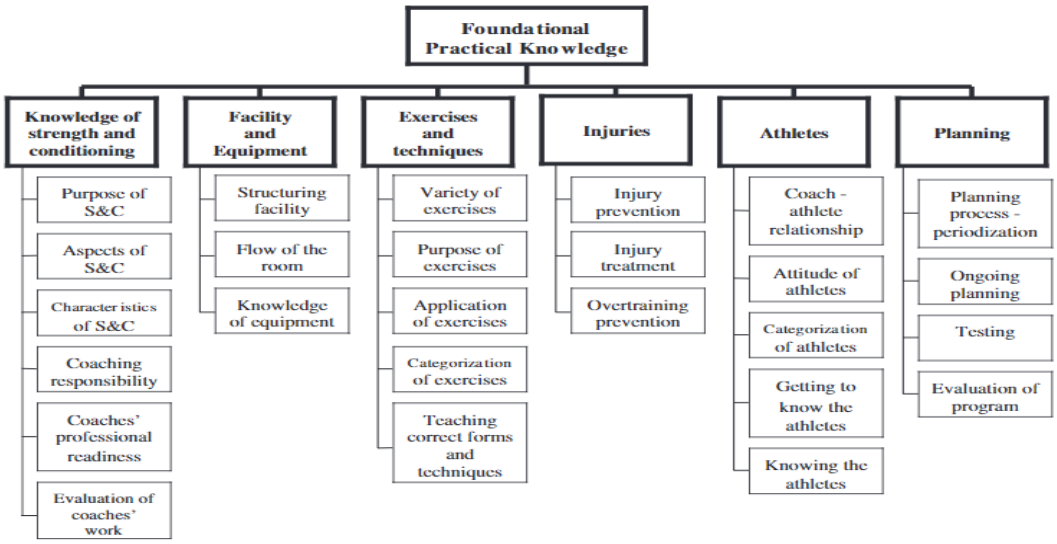


Figure 1. Foundational Practical Knowledge

Figure 2.2

Applied Practical Knowledge (Dorgo, 2009)

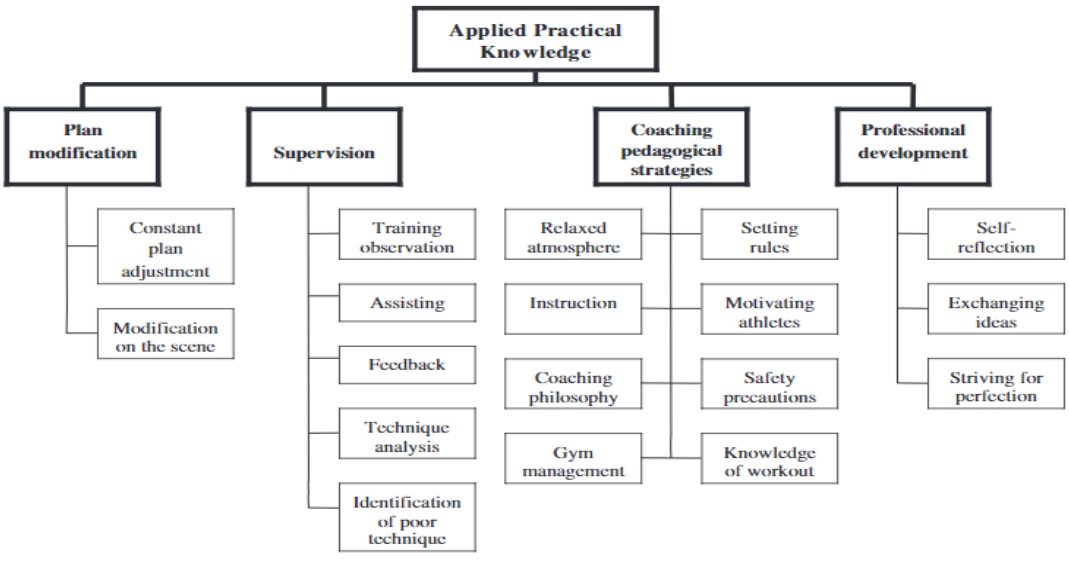


Figure 2. Applied Practical Knowledge

2.1.3 Strength and Conditioning Internships

Research has increasingly acknowledged the need for this diversity of development. For example, Till et al. (2019) recommended a combination of theoretical, applied, and experiential knowledge as part of clarifying what SCCs should focus on when seeking to develop their coaching expertise and effectiveness. Dorgo (2009) highlighted the importance of SCCs obtaining knowledge relevant to real-life practices as part of their preparation for the workplace. Such knowledge is commonly acquired through internships, which have also been referred to as 'work-integrated learning' in the literature (Desai & Seaholme, 2018).

Furthermore, Jeffreys and Close (2013) described an internship within S&C as a method for acquiring career-specific experience through conducting key roles associated with the profession under the guidance of an appropriately qualified and experienced practitioner and mentor. Early research stated that internships can be considered situated learning experiences – a term coined by Lave and Wenger (1991). Within these settings, classroom-derived theories and concepts can be practised. For example, Martin (2020) described S&C internships as providing enhanced opportunities for students to develop the knowledge, skills, and abilities they will require as future SCCs. Furthermore, these internships offer exposure to the intimate details of the role (Desai & Seaholme, 2018). However, prior to the study of Read et al. (2017), the characteristics of those undertaking S&C internships had not been reported in the literature. They include behaviour, applied practical skills, and theoretical knowledge. Read et al. (2017) surveyed SCCs in the United Kingdom who had completed a formal 3-month-minimum internship within the last 2 years, using multiple-choice questions to generate insights concerning their experiences. They found a perceived lack of support and supervision for interns, similar to that identified by Dorgo (2009), who argued that internships are generally unregulated despite NSCA advocacy. The consequences of this lack of regulation are wide-ranging and include lacking role clarity, being assigned responsibilities

without adequate competencies, and lacking a formal development plan. Thus, such examples temper the conclusion of Tod et al. (2012) that workplace-integrated learning is the most beneficial development opportunity for SCCs.

Nevertheless, hands-on practical experience is fundamental for SCC development (Carson et al., 2021), and the literature supports the traditional orientation of SCC preparation and development as building foundational knowledge (Dorgo, 2009) and practical skills (LaPlaca & Schempp, 2020). Therefore, it is reasonable that much interest has been directed at how best to support learners in the S&C domain.

When considering internships for S&C workplace preparation, a crucial consideration has been the role of mentors in the design and delivery of S&C internships. Although a universal definition of mentoring does not exist, in the context of S&C, the definition provided by Alleman et al. (1984) is appropriate. They described mentoring as a ‘relationship in which a person of greater rank, experience or expertise teaches, guides and develops a novice in a profession’ (p.329). Regardless of the definition, a key component of mentoring is the value of guidance provided to the less-experienced person(s) (Cassidy et al., 2004).

Moreover, Read et al. (2017) emphasised the need for internships to be regulated to provide elements of consistency, such as understanding developmental objectives and requiring the presence of a mentor. They remotely surveyed 119 participants (113 men and six women) who had completed an internship in the last 2 years and were either currently employed as an SCC or studying for an undergraduate or postgraduate degree. For inclusion, the internship had to have lasted at least 3 months, requiring the attendance of a minimum of two sessions a week during that period. The authors reported that over half of the participants could not agree or strongly agreed that adequate time had been allocated by a mentor to fulfil their support role. Furthermore, approximately half of the participants reported that 50% or less of their internship had been completed under the supervision of a suitably qualified

employee, with some reporting that they had received no supervision. Furthermore, approximately 25 participants stated that they had never had a meeting to discuss their developmental objectives, while over half were unable to agree or strongly agreed that mentor meetings had been used to discuss their developmental objectives. This lack of governance may have led to high variation in the internships.

Other research regarding S&C internships has demonstrated that mentor supervision is a strong influencing factor in whether internships are effective (Magnusen & Petersen, 2012; Murray et al., 2014). Gillham et al. (2015) argued that securing committed and available mentors to support the learning needs of interns is a challenge in the construction and delivery of effective S&C internship programmes. The wide and varied nature of responsibilities associated with being an SCC can be presumed to leave supervisors time-poor in terms of having the necessary time and energy to verbalise and review their approaches to those who are less experienced. Indeed, Gillham et al. (2015) emphasised the value of novice SCCs reflecting on their experiences to consolidate them and support the development of their future authentic selves. Part of doing so is the ability to rationalise their within-role approaches to programme design.

To close this section, the literature to date on internships aligns with Gearity et al. (2021), who stated that more research in this area is required to develop a heightened appreciation of the intern experience itself as well as its outcomes as part of guiding future recommendations for S&C internship structure and content. While I agree with Gillham et al. (2015) and Gearity et al. (2021), I was also motivated to extend their points through the research presented in this thesis to provide evidence regarding how both experienced and less experienced SCCs understand their PJDM across the full S&C coaching process of planning, delivery and review (Till et al., 2019).

Thus far, this chapter has illuminated the orientation of the three main S&C governing bodies regarding their focus on designing and delivering SCC development materials. It has also offered insights into the experiences of learners in S&C internships. Notably, however, and despite Brooks et al. (2000) finding that specific duties may vary between senior and junior SCCs, only the ASCA has adopted a layered approach to differentiate levels of S&C performance according to workplace experiences. Therefore, the next section explores the similarities and differences of SCCs at these different levels of experience according to the literature.

2.2 Distinguishing the Performances of Strength and Conditioning Coaches

2.2.1 Differentiating the Experience Levels of Coaches

According to Waller et al. (2023), all professions require consistent terminology that is applicable and understandable to those who will be most affected. However, the S&C literature demonstrates an inconsistent use of language regarding the typology of experience within the field. Specifically, inconsistencies exist regarding what title to use to encapsulate a particular SCC's level of experience. In mainstream coaching, Trudel and Gilbert (2013) created a model of a coach's evolution with the following stages: beginner, competent, proficient, and expert. Later, Trudel et al. (2016) amended the stages to newcomer, competent, super competent, and innovator. They explained that competent coaches hold some form of certification and can replicate what they are taught. This definition is helpful when considered in the S&C context. For example, the accreditation processes currently advocated by the NSCA and UKSCA place value on acquiring and recalling theories and frameworks—skills that are befitting a newcomer. At the final stage, namely the innovator stage, one can suppose that SCCs would be able to access and operate at higher levels of thinking and be more contextually aware of the available stimuli.

Within the wider coaching literature, Côté and Gilbert (2009) defined an expert coach as one who has achieved effective coaching over an extended period, during which they have maximised athlete outcomes—specifically competence, confidence, connection, and character. This definition includes an unspecified high number of years of experience and the consideration of more than just physical adaptation. Thus, the definition extends beyond the two primary purposes of SCCs introduced at the start of this chapter.

With a specific focus on the levels of experience that might differentiate SCCs, Grant and Dorgo (2014) attempted to discriminate the characteristics of beginner, competent, and expert S&C coaches using various criteria. They provided some clarity to the ambiguity regarding newcomers and competent SCCs by explaining that beginners rarely perceive personal control within their environments, whereas competent SCCs are confident in their approaches and flexibility with their athletes. Furthermore, Berliner (2004) explored the beginner-to-expert continuum and found that beginners, upon commencing their first formal role, are likely to encounter tasks they consider to be new and unexpected. To this end, it is likely that SCCs would need to be open to and capable of learning new skills and thinking processes if they are to meet the demands of new environments.

LaPlaca and Schempp (2020) also reported on the experiences, skills, and knowledge that differentiate expert and competent SCCs. They identified four key components of an SCC's experience. According to them, expert SCCs would possess at least 10 years of head S&C coaching experience, have worked in a wide variety of environments, have faced different challenges, and continue to deliver high-level programmes. By contrast, competent SCCs would have coached for 5–9 years and worked in different environments with less complexity and diversity. Regarding the coach's skills, the communication of complex concepts across multiple, diverse populations was deemed a characteristic of experts, as was remaining humble in one's approach to learning, managing large groups and understanding

what is important at a particular point in time. The highest-ranked knowledge areas for expert SCCs predictably included substantial knowledge of training methods and techniques as well as planning knowledge. Moreover, interpersonal knowledge was highly rated due to its ability to support how SCCs motivate and coach athletes at an individual level as well as their relationships with different stakeholders, such as staff members, coaches, and administration.

In addition, the value of research that provides insights into the characteristics of SCCs was highlighted by Tod et al. (2012), who argued that understanding the attributes of effective SCCs helps inexperienced practitioners to identify the characteristics they must develop. Most recently, this was supported and extended by Weldon et al. (2022), who stated that characteristics research not only offers insights for SCCs' knowledge and behaviour but also aids in understanding the physical testing, exercise prescriptions, and programming strategies used by SCCs.

However, before any such development strategies can be designed and delivered to relevant cohorts, what constitutes 'effective' must be clearly understood to determine whether it and other terms are the most suitable for representing a particular age and career stage. Côté and Gilbert (2009) provided a definition of coaching effectiveness that forms a basis for examining the effectiveness of SCCs. They stated that coaching effectiveness is 'the consistent application of integrated professional, interpersonal and intrapersonal knowledge to improve athletes' competence, confidence, connection and character in specific coaching contexts' (p. 316). Later in this chapter, I refer to the growing interest in interpersonal knowledge and the underrepresentation of intrapersonal knowledge. In the next section, I discuss the professional knowledge of SCCs regarding what they are deemed to know and the behaviours they demonstrate within their role.

2.2.2 Coaches' Knowledge and Behaviours

The S&C research pertaining to knowledge has focused on factual, declarative knowledge. This form of knowledge is relatively easy to obtain and can be recalled and observed in the behaviours of SCCs within their routines and procedures. However, the various definitions used to identify the status of an SCC have muddled the research concerning the multiple characteristics of SCCs in the workplace. One of the earliest pieces of research to provide a profile of SCCs' characteristics was by Pullo (1992), who surveyed 145 NCAA SCCs. Using surveys is a traditional method for capturing surface-level information on SCCs through responses to closed questions regarding, for example, qualifications and accreditations, professional experience, and general demographic profiles (LaPlaca & Schempp, 2020; Weldon et al., 2022). Another early effort to identify the characteristics of SCCs was by Dorgo (2009), who examined the knowledge base of a single experienced SCC who worked at a major NCAA Division I institution. However, because the insights only included one coach, the transferability of the findings across levels of experience and – crucially – context is limited. The key findings of this research regarding foundational and applied practical knowledge are illustrated in Figures 2.1 and 2.2.

Besides the professional experience of SCCs (i.e., the roles held and the status of their profile, as determined by their professional credentials), research has investigated SCCs' day-to-day practices. According to Gilbert and Baldis (2014), skills and behaviours are visible indicators of what SCCs know and consider. Early characteristics research within S&C emanated from the US and included professional sports, such as American football (Ebben & Blackard, 2001), ice hockey (Ebben et al., 2004), baseball (Ebben et al., 2005), and basketball (Simenz et al., 2005). Duehring et al. (2009) also investigated high school coaches. While these studies have provided insights into the practice habits of SCCs, the transferability of their findings is potentially low at a global level due to the cultural differences associated

with the Northern and Southern hemispheres, the predominance of elite-level practices, and the lack of examination of the nuances of different governing bodies (e.g., the ASCA and UKSCA). Furthermore, the absence of representation of female SCCs and their profiles according to age and career stage is noticeable.

Almost 20 years after early research from authors such as Ebben et al. (2004), a similar but more contemporary line of inquiry was conducted by Weldon and colleagues, who examined SCCs within soccer (Weldon et al., 2020) and cricket (Weldon et al., 2021). Advances in technology and the growth of the S&C domain have allowed research to capture the profiles and preferences of SCCs more efficiently than before. Indeed, Weldon et al. (2022) surveyed 156 SCCs concerning their practices, much like Ebben and Blackard (2001), but they were able to use Google Forms as an open-access survey application. They reported a predominance towards technology, testing, and sports specificity regarding the perceptions of future trends within S&C. This demonstrated a further prioritisation of performance objectification and the biophysical contributors to sporting performance. While this was understandable given that the primary purposes of an SCC are agreed to include injury-reduction strategies and performance improvement (Turner & Comfort, 2017), it perpetuates the SCC role being viewed through a relatively narrow lens.

Similar research (Brooks et al., 2000; Szedlak et al., 2015) has suggested that more in-depth investigations are required to identify the most effective behaviours and characteristics of SCCs, thus contributing to and guiding their personal development as well as enhancing the efficacy of their work with athletes. Early S&C research (Pullo, 1992) inferred that SCCs have relatively similar backgrounds regarding preparation for the workplace and the duties within their roles. Although LaPlaca and Schempp (2020) offered an empirically validated list of characteristics that differentiate expert and competent SCCs, they focused on knowledge and skill characteristics. They concluded that expert SCCs can intuitively identify

what is most important and possess experience of working in a wide variety of environments with many different sports and sport coaches. Within their role, for example, this may manifest as an SCC choosing not to attend to a coaching point to correct a biomechanical error with a developmental athlete. In this case, the movement may not be technically ideal, but as part of a holistic approach the SCC may perceive benefits in allowing the athlete to problem solve or 'feel' the error safely to support long-term learning. Alternatively, an SCC may choose to allow a programme to not be fully completed due to a high level of social interaction between athletes within a training session reducing time spent on working. However, an SCC might intuitively consider the bigger picture of the stage of season, stage of training cycle, or overall context of a training day where a high level of athlete connection is favourable.

Considering the aforementioned research, SCCs of a competent level are seemingly differentiated from those of an expert level by the experts' ability to apply professional knowledge at a deeper level (LaPlaca & Schempp, 2020). This could manifest as an SCC being able to connect what is within an athlete's training programme to wider considerations, such as the athlete's position or the needs of the sport, using language and metaphors that carry a high level of relevance at an individual level. Prior to delivering a training programme, deeper professional knowledge can be used to guide and shape SCCs' planning process through collaboration with other staff and coaches as part of clarifying what matters, when, to whom, and why.

However, if SCCs are considered equal regarding the foundational practical and applied knowledge they possess, then how S&C candidates promote themselves over their peers and – more importantly most effectively support their athletes must be determined. A key consideration is that interpersonal skills are influential in effective coaching (Côté & Gilbert, 2009). For example, Tod et al. (2012) reported that experienced SCCs are flexible

and athlete-centred in their approaches and place importance on elevated athlete engagement and high-quality relationships. This finding reinforces the importance of skills beyond the recall of frameworks and demonstration of techniques.

Furthermore, individuals in their first S&C role will likely have roles and responsibilities that involve working directly with developmental athletes. Based on my industry experience and discussions with my professional network, such roles are often demanding for SCCs due to the wide variation in athlete backgrounds and abilities, their tendency to be resource-poor (in terms of both S&C equipment and sport science tools), and the requirement to work in the absence of formal support from more experienced coaches (e.g., in an academy setting). Indeed, as previously mentioned in this chapter, SCCs may be required to provide athletes with nutritional, psychological, and emotional support as a consequence of both low resources and the trust they develop in these environments. Therefore, SCC preparation is crucial for those in the S&C workplace for supporting their athletes with confidence.

2.3 Introducing the Psychosocial Dimension of Strength and Conditioning

Previous sections have described an SCC's need for a sound theoretical knowledge base and practical competencies to support athlete development. However, the possession of these two capabilities is not sufficient for being holistically effective as an SCC. This conclusion is supported by Brooks et al. (2000), who stated that SCCs have a responsibility to provide social, emotional, and physical development within their role. Despite this early statement within the literature, S&C research has only recently adopted a lens broader than domain-specific knowledge and practical competencies. This absence of attention to psychosocial influences within the role of SCCs is evident in the content of the various accreditation programmes. Indeed, little evidence suggests that any focus is given to

preparing SCCs to manage the critical and complex elements of athlete psychology effectively at the governance level of the S&C domain.

Notably, however, in the last 5 years, a growing body of literature has begun to recognise the interpersonal and psychosocial requirements of the role of an SCC. For example, Foulds et al. (2019) stated that SCCs have opportunities to create small groups and one-on-one situations to set goals mutually with athletes, demonstrate progress, and hold conversations on topics beyond sport. Interestingly, similar observations were made 10 years earlier by Olusoga et al. (2009), who stated that SCCs are afforded frequent contact with their athletes, often away from the pressures associated with team selection. However, research into the opportunities presented by this study has not gained any traction, even though authors such as Jeffreys (2014) have emphasised that building and maintaining positive relationships are underdeveloped skills for most SCCs and, as such, an SCC's ability to demonstrate sound interpersonal skills should not be assumed.

With reference to the lack of traction in psychosocial research, more attention has begun to be paid in the last 5 years. According to Szedlak et al. (2019), psychosocial research within S&C has started to identify how SCCs' psychosocial skills can positively impact athletes' holistic development. In introducing the psychosocial aspect of an SCC's role, I refer to Gearity et al. (2021), who described it as a combination of interpersonal and intrapersonal knowledge that can be categorised across four broad areas, namely pedagogy, philosophy, psychology, and sociocultural considerations. These four areas were confirmed, more clearly defined, and elaborated in a recent study by Callary et al. (2023). Examinations of effective S&C practice have implied that an SCC's psychosocial skills can positively impact athletes' holistic development (Szedlak et al., 2019), and that athletes themselves have reported the positive impact of SCCs' psychosocial skills (Szedlak et al., 2015). This line of inquiry addresses an important gap within the S&C literature, and it is beginning to highlight

the value of enhancing SCCs' psychosocial capabilities at an athlete experience level as well as elevating the quality of an SCC's role execution.

Reflecting on the S&C literature to date, an opportunity exists to explore creative solutions when preparing candidates for the demands of the S&C workplace. This is critical as the number of potential SCC candidates is increasing to such an extent that accredited SCCs now outnumber the positions available (Read et al., 2017). Thus, those who attain internships are not guaranteed a consistent, supervised experience (Read et al., 2017) as part of their development. Szedlak et al. (2018) outlined the use of vignettes as a novel approach for supporting S&C development, describing them as a valuable way to initiate and extend discussions around an issue or story by introducing personal experience. Therefore, they recommended the inclusion of vignettes and self-reflection to enhance these habits in the learning of novice S&C coaches. The authors suggested vignettes as an implicit learning approach that can encourage novice SCCs to challenge their traditional constructs in a safe and social learning environment.

Psychosocial behaviours, according to Szedlak et al. (2019), are those that enhance positive interactions with athletes and encourage interpersonal reflection. Gilbert and Baldis (2014) summarised interpersonal knowledge as the ability to connect and communicate with clients and various stakeholders. Moreover, it can be called upon across sociocultural considerations within the psychosocial dimension of S&C.

The value of an SCC's communication was highlighted further by Holt (2016), who suggested that the success of any method will be influenced by the quality of an SCC's communication skills. Vernau et al. (2021) reinforced this suggestion when they examined 51 job descriptions of SCC roles and found that 80% of S&C employers valued candidates' communication skills as part of achieving buy-in to their approaches. The value of communication was further highlighted in survey research by LaPlaca and Schempp (2020),

who reported that expert SCCs can communicate complex processes in a variety of ways to different stakeholders as part of an aligned approach to athlete development. Since versatile communication across populations is related to interpersonal skills within coaching effectiveness, the psychosocial dimension of an SCC's role is again reinforced.

Furthermore, research such as that of Vernau et al. (2021) and work comparing the characteristics of differing levels of experience, such as that of LaPlaca and Schempp (2020), can be used to support the construction of future role descriptions. However, my review of literature revealed that the focus has predominantly been on knowledge, domain-specific skills, and behaviours. This has left a noticeable absence of evidence regarding the psychosocial and cognitive characteristics of SCCs. The consequence of this imbalance in research and indeed the orientation of governing bodies is a lack of holistic guidance on the appropriate preparation of potential SCCs as well as SCCs already in the workplace.

While possession of practical skills does not support or prepare an individual to be effective within the S&C workplace, skills can direct an individual's behaviour in certain situations, and they can be measured, tested, and assessed. Nevertheless, the skills will lack effectiveness unless they are attached to the necessary relationships and unique context in question. Theories, concepts, and practical skills cannot predict outcomes in uncertain, dynamic contexts that are synonymous with the role of an SCC. Therefore, in the next section, I consider the value of the emergence of psychosocial research within the S&C literature.

Much S&C research has been descriptive in nature, and the applications of the findings used to advance the role performance of SCCs have predominantly been oriented toward competency-based assessments. Recently, Gleason et al. (2020) suggested the optimal frequency of evaluation for SCCs as once or twice a year at a minimum, with the potential for subsequent evaluations to be scheduled based on the findings of the previous evaluation.

However, I argue that opportunities exist to evaluate beyond a purely behavioural and practical competency level. The complexity of such a task was intimated by Gillham et al. (2017), who described the evaluation of SCCs as subjective mystery, noting that unlike for sports coaches, win–loss records by which to judge SCCs do not exist. While Szedlak et al. (2018) argued that SCC education does not provide many opportunities to develop cognitive competencies, this does not have to remain the case.

As this section has demonstrated, the acquisition of knowledge on *what* and *how* to deliver as an SCC is important, as are the psychosocial elements of the role. Within the literature, even as early as the research by Pullo (1992), the need for SCCs to make decisions in the S&C workplace has been intimated. Regardless, ambiguity remains regarding the cognitive characteristics – underpinning the *why* of this or that method – of SCCs at any stage of their careers.

2.4 Cognition Within Strength and Conditioning

While research regarding cognitive processes and their implications for the S&C domain is lacking, insights can be drawn from the wider coaching literature. Early research by Abraham and Collins (1998) demonstrated that coaching does not comprise behaviours to be copied but rather, cognitive skills to be taught. Similarly, coaching has been described as a DM process in which coaches draw upon sport-specific and pedagogic knowledge to determine and then apply the optimal methods for each coaching task (Abraham et al., 2006). Moreover, some authors (Chan & Mallett, 2011; Fletcher & Scott, 2010) have described coaching as not only a practical exercise but also a cognitive and emotional practice. These descriptions indicate the need to explore and determine the ability of each SCC to consider factors beyond their technical competencies regarding themselves, others, and their environments. Nash and Sproule (2009) explained that an oft-overlooked aspect of coaching effectiveness is the ability to adapt behaviour to meet the demands of the coaching

environment. Moreover, Côté and Gilbert (2009) argued that ‘to be effective, coaches must be aware of the over-riding sport context in which they work’. Within such research is the suggestion that SCCs must possess the ability to consider things beyond their technical competencies.

Additionally, Nash et al. (2011) surmised that expert coaches can recognise the most relevant information in multifaceted situations to help their athletes/teams to optimally develop or perform in their ever-evolving contexts. Therefore, without the ability to understand the needs of the environment as well as the people within it, a coach will inevitably have limited effectiveness. In the context of S&C, various authors have offered examples of variables that SCCs may need to consider as part of their practice. These include the demands of the sport (Weldon et al., 2022), athletes’ current and previous medical status (Joyce & Lewindon, 2015), and individual athlete considerations regarding psychological characteristics (MacNamara et al., 2010). Thus, SCCs must engage and be clear in their cognitive and PJDM processes.

The predominant focus on domain-specific skills and knowledge by S&C governing bodies and in educational settings clearly provides an opportunity to introduce, deepen, and broaden the PJDM processes associated with SCC roles. As stated above, the role of SCCs within sporting environments is growing in importance, and acknowledging the characteristics and PJDM processes of SCCs will elevate their impact within an environment. For example, if an SCC is more aware and capable of interpreting and responding to the contextual stimuli available, they will possess a wider range of solutions for most appropriately influencing other aspects of the environment and the people within it. Expert SCCs, according to LaPlaca and Schempp (2020), understand that there is always more to learn. As such, this new horizon of research and development should prove exciting to those SCCs who aspire to be the best they can be.

The studies discussed within this section have focused on the knowledge and practical competencies of SCCs, and I have outlined the value and emergence of research pertaining to the psychosocial aspects of S&C. I identified three dimensions of coaching effectiveness, namely professional knowledge, interpersonal knowledge, and intrapersonal knowledge (Côté & Gilbert, 2009). However, the absence of investigations into not only identifying the PJDM capabilities of SCCs of different levels of experience but also addressing how to develop these capabilities is a significant gap.

2.5 Professional Judgement and Decision-Making: The Next Dimension for Strength and Conditioning Research

The previous sections have revealed the predominant focus in SCC literature on a theoretical and framework perspective, the consequent practices, and the variations among experience levels. While knowledge of *what* and *how* to deliver within their role is important for SCCs, the cognitive characteristics (underpinning the *why/why not*) of PJDM for SCCs) must not be overlooked. As Gamble (2015) has previously argued, SCCs do not exist in isolation but are required to collaborate with other departments. Within these settings, they will inevitably be required to solve multiple problems, yet the effects of the quality and processes associated with PJDM in the S&C field have not been closely examined. Emerging research into the psychosocial contribution of SCCs is stimulating new considerations for the role requirements of SCCs due to the acknowledgement that problem-solving and PJDM considerations must still be discussed within each context.

The indirect inference of PJDM was evident in early research, such as within the applied practical knowledge cluster of plan modification (Figure 2.2) by Dorgo (2009). The author reported that the SCC in question regularly revised and adjusted their original plan in response to the emerging conditions of their context. Thus, the lack of PJDM and problem-solving within the syllabi for coach preparation and development in the S&C domain is

concerning. Moreover, the impact of poor, slow, or ineffective PJDM on S&C coaching performance has been understudied. Since these cognitive processes influence role effectiveness, particularly as environments become more dynamic and unpredictable, an enhanced understanding of the PJDM processes of SCCs at different levels of experience would be valuable. Indeed, at a psychosocial level, Meir and Nicholls (2018) stated that for SCCs to be successful, they must make a range of complex decisions about the health and well-being of their athletes daily. Nevertheless, since the inception of the NSCA in 1978, little has been understood about the PJDM processes of SCCs, and that factors that are influential in accelerating their PJDM qualities remain unclear.

Building on work in mainstream coaching, which has emphasised the importance of decisions, Till et al. (2019) presented a conceptual framework of SCCs' DM. They stated that SCCs must make daily decisions for effective implementation in their practices. They identified the following six domains of SCC understanding: (1) the 'who' (SCCs' athletes); (2) the 'what' (declarative knowledge concerning S&C and the sport in question); (3) the 'how' (principles of skill acquisition and learning); (4) the context, culture, and politics (the social, cultural, and political contexts in which SCCs operate); (5) the 'self' (existing knowledge, beliefs, values, and behaviours); and (6) the coaching process, or planning, delivery, and reflection. This framework offers an encouraging introduction to the much-needed area of SCCs' PJDM, but it currently lacks empirical support.

Furthermore, and contrasting with many of my points expressed above, their structure neglected the why and why not. While the model of Till et al. (2019) includes valuable considerations, it does not reflect the need for SCCs to consider the *why* behind their decisions (Collins et al., 2022). In short, as is the case with elements of other PJDM professions, such as cognitive development, as emphasised by Szedlak et al. (2019), and metacognitive development, improvements in SCCs' understanding of why they make certain

decisions within their environments would enhance their impact. This concept of metacognition is worthy of further introspection within S&C, but there are currently no contributions in the literature. Examples have been provided, however, within high-pressure rapid decision environments, such as firefighting (Klein, 1993), other support services (Martindale & Collins, 2005), and coaching (Lyle, 2010). Through traditional approaches to SCC development, adequate methods exist for ensuring that SCCs know how to train a lift or design a programme in isolation. However, methods for confidently determining who can take the most appropriate course of action within the necessary timeframes in varying contexts are unclear. This again highlights the opportunity for research in this area to have a real impact within the S&C domain.

The growing contribution of SCCs within performance domains and the potential relationships with their athletes, through which they impact sporting and holistic experiences, require SCCs' DM to be examined if these coaches are to maximise their contributions within society.

2.5.1 Scope for Contributions to the Literature

This thesis contributes to addressing the gap concerning the role of PJDM in supporting SCCs to perform their within-role tasks. Through this thesis, I aimed to obtain an enhanced understanding of how to support SCCs beyond the definition provided by Dorgo (2009), which identifies them as professionals who primarily train athletes to improve performance through the application of their scientific knowledge. The latter part of this definition is relatively limited as it implies that scientific knowledge alone will allow an SCC to succeed in their role, whether this was the intention of Dorgo (2009) or not. Therefore, a broader understanding of the cognitive processes within SCCs' roles, as founded on empirical evidence, will offer a platform for future approaches to advance the profession. As no empirical studies have examined the nature of SCCs' PJDM, regardless of experience levels,

future research must address this domain. Furthermore, the processes of experienced and less-experienced SSCs should be compared to produce appropriate, authentic learning materials.

In addition, the need to go beyond competency and the classroom is evident if future thinkers are to be more agile, confident, and impactful with their decisions. For example, individuals must learn how to use tacit knowledge to teach others to be more attentive and decisive in their decisions when approaching problems. If research could extract tacit knowledge from SCCs, then this would elucidate how to develop such knowledge through an enhanced understanding of this seemingly invisible attribute. Such research would support the notions of Gilbert and Baldis (2014), who argued almost 10 years ago that professional knowledge is manifested in a coach's DM ability. The accumulation and execution of such knowledge within the S&C domain would provide new insights into how SCCs access and contextualise the professional knowledge they possess. Other than the conceptual framework proposed by Till et al. (2019), however, no research has investigated how or why SCCs think within their roles. Furthermore, this framework lacks any underpinning evidence and seems to be a direct transfer from similar models proposed in mainstream coaching. Consequently, no empirically supported methods exist to address gaps between experienced and novice SCCs' PJDM.

Articulating what SCCs consider when approaching problems in their role and why they place importance on certain stimuli would provide new evidence for the domain. Selecting appropriate research methods that support SCCs in accurately reflecting on their professional experiences will be crucial to conducting robust qualitative research—a topic that I will discuss more in the next chapter. I am passionate about undertaking this valuable body of research concerning S&C, as I aimed to provide insights into the PJDM of SCCs of various levels of experience and, consequently, to construct and test empirically supported approaches aimed at providing authentic, relevant, and impactful experiential learning

opportunities for potential SCCs. I anticipated that this research has the potential to identify knowledge gaps in a critical dimension of S&C and would work within the NSCA's mission to 'bridge the gap' from the scientific laboratory to the field. The next chapter discusses the ontological and epistemological underpinnings of this thesis and explores the methodologies and means of analysis available to support such research.

CHAPTER 3. Methodological Considerations

3.1 Introduction

In Chapter 2, a lack of empirical research was identified and thus a lack of empirical evidence to support what underpins the PJDM of SCCs as well as how these capabilities can be improved. According to Gough et al. (2003), research questions 'should have some social relevance and originality' (p5). As revealed through Chapter 2, the S&C domain is predominantly oriented towards preparing and evaluating SCCs according to their ability to achieve physical adaptations with athletes and support them in avoiding injury. The discussions throughout Chapter 2 demonstrated the scope for this new line of inquiry and offered a strong sense of how the overall research questions and the research objectives would contribute to the S&C domain. Consequently, as a critical precursor to the empirical work that follows, within this chapter I clarify my ontological and epistemological perspectives as a researcher and describe the processes undertaken as well as choices made as part of determining my research design for this thesis. In short, this chapter presents the considered and selected means of data collection and data analysis.

According to Alvesson and Sköldberg (2018), it is not methods but rather ontology and epistemology that are the determinants of good social research. Ontology refers to theories about the nature of reality. In seeking to distinguish various ontological positions, Clarke and Braun (2013) offered an ontology continuum that included realism, critical realism, and relativism. In distinguishing the nature of 'truth', realism is the theory of an 'absolute truth', whilst relativism is that theory that 'truth is relative' to the person or group holding them. Furthermore, relativism describes that reality is dependent on the ways we come to know it, while 'reality' is entirely dependent on human interpretation and knowledge. As a researcher, I have an ontological orientation founded on relativism, as I

believe that reality is only knowable through the human mind and socially constructed meanings.

If I had applied a different approach, such as one of realism, then the research that I conducted would have been quite different. In the case of an ontology founded on realism, I would have used inductive logic when analysing data sets. Such an approach would have implied that I would be expecting to reach an absolute truth as opposed to uncovering the truth as conceptualised by participants. As is the nature of qualitative enquiry, there was a specific line of enquiry within each research design and themes were generated from participant responses. It is important to note that I was not expecting themes to emerge from participant responses, rather they would be generated through interrogation and being critical of the data.

Epistemology is the branch of philosophy concerned with the nature and scope of knowledge. It is concerned with answering the questions of what knowledge is, how it is acquired, and how we know what we know (or conversely what we do not know. Grecic and Collins (2013) emphasised that epistemology is important because it is fundamental to how we think, and without the ability to understand how we acquire and develop knowledge, we would have no coherent path on which to base our thinking. Perry (1981) defined epistemological beliefs as beliefs about knowing and learning that reflect views on what knowledge is, how it is gained, and the limits and criteria for determining knowledge. From an epistemological perspective, my stance is one of interpretivism rather than positivism. I state this because I consider myself as a researcher and the nature of reality to be dependent on each other. I see facts as human creations and do not feel that it is possible to conduct value-free research within the S&C domain when exploring the PJDM processes of SCCs.

Key insights from the science of learning and development include that the brain and the development of intelligences and capacities are malleable, and that the development of

the brain is an experience-dependent process (Cantor et al., 2018). Three categories of learning theories that support the learning process are behaviourism, cognitivism, and constructivism. A constructivist approach is one that frames human learning as constructed and realities as determined by the learner's experiences. Indeed, three principles within a constructivist approach contend that learning is (1) an active process, (2) an adaptive activity, and (3) situated in the context in which it occurs (Boethel & Dimock, 1999; Fox, 2001). To this end, the qualitative research within this thesis was conducted through a constructivist lens, one that believed that participants would construct their own realities and meanings through experiences (Lincoln et al., 2018). This approach is in keeping with a relativist ontology. In the next section, considerations pertaining to the qualitative research eventually undertaken are discussed.

3.2 Qualitative Research Considerations

Willig (2001) described a good qualitative research design as 'one in which the method of data analysis is appropriate to the research question, and where the method of data collection generates data that are appropriate to the method of analysis' (p. 21). To this end, the ontological and epistemological stances described above were fundamental in shaping the research design. Kidder and Fine (1987) differentiated between small Q and big Q research, which was another crucial factor to consider at the start of the research design process. Small Q research is concerned with the accuracy of a participant's accounts and implies that there is a singular truth to their experiences, which is similar to realism. Using research tools within a small Q approach permits an investigation to get close to this truth, at least as perceived by the focus of the process—usually the participant. Important to acknowledge within this form of research is that researchers are passive during analysis, as they are discovering themes rather than generating them. In this version of qualitative research, the assumption is that accounts are not contextual but rather, multiple and situated. Therefore, this approach did not

fit with my position as a researcher. As part of considering whether I would adopt a small Q approach to address my research objectives, I rejected this as I believed it would not offer sufficient introspection for exploring the complexity within the area of SCC PJDM. Furthermore, sufficiently generalisable insights from professional practice would not accrue. To this end, my research within Chapters 4, 5, and 6 was big Q in orientation. Crucially, big Q research fits with the ontological position of relativism and the epistemological position of constructivism, in which absolute truth is not considered possible. My research was conducted as part of a generative and creative process. As a researcher, I was active, and the insights collected and themes that emerged were generated through iterative processes that used my subjective interpretations. Within these processes, my interpretations were situated in a particular context. Built on my professional experiences and knowledge gleaned, I understood participants' own responses and use of language, and their situated experiences offered valuable contextual understanding. This could have been the source of potential researcher bias and I was conscious to consider this throughout the course of the research conducted. Critically, however, this contextualisation, while essential, reduced my control as a researcher over the research process as each of the SSCs interviewed and involved in Chapters 4, 5, and 6 made sense of their realities and reflected their unique perspectives. Their sense-making was likely shaped by a wide variety of influences, including academia as well as their upbringing, sporting experiences, and various role models.

Within the big Q research paradigm, I considered the work of Reicher and Andrade (2000) to determine whether I would adopt a more experiential or critical orientation. Research with an experiential orientation is focused on sense-making, and I intended to probe participants' lived S&C experiences. Therefore, the research that I conducted could be experiential, not critical as the latter would seek to comprehend factors, and their effects, on the particular meanings or representations expressed. As previously stated, the aims of this

thesis were to explore the PJDM processes of SCCs within their roles through a research design that deeply examined each participant's own perceptions of their beliefs, philosophies, and opinions. Examining participants' experiences through an experiential orientation required me, as a researcher, to actively engage with the collected data to fully appreciate the meanings, as I interpreted them, within the language used in each reflective discussion. Moreover, big Q research has subjectivity, and to this end, I brought my own history, values, and experiences into the research process. These factors inevitably influenced the research.

Finally, in consideration of my research question, I felt that an inductive methodology was appropriate for exploring and analysing the collected data and generating new insights with regard to understanding the PJDM processes of SCCs. According to Kalender (2007), the traditional approaches within a constructivist philosophical paradigm include interviews, observations, document review, and visual data analysis. Within the S&C literature to date, evidence exists of semi structured interviews as part of a psychosocial orientation of research (Szedlak et al., 2021; Szedlak et al., 2015) and surveys of the behaviours, knowledge, and practical skills of SCCs (LaPlaca & Schempp, 2020; Weldon et al., 2022). The next section specifically discusses the research tools that I selected, namely cognitive task analysis (CTA), applied CTA (ACTA), and focus groups, as part of introducing the qualitative methods applied within Chapters 4, 5, and 6 to generate novel insights into the PJDM processes of SCCs of varying levels of experience.

3.3 Data Collection Methods

3.3.1 Cognitive Task Analysis

The methods used to elicit knowledge from experts include structured and unstructured interviews (Klein, 1989), videos of task performance (Omodei et al., 1997), retrospective analysis of critical incidents (Lipshitz & Strauss, 1997), and CTA. Recently, Swaby et al. (2022) summarised CTA as an umbrella term for tools and techniques as part of

describing the knowledge and strategies that are used in making decisions and judgements in various contexts. Indeed, previously Hoffman et al. (1998) stated that using CTA is aimed at knowledge co-discovery or co-creation. A clear intention of the research presented in the thesis was to elicit the tacit knowledge of SCCs.

3.3.2 ACTA

ACTA can be considered a streamlined version of CTA (Militello & Hutton, 1998). It is an empirical method of inquiry used to access the tacit knowledge of experts. Expanding on this, McAndrew and Gore (2013) described ACTA as a set of knowledge elicitation and representation techniques intended to assist in identifying the key cognitive elements required to perform a task proficiently. Researchers have successfully used ACTA in empirical work to understand expertise in a diverse range of areas, including weather forecasting (Hoffman et al., 2006), clinical nursing (Militello & Lim, 1995), firefighting (Klein et al., 1989), recruitment (Gore & Riley, 2004), and military command-and-control operations (Drury & Darling, 2008).

It is important to state that ACTA is an entirely verbal method. By asking experts to expose their thinking, qualitatively rich accounts of their reasoning processes become accessible (Ericsson & Simon, 1980). The open-endedness of ACTA's probes permits participants to respond in ways which make their thinking 'visible', which is crucial for studying cognition as it occurs in the wild (McAndrew & Gore, 2013). Furthermore, ACTA is empirical and offers an opportunity to directly examine SCCs' experiences in the workplace. Within the qualitative research conducted on SCCs to date, no studies have used ACTA to evaluate their perceptions of the types of knowledge and skills required within the profession and their relevance to work in the field. Within the process of completing ACTA, there are the following three stages: the task diagram, the knowledge audit, and the simulation interview.

First, the purpose of the task diagram is to identify areas that demand complex cognitive skills and provide researchers with a broad overview of a particular task. Aspects of responses are explored further in the next stage. Second, the knowledge audit requires researchers to ask a series of questions using various probes. These probes are based on the following knowledge categories that characterise expertise (Militello & Hutton, 1998): diagnosis and prediction, situation awareness, perceptual skills, development of tricks of the trade and knowledge of when to apply them, improvisation, metacognition, recognition of anomalies, and compensation for equipment limitations. A key difference between the knowledge audit and standard forms of mental model assessment is that the knowledge audit draws directly from research on expert–novice differences (Klein & Hoffman, 1993). This encourages respondents to identify why certain elements of their expertise may result in errors for less experienced others. Lastly, there is the simulation interview stage, which was deemed optional by McAndrew and Gore (2013); however, it provides an opportunity to explore three environmental circumstances around a situation common to the respondent.

Following the ACTA interviews, researchers then produce a *cognitive demands table,* which serves to collate and synthesise the collected data. This provides an overview of (a) the difficult cognitive elements; (b) why they are difficult for a novice; (c) errors a novice might commonly make; and (d) cues and strategies that experts use to overcome cognitively difficult elements. This table is the main output of ACTA, and its content is intended to support others in the same domain to make more informed decisions regarding future problem solving in the field, design specific training for a discipline, and support the design of job descriptions (McAndrew & Gore, 2013). Based on my critical consideration of the different methods available, I believed that undertaking an ACTA approach and applying its findings within the domain of S&C would offer the opportunity for academia and coaching

practice to come together to accelerate how less experienced SCCs learn and increase their impact.

3.3.3 Focus Groups

A focus group is a research technique for collecting data through group interaction on a topic determined by the researcher (Plummer-D'Amato, 2008). This technique enables investigators to access participants' views on a specific topic. Investigations can then draw from the complex personal experiences, beliefs, perceptions, and attitudes of participants through moderated interactions (Kitzinger, 1994). Notably, S&C research has paid little attention to the PJDM of SCCs. As such, a strong potential existed for the application of qualitative research using ACTA and focus groups to provide insights to inform future learning approaches as described below.

3.3.4 Online Materials for Generating Insights

In the research presented in Chapters 4, 5, and 6, I used both ACTA interviews and focus groups as a method for knowledge elicitation, with materials (especially Figures 4.1 and 5.1) generated from the ACTA to stimulate discussion within the focus groups. Both methods effectively probed participants' lived experiences and perceptions within the S&C workplace. A different approach was used in the research presented in Chapter 8, where a combination of text-based case studies, previously captured video examples from within various S&C workplaces, and evolving simulations were used to provoke thought and reflection with participants as part of an alternative approach to SCC learning.

3.3.5 Sampling Considerations Across Research Projects

When considering the cohort of SCCs to purposefully sample across the qualitative research investigations, I wanted to ensure that the eventual research findings would have relevance for a range of SCCs and make a wide-reaching contribution within the S&C domain. Prior to approaching potential participants, I took the time to determine what and

who would represent a sufficient diversity of SCCs, as well as factors such as how I would recruit them and the challenges associated with accessing them. In determining how many participants to recruit for each investigation, I considered previous research that has used ACTA interviews and focus groups. Ascertaining this research context was helpful for confirming that the richness of the data would be crucial within a big Q approach, and therefore, fewer participants would be required in each investigation. To this end, in the ACTA research conducted there were nine participants in research conducted in Chapter 4 and eight participants in Chapter 5.

The qualitative sampling across ACTA research (Chapters 4 and 5) and the focus group research (Chapter 6) were both purposeful as the SCCs approached and selected were considered to have characteristics and experiences, which they could directly refer to and reflect on as part of addressing the research question and the particular aspect of each investigation. Certainly, for the research on high-level SCCs, I encountered recruitment challenges due to there being an insufficient number of SCCs in New Zealand that meet the criteria for being high-level SCCs. Here, I consider a contributing factor to be the formal absence of an S&C governing body in the country. The closest and most accessible is the ASCA, but the lack of experienced SCCs who also possess the necessary accredited status results in some ACTAs being completed online through video conferencing as well as investing in international travel to complete others. Conversely, there was a far greater sample to access regarding developing SCCs within New Zealand.

With reference to the focus group research, I made use of my status within the S&C domain –positioning myself as an inside researcher – to lean on professional networks in the United Kingdom. Through these networks, I accessed a sufficient number of experienced SCCs who could commit to a date, time and location that would permit focus groups to be held. It was vital to keep the barriers to participation as low as possible, which resulted in

much travel for myself and the organisation to organise and adequately prepare the focus groups.

3.4 Qualitative Data Analysis

As part of discussing qualitative data analysis, Patton (1990) stated that ‘the challenge is to make sense of massive amounts of data, reduce the volume of information, identify significant patterns and construct a framework for communicating the essence of what the data reveal […]‘ (p. 372). In determining whether an analysis should be of an inductive or deductive orientation, Byrne (2022) recently argued that conducting an analysis that claims to be exclusively inductive is not possible due to the requirement that the researcher should possess some initial form of criteria to identify whether the information collected can indeed contribute to addressing the research question. Within my research design, I contended that an inductive approach would predominate, with the data collected being openly and reflexively coded and a curiosity being upheld toward the interpretations of meaning within participant responses. Then, consistent with Byrne (2022), an element of deductive analysis would be present through safeguarding that the generation of themes from codes was relevant to my research questions. Of the approaches available to me as a researcher, I briefly discuss codebooks and coding reliability in this section, before paying greater attention to reflexive thematic analysis (RTA).

3.4.1 Codebooks and Coding Reliability

In discussing methods of analysis, Braun and Clarke (2021) explained the importance of selecting a method that is in alignment with the theoretical assumptions and research question(s). Initially, thematic analysis (TA) was implied by Braun and Clarke (2006) to be a singular method, but the thinking of these authors has evolved over time, and these authors (Braun et al., 2019) later proposed that TA could more appropriately considered a family of

methods with three broad approaches. Within this ‘family’ were the typologies of coding reliability, codebook analysis, and RTA.

Previous researchers (Boyatzis, 1998; Joffe, 2012) have made use of a structured codebook to enhance the reliability of their data coding. This approach is not consistent with my position as a researcher as within it, themes are typically established in the initial stages of the analytical process, which prevents the researcher from actively engaging in deeper exploration and interpretation processes to generate themes. Examples of codebook approaches are template analysis (King & Brooks, 2017) and framework analysis (Smith & Firth, 2011). In addressing coding reliability, this is a common, deductive approach, and themes can be partly determined in advance and reflect the interview questions used. This form of research will not be conducted in the present research of this thesis.

3.4.2 Reflexive Thematic Analysis

Compared with the aforementioned two typologies, RTA is more organic and fits with big Q research through using a values-based framework. It is an inductive approach informed by a constructivist ontology as well as a means of analysis aligned with my research intentions. Initially, Braun and Clarke (2006) conceptualised RTA as a paradigmatically flexible analytical approach that could be applied across a range of research paradigms. As prominent researchers in this area, Braun and Clarke (2012) described RTA as an easily accessible and theoretically flexible interpretative approach to qualitative data analysis that facilitates the identification and analysis of patterns or themes in a given data set. Later, these authors (Braun & Clarke, 2019) stated that RTA can be considered a reflection of a researcher’s interpretive analysis of the data and is conducted at the intersection of (1) the dataset; (2) the theoretical assumptions of the analysis; and (3) the analytical skills/resources of the researcher. More recently, RTA was established to be an exclusively qualitative

approach to analysis and appropriate for research with a constructivist orientation (Braun & Clarke, 2019).

The six phases of RTA are as follows: (1) familiarising oneself with the data and identifying items of potential interest; (2) generating the initial code; (3) constructing initial themes; (4) reviewing potential themes; (5) defining and naming themes; and (6) producing the report (Braun & Clarke, 2021). I selected RTA as it does not contain methodological stipulations, nor is it tied to a specific theoretical framework or approach; thus, it allows researchers flexibility in analysing their data. Moreover, (Braun & Clarke, 2019) described this approach as offering flexibility around data collection and indicated that it has been popularly applied to focus groups (as presented in Chapter 6). The process identifies new patterns of meaning, which can help to determine whether the information generated by participants offers something new (Braun & Clarke, 2019), thereby extending published research regarding the PJDM processes of SCCs.

The flexibility across the six phases of RTA not only allowed me as a researcher to navigate forward within the analysis process but also – crucially – to retrace and repeat as I became more engaged with the data and my understanding developed. To this end, when analytically engaging with the data, I regularly questioned what was significant in the data sets, keeping my research question at the forefront of the analysis. Within this phase was the value that resided in the transcription process. Listening to the audio transcripts repeatedly supported me during the notation of participants' responses. Over time, I developed proficiency in the coding process, and I was most confident and efficient during the focus group research, having learned from the ACTA investigations. I was able to identify data of potential interest, which in turn provided ideas for further coding. When engaging with the data, I also highlighted and wrote notes on transcripts. Transcripts were 'actively' read, which progressed to being read analytically and eventually critically. My note-taking was initially

casual, but subsequently, through my curiosity, I asked myself deeper questions about how I was making sense of the data. An example was during the RTA of SCC data presented in Chapter 5. Compared with the high-level SCC data, the responses were initially brief and required substantial probing. As a researcher, I was cognizant of not limiting how I was engaging with the data. Furthermore, given my history as an SCC combined with the previous high-level SCC research, I needed to be mindful of any potential bias and not assume that briefer responses would bring a lack of substance.

In addition, I considered the coding process a source of unavoidable subjectivity. As such, when I was coding the data sets, I endeavoured to follow a systematic process and direct equal attention across responses. These codes were reviewed and reflected on as part of the reflexivity of the RTA, and within this, I was able to expand and rename codes as my understanding of the data evolved. This early coding was not necessarily the final coding as part of the ACTA and focus group research. As the codes were primarily semantic in nature, they captured surface-level meaning and provided a descriptive analysis of participant responses (Byrne, 2022). Latent codes go beyond a descriptive level of analysis (Byrne, 2022), but they are not apparent in Chapters 4 and 5. Certainly, in the early stages, the codes were primarily semantic and easily noticed. I considered the coding within the focus group research (Chapter 6) to feature more latent coding as I was able to conduct deeper interrogations of the data.

My generation of initial themes was again an active process that resulted in the promotion of important codes into clusters to become initial themes. I made use of thematic tables to help construct these and organise my ideas. Consistent with big Q research, the prevalence of a particular code or response did not necessarily mean that it was considered an initial theme. In the next phase, however, commonalities were considered further as part of the review process and development of themes. I asked myself whether the data were

meaningful enough, and in some cases, they or initial themes were discarded, data were revisited, and coding revised. It was important for me to consider whether the themes worked in relation to coded data prior to refining, defining, and naming them. Themes also had to be named in a manner that sufficiently captured the essence of what was generated from the RTA.

3.5 Establishing Rigour

I resonate with the position of Elliott et al. (1999), who asserted that researchers should strive to own their perspective. I conceptualised myself as an artist who actively created a sculpture from the materials provided from the raw data within each participant's responses. I brought pre-acquired skills and life experiences to the research process, and my skills as a researcher were broadened and deepened over the course of completing the research.

As recently summarised by Byrne (2022) regarding the use of RTA, it is fully expected that no two researchers interpret data in the same manner and, consequently, any codes or themes produced through the interpretations of one researcher are not required to be reproduced by another. To this end, the research presented in Chapters 4, 5, and 6 was conducted with myself as the primary researcher, and the absence of additional interpretations was not required. Having said that, my supervisor did serve as a critical friend in the ACTA and focus group studies. Said role was 'not to "agree" or achieve a consensus but rather to encourage reflexivity by challenging my construction of knowledge', which is consistent with the position of Cowan and Taylor (2016, p. 508). I also considered it appropriate to dispel saturation as a means of determining sample sizes within my research design. Consistent with Braun and Clarke (2019), saturation is an approach that is more appropriate for positivist and realist forms of research.

Through my professional experiences and relationships across the S&C domain it was anticipated and acknowledged that I may be known by some participants across the various research to be conducted. This was similarly acknowledged by Mees et al. (2022) recently and these authors highlighted the benefits that such relationships can offer during qualitative research regarding development of rapport and the potential for gaining a deeper insight.

3.6 Acknowledgements and Reflections Regarding the Design Process

In this chapter, I have described my thinking and processes pertaining to the big Q research that I designed and conducted; however, I also note here that, as a result of the findings, I also designed and conducted a final study. This final study (Chapter 8) made use of the principles of Cognitive Apprenticeship and applied the findings of the ACTA and focus groups in an attempt to elevate the PJDM of potential SCCs. Within this research, I developed and applied a purpose-designed rubric to evaluate the performance of participants. This design process is explained in Chapter 8. It is not discussed here as it fits better later in the thesis, however as brief overview data was collected through the participants responses to three online simulations regarding S&C contexts. As a means of rating participant responses, a score was assigned according the depth and breadth of responses against the rubric. I feel that my grasp on the research design, subsequent collection, and RTA allowed me to tell the stories within the participant data in Chapters 4, 5, and 6. I did not limit my insights and used tools to engage with the data and deliver a coherent analysis. My research question remained consistent and I was able to treat it as an anchor throughout. Novel insights are provided across the three chapters, and the themes can be considered well developed as part of holding the concept of metacognition across the coaching process.

CHAPTER 4. Study 1: Examining the Roles and Consequent Decision-Making Processes of High-Level Strength and Conditioning Coaches

4.1 Introduction

In the previous chapter, I outlined my position as a qualitative researcher who believes that SCCs can develop their cognitive and metacognitive capabilities through engaging in constructivist pedagogical approaches. The critical examination of existing S&C literature pertaining to the characterisation of SCCs, both experienced and less experienced, clearly presents an opportunity to focus on cognitive processes and transition away from the predominant focus on knowledge as well as biophysical focuses. The conjecture surrounding the classification of SCCs according to experience level, knowledge possessed, and professional achievements, among others, was addressed in Chapter 2. Within this chapter, the focus is on SCCs with a high level of experience (i.e., high level coaches hereinafter 'HLCs').

4.1.1 The Context

As evidenced in Chapter 2, much has been written about the characteristics of SCCs regarding the behavioural and domain-specific knowledge possessed across coaches of differing levels of experience within S&C. However, the ability of SCCs to effectively comprehend the cultural and psychosocial elements of their environments is not commonplace. Indeed, Gearity and Mills (2012) described the lack of qualitative research involving SCCs as a problem. Through examining the literature, it was clear that greater efforts needed to be made to understand not only what and how effective SCCs are at working well but also why they think the way they do.

Despite their roles requiring SCCs to be both academically and professionally qualified while also possessing a depth and breadth of domain-specific skill (LaPlaca & Schempp, 2020), other qualities undoubtedly reside beyond competencies and declarative

knowledge that can enable SCCs to be effective in their environments. However, it is problematic for S&C employers to be able to determine whether, for example, an SCC is capable of identifying the critical points and problems within a context and responding with optimal behaviours. The origins of such problems are that, at least to date, no research has explored the situations that experienced SCCs consider challenging in their roles. Furthermore, and in parallel to this, an understanding of how and why they respond in the way they do is not yet apparent. A deeper appreciation for what are considered the critical influencers of a HLC's PJDM within a given problem or context is critical in the process of assisting those who are less experienced in beginning to understand how to successfully resolve similar problems. It became clear that research that facilitated the documentation of such PJDM would build a series of findings to support future pedagogical methods within S&C. This would be achieved by elevating the quality of SCCs' capacities to consider problems in different ways and become more curious than they may be if restricted to a syllabus-focused and rules-based approach formulated in a classroom.

4.1.2 The Gap

As a role, the SCC is growing in prominence as an indispensable service to support athletic development and performance (Springham et al., 2018). Bishop et al. (2019a) confirmed that the rise in popularity of S&C has resulted in the number of SCC candidates for roles now far outweighing the number of actual roles available. Chapter 2 presented a clear narrative for the development of the SCC and, more specifically, a need to better understand the characteristics of SCCs regarding their PJDM. A positive of an ever-growing job market is the corresponding increase in SCCs in possession of a number of years of experience and qualifications is greater than it was previously, and this has been illuded to with authors describing the growth of members across governing bodies (Vernau et al., 2021). However, once a HLC is identified, a deeper consideration is how research can be designed

and applied to assist HLCs in understanding and dissecting the lessons of an experience, which in turn can help those less experienced to be more aware of factors in their own environments. As identified within Chapter 3, ACTA has been successfully used to access experts' cognitions in domains outside of S&C and is a tool that offers value in revealing the depth and breadth of SCCs' PJDM.

4.1 Current Objectives

With reference to expertise in a wider sports coaching context, Strand and Christofferson (2017) stated that it is essential for coaches to have an open mind about their *own* need for growth and improvement, not just that of their clients. Therefore, coaches who wish to become experts and provide an optimal experience for their clients must develop strong self-awareness through self-reflection and feedback from others. In this regard, Côté and Gilbert (2009) suggested that an essential part of coaching effectiveness and expertise is a coach's ability to be introspective and reflective. In essence, expert coaches develop an 'open mind' that allows them to critically consider their past experiences, recognise weakness, and revise their techniques as necessary.

Within a domain that has historically revered and focused pedagogical approaches on biophysical disciplines and the acquisition of greater theoretical knowledge, I acknowledged, prior to undertaking this research, that it may not be initially openly received within the S&C domain. Reflecting these concerns, the present study had two objectives. The first was to examine the PJDM of HLCs within S&C using ACTA, while the second was to identify, through the findings generated, which aspects of their within-role problem solving HLCs perceived to be most challenging for ECCs. An examination of the S&C literature to date suggested that SCCs should reflect on their knowledge, its delivery, and their adaptability within contexts as a starting point for growing expertise. However, it was hypothesised that the findings would, through the open minds of SCCs, contribute valuable and novel insights

into how SCCs can be more aware of the role that cognitive processes can play in elevating their coaching effectiveness.

4.2 Methodology

4.2.1 Participants

Following ethical approval from the University Ethics Committee, participants were recruited through criterion-based purposeful sampling strategies (Sparkes & Smith, 2014). The four selection criteria used to ensure status and remain consistent with previous S&C literature on expert-level coaches were as follows: (a) 8 or more years of full-time experience (10 ± 2.9 years) as an SCC; (b) completed some form of postgraduate education; (c) at least one professional accreditation; and (d) work experience in at least two different high-performance environments. A total of 10 participants (nine men and one woman) were recruited and gave informed consent. This sample exceeded the recommendation of three to five participants offered by Militello and Hutton (1998) as the minimum requirement for effective ACTA use. The experiences of the HLCs interviewed provided data spanning 32 sports coached at the elite level (of international and/or professional standard) and 11 sports coached at a pre-elite standard (Table 4.1).

Table 4.1

Characteristics of the HLCs Interviewed

Number of Coaches	10 (one female)
Age of Coaches	34.6 + 5.8 years
Years of Coaching	10.0 + 2.7 years
Nationality of Coaches	Australian (5), New Zealand (4), German (1)
Educational Level	PhD (3), MSc (4), MHSc (1), MSpEx (1), Mba (1)
Accreditations Held	ASCA Level 3 (3), ASCA Level 2 (4), ASCA Level 1 (1), NSCA CSCS (3), UKSCA (1)
Athletes Coached	Male (10); Female (1); four coaches had worked with para-athletes
Sports Coached at Elite Level (International/Professional)	Alpine Skiing, Archery, Athletics, Basketball, BMX, Boxing, Canoe Sprint, Cricket, Curling, Cycling Endurance, Gymnastics, Handball, Hockey, Judo, Netball, Para Athletics, Para Curling, Para Rowing, Para Swimming, Para Winter Sports, Rowing, Rugby League, Rugby Sevens, Softball, Surfing, Surf Lifesaving, Swimming, Tennis, Triathlon, Water polo, Winter Sports
Sports Coached at Non-Elite Level	AFL, Athletics, Basketball, Netball, Rugby League, Rugby Union, Squash, Swimming, Triathlon, Water Polo, Weightlifting

4.2.2 Measures

An ACTA was completed with each participant and the elements of the ACTA were all introduced and described in the previous chapter.

4.2.3 Procedures

In the initial stages of developing the ACTA and reflecting recommendations for good practice, four pilot ACTAs were conducted to establish and refine the foundation questions to be used. This enabled me, as the primary researcher, to obtain an enhanced understanding of the common duration and flow of the interviews.

Each ACTA interview lasted between 50 and 90 minutes, and all were recorded using a digital voice recorder. Field notes were taken throughout the interview process. Interviews commenced with a discussion about the format of the ACTA and some general questions regarding the participants' careers to date. This also included their underlying philosophies towards the profession. The first ACTA element provided a broad overview of the task in question, which in the present study was directed at the process by which HLCs plan and make decisions regarding their training programme content. Participants were also asked to identify the most cognitively demanding element of their process. This stage enabled the construction of a task diagram, which allowed participants to identify areas that demanded complex cognitive skills. The second stage, namely the knowledge audit, required me to ask a series of questions using various probes. These probes were based on the following knowledge categories that characterise expertise (Militello & Hutton, 1998): diagnosis and prediction, situation awareness, perceptual skills, development of tricks of the trade and knowing when to apply them, improvisation, metacognition, recognition of anomalies, and compensation for equipment limitations.

This process encouraged the HLCs to identify why certain elements of expertise may result in perceived errors for ECCs. For clarity, ECCs were defined to the participants as

SCCs with less than 3 years of experience within an S&C environment but who held an undergraduate degree in S&C or sports science and a domain-relevant accreditation, such as NSCA, UKSCA, or ASCA Level 1 as a minimum standard. Examples of probing to maintain the direction of the ACTA included the following: 'Is there anything else you paid attention to? Why?', 'What else might influence you here?', and 'Is there other information you would have liked access to?' Following the data collection, each interview was transcribed. After transcription, and as part of a process of member reflection (Smith & McGannon, 2018), each HLC was given a copy of their transcript to read through to verify the 'completeness' and 'accuracy' of the information at each stage. The respondents were actively encouraged to highlight anything that was missing or incorrect, as well as to report on the perceived benefits and limitations of the ACTA itself as a method of investigation.

4.2.4 Analysis

The analysis method employed for the qualitative data set was a rigorous inductive RTA, following the six-phase procedure outlined by Clarke et al. (2019). The approach was inductive in nature, and therefore, codes and themes were developed from the collected data. In the first instance, I familiarised myself with the ACTA responses through a combination of relistening to audio recordings as well as reading and rereading their field notes from the ACTA interviews and the generated transcripts. During the coding process, time was taken to revisit the initial codes and revise them accordingly. To ascertain which codes were more prevalent than others, all codes were clustered and then rechecked to determine whether the patterns they described were representative of the entire data set (Braun & Clarke, 2012). My supervisor served as a critical friend throughout this process, which included reviewing the coding process on a subset of data scripts. On the understanding that, in relation to the research question, a theme captures something important about the data and represents a patterned response or meaning within the data set (Braun & Clarke, 2006), four themes were

identified. They are presented in the results section. As part of the reporting stage, the analysis of stage one of the ACTA facilitated the construction of a task diagram (Figure 4.1).

4.3 Results

I present the ACTA interview findings in three sections. First, I present the four main themes generated as part of the task diagram stage and their associated subthemes (Figure 4.1). Examples of HLCs' responses that illustrate these themes are evidenced in Table 4.2. Second, I present six cognitive elements that were identified as difficult within HLCs' roles as well as the cues and strategies used. These were generated as part of the analysis of knowledge audit responses (Table 4.3). Finally, participant insights regarding their perceptions of how less experienced coaches would respond in the same contexts are reported.

Figure 4.1

Task Diagram of Stages Associated With HLC Decision Making for Designing Training Programmes

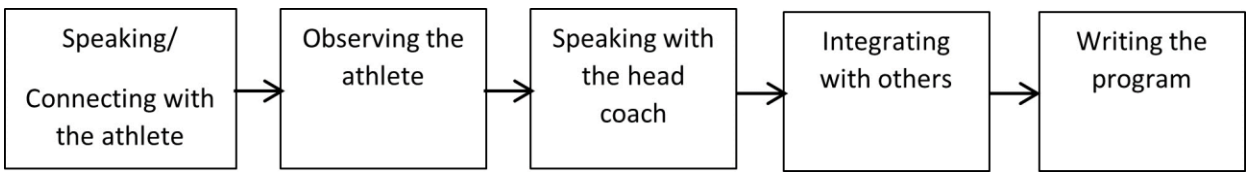


Table 4.2

Summary of Themes in Task Diagram Responses for Training Programme Design

Themes Within the Task Diagram Stage of ACTA	Example of HLC response
Speak/connect with the athlete	
As a person	'It doesn't matter if it's a new group or an old one, I meet everyone as they walk in and try and make that real connection straight up…I try and make that connection straight off that isn't necessarily S&C related. So all of a sudden, they go well there's a guy here who talks about human stuff rather than worrying about the S&C side of things'. (HLC 3)
As an athlete	'I talk to them [the athlete] about their past training, what they have done in the last few weeks, in the last months and what they think they need to do to improve or what they think they need to do to get better at their sport'. (HLC 5) 'If you are working with an elite athlete – because they know a lot about the sport that I don't know because I'm not an elite athlete in that sport I try to seek as much knowledge from them and make it that shared performance preparation'. (HLC 2)

Themes Within the Task Diagram Stage of ACTA	Example of HLC response
Observe the athlete	
Training/competing in the sport	'I just watch them move… warm-up exercises… I watch them move and that helps me decide what I need to immediately change over the first few weeks with this athlete in terms of how they move is going to relate to what I'm doing with them and the gym programme. What exercises I'm programming, what extra stretches I might be giving them to deal with their extra movements I might be doing outside of the S&C time'. (HLC 5)
In testing/screening what the athlete is capable of	'In S&C you perform your tests you know, you see how an athlete actually physically moves, how an athlete physically performs in a speed test and conditioning assessment if you like, so you have a physical profile both from a movement and physical performance point of view'. (HLC 6)
How the athlete achieves results	'I'm always assessing how an athlete responds to direction, how body language is when under stress or when put in stressful situations and what are his or her go-to habits or what are the fall back behaviours in times of stress, during assessments and observing during training

Themes Within the Task Diagram Stage of ACTA	Example of HLC response
	situations and things. I try to develop an individual understanding of how each athlete will respond to different communications styles'. (HLC 5)
Speak with head coach *Clarify direction*	'I see my job as supporting the coach in the sport. In my mind that is clear…so I need direction and coordination from the coach in the sport to do what I do really well'. (HLC 2)
Alignment of language and opinions	'I need to spend time knowing their (the athlete's) sport…I need to go out and spend time with the coach and watch them in the environment. I'll have a conversation at the same time with the coach and find out where they (the athlete) sit within the system and where we are looking to get them to, and what they're trying to work on in (the sport's) perspective'. (HLC 7)
Integrate with others *Gain additional perspectives*	'I'd approach different people first and try and get my head around what it is that they see for S&C and approach the coaches first and see what do they see for the athletes what do they see in developments how S&C might integrate with the programme. Whether they see value in

Themes Within the Task Diagram Stage of ACTA	Example of HLC response
	it and that sort of thing and I approach the medical staff with the same sort of questions generally just trying to find out what or why those people, coaches and athletes, other professionals what they want and why they want it and how I might be able to facilitate that and how I might be able to fit into the picture'. (HLC 6)
Establish alignment of approach	'If you get challenged which happens a lot in my environment especially with (the sport in question) what do you fall back on? It's like if I get challenged on something, a certain exercise or where someone is in the training phase, I've got the meetings in the sport, conversations with a coach, structured planning, so we spoke about this, we want to review it but this is how we got to this point we agreed on it'. (HLC 8)

Table 4.3

Cognitive Demands Table Overviewing Difficult Cognitive Elements Identified by HLCs

Difficult Cognitive Element for Coaches in Their Role	Why is This Difficult in the Coach's Opinion?	Common Errors High-Level Coaches Might Expect to See From Less Experienced Coaches	Cues and Strategies Used by Experienced Coaches to be Effective in This Element
Identifying relevant considerations when constructing resistance-training programmes	Multiple factors/people interplay with each other	Low domain (sport) knowledge	Making decisions based on experience and have an awareness of what, why and how to prioritise
	Must consider the needs of the sport and position	Lack of integration with others	Relying on tacit knowledge – know what will work for who and when.
		Theory oriented/exercise-driven focus – rather than an impact / specificity focus	Involving others in the planning stage for a more complete picture

Difficult Cognitive Element for Coaches in Their Role	Why is This Difficult in the Coach's Opinion?	Common Errors High-Level Coaches Might Expect to See From Less Experienced Coaches	Cues and Strategies Used by Experienced Coaches to be Effective in This Element
		Lack of direction / low stability in decision making due to a lack of clarity in philosophies	
Identifying relevant variables to ensure that training is delivered as intended	Navigating between varying mindsets and purposes among athletes in the same session The need to have group awareness and establish a feel for energy and mood	Not knowing what is not typical – noticing is limited and distracted	Considering context – training cycle focus, time of year (bigger picture). Does it look how it should be based on these factors?

Difficult Cognitive Element for Coaches in Their Role	Why is This Difficult in the Coach's Opinion?	Common Errors High-Level Coaches Might Expect to See From Less Experienced Coaches	Cues and Strategies Used by Experienced Coaches to be Effective in This Element
			Making reference to mental models – awareness of want the session should look and feel like
	Management of task proficiency – for example, was the task too hard/too much was expected?		
Managing self within the training environment	Environmental manipulation – Fostering competition/energy	Limited coaching eye – failing to pick up technical errors quickly	Taking time to consider the context (who/what/when/how)
	Finding a balance of instruction vs. guidance	Limited contextual toolbox for solving the same problem	Achieving multiple interactions with athletes

Difficult Cognitive Element for Coaches in Their Role	Why is This Difficult in the Coach's Opinion?	Common Errors High-Level Coaches Might Expect to See From Less Experienced Coaches	Cues and Strategies Used by Experienced Coaches to be Effective in This Element
	Varied preferences for athletes' learning styles	Limited communication toolbox for appropriately telling or showing an athlete	Reflecting on what has worked before
	Athlete empowerment – creating ownership through scaffolding while not overcoaching	Low predictive ability regarding knowing how athletes respond (who needs what and when)	
		Too directive – being too instructional	
Responding to unexpected changes to	Determining the causal factor(s) for response – is it due to a	Not being aware of the bigger picture – what is the wider training plan/demands	Forecasting ahead Reflecting in action

Difficult Cognitive Element for Coaches in Their Role	Why is This Difficult in the Coach's Opinion?	Common Errors High-Level Coaches Might Expect to See From Less Experienced Coaches	Cues and Strategies Used by Experienced Coaches to be Effective in This Element
the training environment	physical, environmental, or behavioural event? Experience can cause assumptions (and blind spots) to decision making if not alert	Lack of a philosophy, so no guiding principles to guide decision making Lack of experience to be confident in a decision to deliver an outcome (in an appropriate time frame) Being consistent – keeping the target stable despite a change of approach (hitting a moving target)	Context dictating the content Using coach feel – intuition Reframing the same problem and change the task demands Restart a session – change goals

Difficult Cognitive Element for Coaches in Their Role	Why is This Difficult in the Coach's Opinion?	Common Errors High-Level Coaches Might Expect to See From Less Experienced Coaches	Cues and Strategies Used by Experienced Coaches to be Effective in This Element
Drawing on coaching skills to deliver in the training environment	The need to understand individuals – their perception is their reality	Low knowledge of self	Using technical knowledge to plan and understand performance
	Being adaptable	Having a closed mindset – not being open to ideas / methods can limit awareness	Using applied knowledge to create clarity
	Being patient		Using experiential knowledge so there is less trial and error in decision making

Difficult Cognitive Element for Coaches in Their Role	Why is This Difficult in the Coach's Opinion?	Common Errors High-Level Coaches Might Expect to See From Less Experienced Coaches	Cues and Strategies Used by Experienced Coaches to be Effective in This Element
			Using coaching tongue to make the complex become simple (simplex) – create clarity
Considering the effectiveness of coaching performance	Determining criteria with which to consider before/during/after the session	Low awareness of surroundings; what/when/how/who to review	Determining through what HLC sees/hears/feels Gaining valid athlete feedback – energy/environment (better answers through better questions)

Difficult Cognitive Element for Coaches in Their Role	Why is This Difficult in the Coach's Opinion?	Common Errors High-Level Coaches Might Expect to See From Less Experienced Coaches	Cues and Strategies Used by Experienced Coaches to be Effective in This Element
			Establishing environment to gain feedback from a supporting coach

4.3.1 Task Diagram

The HLCs interviewed each possessed a similar level of experience sufficient to be considered an 'expert' within S&C. Within their recalled experiences, commonality existed between the PJDM stages of programme design and the manner in which they organised their concepts according to perceived role delivery importance. An examination of the themes generated at the task diagram stage of the ACTA (Table 4.2) demonstrated that communication is a crucial consideration for HLCs. Connecting with the athlete, observing the athlete, speaking to the head coach, and integrating their approach with others all entail different levels of communication. Within these stages, listening to the wants, needs, and perceptions of others to help form an enhanced understanding of the context were evident in the responses. This was illustrated in the following response of HLC 3:

> It doesn't matter if it's a new group or an old group; I meet everyone as they walk in and try and make that real connection straight up. It might be, Hi, I'm your S&C coach, I'm going to talk to you a bit later. I'm going to try and grab something out of them. How are you going? If I see an article from a certain place, I can bring something up about that. Try and make that connection straight off; that isn't necessarily S&C-related. So all of a sudden they go, Well, there's a guy here who talks about human stuff rather than worrying about the S&C side of things.

This HLC was confident in the benefits that a commitment to building rapport brought to their coaching. He felt that connecting with athletes would have a significant influence on the success of any training programme designed.

Within Table 4.2, observing the athlete and gaining an enhanced understanding of the sport, the purpose of S&C within the sport, and the needs of the head coach are also indicated to be crucial stages of programme design. When describing their process, HLC 7 stated the following:

> Personally, I need to spend time knowing their [the athlete's] sport so for me, that means if it's [the sport] I need to go out and spend time with the coach and watch them in the environment. I'll have a conversation at the same time with the coach so I know where they sit within the system and where we are looking to get them to and what they're trying to work on from a [the sport's] perspective.

The task diagram stage revealed that more than one stage is required for HLCs to ascertain the relevant information to design a training programme. Within the five common stages generated, each had subcomponents that demonstrated deeper levels of cognition and self-awareness by HLCs. The results indicated that effective training programme design requires communication and collaboration with a variety of individuals within the performance environment.

4.3.2 Knowledge Audit

Prominent themes concerning the strategies employed by HLCs in response to difficult cognitive elements of their role included the utilisation of tacit and experiential knowledge and the consideration of the context they were in. Indeed, this stage revealed insights beyond what HLCs knew *about* a domain and gathered descriptions of what they *do* with their knowledge. Through their ability to recall and select from a wide range of previously learned and tested strategies, the HLCs described a confident, flexible approach to adaptation for situations within their environments. Furthermore, they acknowledged that contextual changes are to be expected and prepared for, rather than them being daunting and catching them unaware. When discussing the strategies they use to effectively improvise, HLC 9 stated the following:

> It depends on what happened what's going on – physical versus environmental versus behavioural… if it's a physical consideration and I have to get this high-intensity work done and they're not, then it can be we just haven't warmed up properly, start

> again, it could be yes I'm feeling good I think we're getting it. If it's something environmental then I'll consider the conditions and make it into a race to be more competitive… whereas behaviourally, I might need to go with a conversational and mindset approach.

Reinforcing this point, HLC 5 referred to experiential knowledge and DM when explaining skills that helped them to be effective within their role. They identified the following: "Quick decision-making. The ability to know what's right for the athlete this time and the ability to adjust things on the fly". Furthermore, the HLCs appeared intuitive and recalled being able to manage their experiences to generate effective problem-solving strategies. When describing their approach to programming, HLC 9's response illustrated the blend of contextual variables that influence their DM:

> [U]nderstanding the sport, understanding the athletes, understanding the coaches, the physios everything and the context based on the environment, the restrictions, the resources and all those other things and then building my programme from that based on what outcome I decide on.

This approach, specifically the HLC working together with other organisational disciplines, does not rely on a single variable in isolation. Each practitioner is aware of their influence on other aspects to build a more complete understanding of the approach(es) required. This ability to appreciate more than one aspect of performance or within a context extended to HLCs' explanation of how they determine session effectiveness. Rather than being metrically defined or confined to a biophysical variable, a commonality surrounded coaches' 'feel' and consideration of wider, psychosocial variables. An example of this is found within the following response from HLC 9:

> Sometimes I would reflect with an athlete as well and ask, What do you think of that session? How can we make it better? But generally, you know that sometimes sessions

> run perfectly and sometimes they don't run great, and you'll look back and say, If I understand what I wanted out of that session, if I can tick the box and they have achieved what I wanted to achieve, if I achieve something out of that session, then it doesn't matter whether that's physical or mental; it might not have been a great session, but the guys left it feeling really awesome and competitive, then maybe that's a win.

Moreover, the HLCs mentioned interpersonal relationships with their athletes as well as acknowledged the value of energy within their training environment. Training effectiveness existed beyond adaptation through a blend of inter- and intrapersonal awareness. The HLCs described finding opportunities to improve their approach in future sessions. In summarising the value of experience in helping HLCs to develop their interpersonal skills, HLC 4 reflected as follows:

> [S]o I think that's probably been a big shift for me in the last 5 years just making sure I have a better relationship with my athletes and that was just observing how to get the most out of the athletes and what really good coaches do in terms of the interaction with the athletes and they get trust and the outcome.

4.3.3 Perceptions of ECCs

Low domain knowledge, specifically of the sport in question, and a lack of an integrated approach were identified as common errors that HLCs would expect of ECCs when required to construct training programmes. These errors contrast with the importance placed on these elements within the PJDM of HLCs (Table 4.2). Crucially, a lack of experiential/tacit knowledge and a low appreciation of context were perceived as errors by ECCs when HLCs described how they approach difficult cognitive elements of their role (Table 4.3). HLC 2 described ECCs as likely being too prescriptive in their approach to delivering training sessions when they said the following of ECCs: "I just think a degree of

being too rigid in their prescription and what I found is what they plan in a session they will find hard to go away from if you like". Additionally, the ACTA responses of HLCs suggested that ECCs may not possess the required resources to recall and operationalise within their environment in a timely manner to positively affect change. When discussing how ECCs would determine session effectiveness, this perceived lack of wider awareness or appreciation was evident in HLC 2's responses about ECCs: "They wouldn't be happy if the guys or girls didn't hit the numbers that they were expecting. I don't think they would have the insight around the mood of the group and when an athlete walks out feeling invigorated or absolutely buggered, you know". This HLC was referring to ECCs favouring a metric-driven, adaptation-oriented mindset to an effective session while lacking the tacit knowledge to understand the interactions within a group of athletes. They suggested that ECCs seemed unaware of the impact that this can have, both positively and negatively, on training sessions. This lack of understanding may be due to a perceived low knowledge of oneself and underdeveloped coaching philosophies within ECCs (Table 4.3).

> To me the big thing is at the end of the results on court or field or something like that so that's where I start and I reverse engineer from that rather than from a young coach I feel they try and build, build, build to make that fit in to the sport, this is the average demand of the sport build them towards it.

In sum, it was evident that HLCs engage in a pattern of innovative and diverse thinking, together with adaptability and multilevel planning, designed to promote an inclusive approach for performers, coaches, and management. At an interaction level, the need to understand athletes as people and their circumstances outside of sport was critical within HLCs' PJDM processes for programme design and associated athlete support. Identifying, interpreting, and responding to individuals within their environments were considered difficult cognitive elements, while a lack of tacit knowledge and the associated limitations

regarding relevant strategies to adapt were perceived as sources of error by ECCs in similar situations.

4.4 Discussion

This study sought to access the cognitions of HLCs to understand their PJDM and identify the perceived errors of less experienced SCCs. The results suggested that HLCs perceive connecting with athletes to understand their athletic and personal needs as important and influential when designing programmes. This consideration of 'the who' as part of SCCs' PJDM is consistent with the DM framework recently proposed by Till et al. (2019). The consideration of wider personal circumstances by HLCs is also supportive of previous research into the impact of factors outside of sporting environments on athletes. For example, professional golfers believe that their personal lives strongly affect their tournament performance (McCaffrey & Orlick, 1989). Building on this, HLCs in this study were consistent with recent S&C research in their belief that trust, care, role modelling, and authenticity are essential psychosocial behaviours for developing effective relationships with athletes (Szedlak et al., 2020).

Expert SCCs have been characterised as being able to intuitively identify what is most important and possessing experience of working in a wide variety of environments with many different sports and sports coaches (LaPlaca & Schempp, 2020). The HLCs interviewed were consistent with these characteristics and were comfortable recalling their ability to make decisions according to how the session should look and feel to them. The ACTA interviews provided the HLCs with a platform for conveying their tacit knowledge within their responses by identifying the cues and strategies they use to make decisions. Participants included the use of stories, analogies, and metaphors when verbalising their PJDM. At both the task diagram and knowledge audit stages, HLCs frequently referenced the context they were in as part of their PJDM process and strategies to navigate difficult cognitive elements

of their role. In this regard, Mellalieu (2017) suggested that applied practitioners who develop the skill of contextual intelligence are able to immerse themselves, work within, and change within a specific culture, and such contextual intelligence appears to be a capability of HLCs when navigating their environments.

This characteristic has been identified in other domains. For example, Rutt Leas and Chi (1993) found that experts plan in a much more focused manner, and that deeper, more complex reasoning underlies their use of various coaching tools to achieve their aims. The present study demonstrated this depth of planning, while the consideration of variables within and outside of the performance environment was evident in ACTA interviews and perceived as a source of errors for ECCs. Similar differences were prominent in the inclusion of others, or lack thereof, within their PJDM processes. The inclusion of others within all stages of SCCs' PJDM has been advocated, with each disciplinary perspective being thought to offer a great deal, and it is believed that they should be harnessed to formulate a shared understanding within a multidisciplinary team (Till et al., 2019).

Furthermore, Buchheit (2017) has identified that an SCC's understanding of their own beliefs, behaviours, and values are crucial for determining quality coaching practice and ongoing personal development. HLCs' responses suggested that the ability to manage themselves through self-awareness is important, while varying capabilities were assumed of ECCs (Table 4.3). Indeed, a lack of defined coaching philosophies within ECCs could account for their perceived limited contextual toolbox for solving the same problem. This implies that they have a limited depth and breadth of procedural knowledge for selecting the most appropriate solution to given situations. With this in mind, having more tools within one's toolbox was proposed by Till et al. (2019) as an opportunity for SCC development content for equipping SCCs with methods to consider within their practice.

When discussing self-management within the training environment, a theme was generated surrounding the limited 'communication toolbox' of ECCs to appropriately tell or show athletes what is required. The development of communication skills appears to be a consequence of time spent within roles and reflection on experiences. Despite this, Pines et al. (1981) encouragingly suggested that although individuals need six distinguishable forms of social support, four of them can be given by any concerned individual. They stated that (1) listening, (2) emotional support, (3) emotional challenge, and (4) shared social reality are types of support that can be provided by individuals who are concerned about the athlete but lack expertise in the sport in question. As such, it is reasonable to expect ECCs to be comfortable with, and afforded the responsibility to, provide these forms of support within their environments. However, by contrast, they stated that support in the form of technical appreciation and technical challenge needed to be provided only by individuals with expertise in the specific sport in which the athlete participates.

It seems that to develop SCCs' coaching expertise and effectiveness, a combination of theoretical, applied, and experiential knowledge is necessary within SCC education and development (Till et al., 2019). Currently, a consensus is lacking regarding how to most appropriately tailor coach development materials and environments for developing the abilities of SCCs to more effectively navigate the contexts they encounter. Differences in the breadth and depth of experiences that HLCs were able to recall as part of their PJDM were seen as a point of difference between the strategies these experienced practitioners were able to employ, and the limitations described as being associated with ECCs. Recognising that such experiences take many years to accumulate, efforts must be made to prepare ECCs more effectively for the cognitive demands associated with performance domains.

With reference to the stages described in Table 4.2, the participants saw a need for ECCs to be encouraged to use opportunities to observe athletes in practice and competition,

as this would enable them to refine their interpretations and existing knowledge of the context in which they operate. From a constructivist perspective, their immersion of experiences and, to an extent, socialisation within their context will better frame their existing knowledge. Similarly, prioritising time spent on forming and strengthening quality relationships with athletes as performers and people will serve to develop valuable tacit knowledge. More conversations where questions, responses, and approaches, for example, can be tested and reflected upon will create more tacit knowledge to access in the future.

According to Nonaka (1991), tacit knowledge does not become part of a person's knowledge base until it is articulated and internalised. Given the importance of tacit knowledge as part of the interaction model of coaching knowledge (Nash & Collins, 2006), it is vital for S&C developers to understand the contribution of articulation as part of any future development approaches. Within S&C contexts, SCCs can readily achieve this at all stages of their careers, such as through video- or audio-recording performances and then reviewing them alone – or ideally with others – and describing their processes. Another opportunity for articulation is found within the planning stages for SCCs. As recalled in the task diagram stage of ACTA, including others, such as athletes, coaches, and support staff, provides opportunities to articulate an SCC's cognitions and test them under scrutiny prior to finalising an approach. Engaging in and committing to such practices will inevitably take time, but the present study suggests the differences between the strategies employed by HLCs and the perceived errors of ECCs offer a compelling case if SCCs at all levels are to be impactful within performance societies.

4.5 Key Implications

The knowledge elicited through the ACTA interviews was a novel method not previously conducted with SCCs. The quality of the responses encourages future applications of this investigative approach within S&C. Tables 4.2 and Table 4.3 contain specific areas of

attention relating to stages of consideration within training programme design and difficult cognitive elements in SCCs' roles. Noteworthily, although the primary role of SCCs is accepted to be the improvement of athletic performance, the consideration of the PJDM processes and strategies employed by HLCS could guide the direction and content of future coach preparation materials. Specifically, the consideration of the context, individuals in question, and previous experience are influential on HLCs' PJDM.

The findings also helped to identify what HLCs believe to dictate their performance under stress. A suggestion was made that this performance may not concern knowledge but rather personal attributes and societal influences. This would be interesting to compare and contrast with ECCs and, as such, it is explored further in the next chapter. SCCs at an early stage of their coaching careers are unlikely to have developed sufficient experience to allow them to attentively consider possibilities at the planning stage and effectively notice and respond to the dynamics of their performance environments. I propose that actively engaging in an ACTA may assist them in reflecting on their experiences to date and, through any necessary probes, expanding their current philosophies and approaches to role-specific problems. Following this, if their responses were compared and contrasted with the responses of HLCs this could accelerate their learning curves even faster.

CHAPTER 5. Study 2: Exploring the Decision-Making Processes of Early Career Strength and Conditioning Coaches

5.1 Introduction

Thus far, this thesis has clarified that helping athletes to excel at their specific sport is the number one priority of SCCs (LaPlaca & Schempp, 2020). Thus, the PJDM of SCCs and their underpinning rationale must be as well informed as possible. Defining the quality or competence of a decision is a difficult proposition that would prove easier if standards existed for determining what is a good decision and what is not (Shanteau, 1992). The ACTA research presented in the previous chapter generated rich themes regarding the within-role cognitive processes of HLCs. As a result of these findings, a previously unknown level of understanding surrounding the within-role cognitions of HLCs was achieved, adding clarity regarding what is considered necessary for SCCs to make quality decisions. This chapter clarifies the need to better understand the level and nature of preparation learners require for the S&C workplace and to describe the research undertaken to identify the PJDM of a cohort of ECCs as a means of advancing the understanding in this area.

5.1.1 The Context

Chapter 2 provided a critical examination of the literature pertaining to the characteristics of SCCs and their current practices. Through this inspection of the S&C domain, it became evident that a predominance of research has focused on experienced SCCs (Gillham et al., 2016; LaPlaca & Schempp, 2020; Szedlak et al., 2015; Tod et al., 2012). This has created a separation of understanding for those SSCs at the early stages of their career or indeed those aspiring to enter the domain, be it through internships or academia. While some research has emerged regarding the characteristics of less experienced SCCs (Carson et al., 2021; LaPlaca & Schempp, 2020), such investigations remain sparse.

A factor to be cognisant of within S&C is that, as stated by Bishop et al. (2019a), the job market, although growing rapidly, appears to be highly saturated. As there are more applicants for S&C roles than the number of available positions, the question remains how candidates can be most suitably developed and engaged within S&C education. However, as is apparent from the previous HLC findings, any approaches should acknowledge that more is required than a continual increase in candidates' theoretical and procedural knowledge bases to become sufficiently prepared for the demands of the S&C workplace. At present, a review of job descriptions (Vernau et al., 2021), current practices (Weldon et al., 2022), knowledge and behavioural characteristics (LaPlaca & Schempp, 2020), and psychosocial requirements (Szedlak et al., 2020) suggests that development strategies should be oriented towards raising the level of professional and, to a lesser extent, interpersonal skills.

It could be anticipated that helping learners, such as ECCs, to comprehend that every problem they face may be connected to a previous problem and that a current problem represents the origin of a future problem may be an intimidating and complex prospect.

An example of this could be through an ECC in a team sport setting a warm up but noticing that the athletes have become disengaged and are not doing the intended drills and movements with full concentration. This can be a common problem for SCCs if they have not conducted a detailed session plan to consider factors such as the number of athletes they are coaching. This may require them to set up multiple areas of the same drill to ensure all athletes are able to work at the same time. The number of athletes can influence the amount of equipment or balls they utilise for a similar reason to avoid dead time in a drill or session. A future consequence of an aspect of practice going poorly can lead to a change in the coach-athlete dynamic, meaning that a SCC may need to change their coaching style to refocus or engage the group in a different manner. Or indeed, having to alter a session plan to the point that intended drills or elements of practice are completely removed. Such an example

demonstrates the value of heuristics and tacit knowledge; two key strategies used by HLCs (Table 4.3) when approaching difficult cognitive elements of their role.

Excitingly, however, being able to address this concept offers support as part of developing the cognitive skills that will support the PJDM of SCCs. The absence of research regarding the cognitive processes associated with S&C roles leaves a state of ambiguity as to what should or could be addressed. Consequently, a commitment to understanding more about the processes of ECCs would offer new insights into the domain. As part of attending to the suitable preparation of candidates to enter the S&C workplace, Chapter 4 suggested that SCCs must possess a broad lens with which to consider the contexts they are in as well as consider alternative approaches as part of a collaborative process for problem solving. If ECCs are limited to only engaging in surface-level introspections within their role due to an inability to notice and interpret signals and a limited toolbox of strategies, then they may lack the intended impact within their role.

A common example of this would be through ECCs delivering their resistance training programmes with a rigid approach without observing the level of perceived and actual effort of athletes. It may be the ECC has under or overestimated an individual's capacities in a particular lift or an individual may have responded quicker to a stimulus and therefore is capable of more. If unable to notice such subtleties in the moment, an ECC may miss an opportunity to get more from an athlete or group. From my own practical experience I found benefit from strategies such as coach positioning in a session, environmental manipulation using audio visual stimulus, or purpose grouping of athletes and inclusion of goals in a session preview. All factors which can support me as an SCC to see and do more in a training session and heighten my impact. Importantly, however, all required a lot of practice. As such, a case is developing for research to interrogate the current PJDM of ECCs and generate empirical findings.

The ACTA interviews discussed in the previous chapter provided the opportunity to identify the cognitive demands and skills that HLCs perceived themselves to perform difficult within-role tasks proficiently. The exploratory nature of the approach delivered novel evidence concerning the tacit knowledge of these participants. As tacit knowledge does not become part of a person's knowledge base until it is articulated and internalised (Nonaka, 1991), it was rational to suppose that obtaining clarity regarding the knowledge that ECCs had developed during their personal and professional experiences using ACTA would help to provide findings that can inform future development strategies. For example, within the findings of Chapter 4, HLCs revealed perceptions that ECCs could enhance the quality of their interpretations and better contextualise their knowledge through observing athletes in practice and competition. However, even if such a recommendation were acted upon, ambiguity would remain regarding what, how, and why ECCs think in the S&C workplace; therefore, the quality of observations and subsequent PJDM would also remain unknown.

5.1.2 Current Objectives

Research findings concur that SCCs at all levels of experience need to possess a high level of sport and theoretical knowledge, with experienced coaches being more versatile in the application of this knowledge (LaPlaca & Schempp, 2020; Vernau et al., 2021). Furthermore, emerging research surrounding the psychosocial characteristics of experienced SCCs (Gearity et al., 2021; Szedlak et al., 2019) has demonstrated the need to identify the depth and breadth of these skills in less experienced ECCs. Tod et al. (2012) stated that understanding the attributes of effective SCCs could help inexperienced practitioners to identify the characteristics they need to develop in themselves.

Therefore, having now demonstrated the value that ACTA can have within S&C by identifying the cognitive demands and skills required to perform S&C tasks proficiently, potential existed to extend its application to a less experienced cohort of SCCs. Accordingly,

the purpose of the present study was to build on the findings of Chapter 4 and examine the cognitive characteristics that underpin the PJDM of ECCs using ACTA.

5.2 Methods

5.2.1 Participants

Following ethical approval, participants were recruited through criterion-based, purposeful sampling strategies (Sparkes & Smith, 2014). To ensure that those interviewed were ECCs within S&C coaching practice, the following criteria were applied: (a) less than 3 years of full-time coaching experience; (b) completed an undergraduate degree in sport science or S&C; and (c) held aspirations of working as a full-time SCC in the future. A total of eight participants (six men and two women) were recruited. This sample exceeded the recommendation of three to five participants proposed by Militello and Hutton (1998) as the minimum requirement for the effective use of ACTA. Interviewees (25.7 $\pm$ 3.3 years) had experience of working across a range of sports, including rugby union, rugby sevens, weightlifting, track and field, netball, soccer, cricket, and swimming.

5.2.2 Measures

Within this study the same measures were applied as with the ACTAs within the previous chapter.

5.2.3 Procedures

Consistent with the previous study, four pilot ACTAs were conducted to establish and refine the foundation questions. This enabled an enhanced understanding of the duration and flow of the interviews.

Each interview lasted no more than 65 minutes and was recorded using a digital voice recorder. Field notes were also taken during the interviews. Interviews commenced with a discussion of the ACTA format and some general questions regarding the ECC's career to date. The first phase of the structured interviews provided an overview of the task in

question, which was directed at ECCs' planning process and PJDM training programme content. Next, ECCs identified the most cognitively demanding element of the process described. The second ACTA stage, namely the knowledge audit, used probe questions based on the following knowledge categories that characterise expertise (Militello & Hutton, 1998): diagnosis and prediction, situation awareness, perceptual skills, development of tricks of the trade and knowledge of when to apply them, improvisation, metacognition, recognition of anomalies, and compensation for equipment limitations. As in the methods described in Chapter 4, I was consistent in the use of probe questions to promote further reflection and articulation within participant responses as appropriate. To enable reflection (Smith & McGannon, 2018), participants received a copy of their transcript and were asked about the 'completeness' and 'accuracy' of the information at each stage. Respondents were encouraged to highlight anything that was missing or incorrect as well as to comment on the perceived benefits and limitations of ACTA as a method of investigation.

5.2.4 Analysis

The collation and analysis process was the same as that described in the previous chapter. Both semantic and latent features of the data were considered using a relativist perspective. Again, my supervisor served as a critical friend throughout this process, also reviewing the coding process on a subset of data scripts. Four themes were identified, which are presented in the results section. As part of the reporting stage, interrogation of the ACTA findings facilitated the construction of a task diagram (Figure 5.1) and a cognitive demands table (Table 5.1). Table 5.1 was compiled to provide an overview of the difficult cognitive elements identified by the ECCs, the themes concerning what was difficult regarding the identified elements, and the cues and strategies used to overcome them.

5.3 Results and Discussion

Within this section, the four themes generated from the ACTAs are discussed and supported with examples of ECC responses. Figure 5.1 illustrates the commonality of responses associated with training programme design. Table 5.1 identifies the difficult cognitive elements that the ECCs commonly associated with their roles and provides a summary of the strategies used by ECCs in response to these elements. Following the consideration of the four themes, the role of metacognition is considered as a potential solution to the observed issues.

Figure 5.1

Task Diagram Representing the Key Stages for Early Career Coaches in Making Decisions for Training Programme Construction

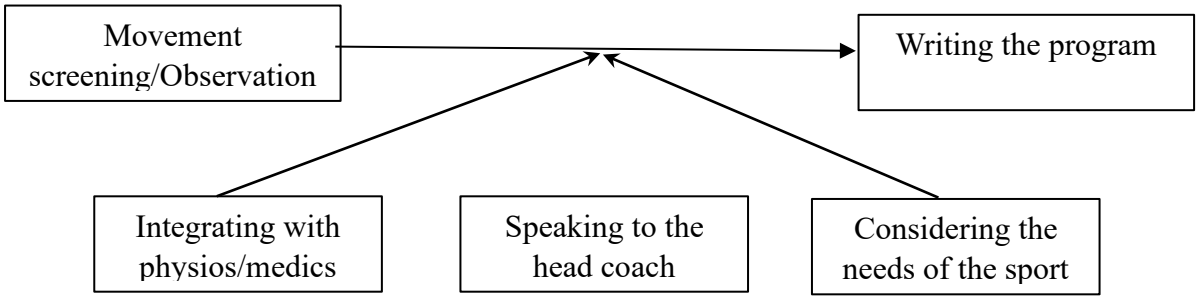


Table 5.1

Cognitive Demands Table Overviewing Difficult Cognitive Elements Identified by ECCs

Difficult Cognitive Element	Primary Strategy Used	Secondary Strategy Used
Identifying relevant considerations when establishing resistance-training programmes	Needs of the sport considered	Training age/experience of the athlete
Identification of relevant variables to ensure that training is delivered as intended	Look for the noticeable – technical efficiency and loads lifted	
Drawing on coaching skills to deliver in the training environment	Predetermined plans going in	Deliberate Intentions of who, how and what to coach – stabilise environment
Responding to unexpected changes to the training environment	Simplify the task/environment Interpersonal skills to form relationships and gain insights	Adjust coaching style – instruct more to gain control Reclarify and/or reset expectations
Effectiveness of coaching performance	Determine athlete satisfaction	Was technical competency shown?

5.3.1 Finding Comfort in Stability

Throughout the interviews, a common theme was that of ECCs creating or desiring stable conditions to operate within. Responses consistently referenced the stability of DM processes relating to the construction of training programmes as well as their approach to roles. For example, ECC 6 reported the following: "[I]n my mind I'm sort of forming them into groups, more metabolic conditioning, who needs to work more on building a strength foundation and whose like in a good place and can work on more speed and power." This grouping approach simplified the programming decisions and assumptions made based on surface-level, subjective observations. Evidence suggested that heuristics and predetermined plans (e.g., metabolic, strength, or speed frameworks) are applied to athletes who satisfy the coach's criteria. The stability afforded through this framework approach was reinforced by ECC 8, who explained that they "would just try and hit a squat, a lunge, a push-pull, anti-rotation and anti-extension within a week." This suggests that ECCs have a template they adhere to regardless of the contexts presented.

Expert SCCs remain calm and confident when faced with adversity (LaPlaca & Schempp, 2020). Furthermore, they intuitively adjust and fill any role required to get the job at hand accomplished. This contrasts with the ECCs' responses, since they mentioned experiencing uncertainty and anxiety when attempting to evaluate dynamic contexts. For example, ECC 5 reported the following challenges to attention management:

> It's a bit hard with field sessions because I've just got them all at the same time, so I can't really individualise it too much there. I guess I could, but I haven't really figured out a system how I'll do it without wasting time explaining things.

The ability to adapt and make increasingly intuitive decisions appears to be an area for development in ECCs as well as a focus for future coach preparation materials. Deliberately preparing ECCs through trialling, testing, and reviewing approaches in varying

contexts would facilitate confidence and impact, as opposed to inappropriately simplifying complex situations. Entering an applied coaching environment can be daunting, especially if the ECC has minimal background in this type of environment (Massey & Maneval, 2014; Massey, 2010). As a result, more focused coach preparation methods are indicated as necessary.

When coaching many athletes, concerns were expressed regarding the ability to notice effectively. For example, ECC 7 stated the following:

> When there's only a group of five or six, I have more time to go over their technique or just talk about how we're going in terms of what loads we're doing. I can get a more quality session just because we're clearer on what we're doing and how we're doing it, rather than when we're in a big group… we don't see everything and be able to fix everything.

Throughout all stages of the ACTA, responses suggested that ECCs were unable to formulate a complete assessment of a given context. This reduces the effectiveness of their subsequent decision(s). The combination of an incomplete assessment coupled with a reduced appreciation for integration and communication with others lessens the impact of a session. Data suggest that ECCs must develop strategies to gather more relevant information from work contexts to make informed decisions. As LaPlaca and Schempp (2020) confirmed, SCCs may be required to work with athletes of many different sports, for differing reasons, and all on the same day. As such, although ECCs may favour stable contexts, this is not a realistic expectation.

5.3.2 Prioritising Movement Quality

At the task diagram stage of the ACTA interviews, it was evident that the ECCs preferred assessing movement qualities to guide their DM processes (Figure 5.1). Indeed, only additional probing provided the possibility to include other variables, such as

collaboration with others or consideration of the sport in question. Helping athletes to excel at their sport is the number one priority of SCCs (LaPlaca & Schempp, 2020). However, in the present study, responses surrounding effective training sessions and/or programmes revealed a preference for achieving quality movements and creating adaptation through lifting loads. A lack of reference to sport-specific transfer suggested a contrast in perceived role requirements in ECCs. This was supported by the response of ECC 5 who, when discussing their approach on the gym floor, explained that they complete

> [s]omething like a quick, not a specific like movement screen, but using a warmup with like your basic unilateral/ bilateral lower body movement, maybe a jump as well, a landing mechanic, and then a push and a pull, just to try and assess what stage they're at.

Using subjective, movement-driven criteria to primarily guide DM is restrictive of ECCs' DM capabilities as there are few contextual variables to consider and review against the eventual outcomes. With reference to learning, Sitkin (1996) explained that being able to consider small failures is valuable in promoting risk-taking, innovation, and the development of the capacity to adapt to changing circumstances. A lack of experimentation and wider consideration may also be due to the nature of ECCs' roles and responsibilities. For example, ECC 6 emphasised the lack of a need for critical thought within their role when they stated the following: 'I find a lot of the time I'm just presenting other people's programmes'.

Within the present study, experiences were familiar and stable in the variables presented. The preferred strategies for difficult cognitive elements (Table 5.1) were to simplify the environment, maintain predetermined plans, or adjust from relationship-based approaches to adopt a more instructional style to gain control.

5.3.3 Defaulting to Theory

Expert SCCs possess strong knowledge of training and the technique of movements. Crucially, however, they are also able to apply simple and effective coaching cues to athletes. Favre (2017) recommended that SCCs complete academic and professional qualifications to provide underpinning theoretical knowledge and practical experience in sports. However, acquiring procedural knowledge is not sufficient, and the apparent reliance on such knowledge in the absence of declarative and tacit knowledge makes it difficult to state that PJDM is being engaged in by ECCs. An example of ECCs defaulting to a set of rule-based heuristics within their DM was provided by ECC 7 when they recalled the following situation:

> Within the gym we've got our main exercise set out, and then there are three or four different exercises underneath that which if an athlete can't perform exercise one, they just go down the list and hit one they can. If they can't do any of those or there's something wrong, I just send them to [Head S&C coach] and he sorts that out. I'm just there to coach rather than actually implementing them.

Moreover, ACTA responses highlighted that ECCs found the identification of relevant variables to be a difficult cognitive task. The primary strategy identified (Table 5.1) was paying attention to the athlete's technical efficiency and loads lifted, implying a preference to recall previously learned theoretical frameworks and the consideration of biophysical concepts. By contrast, expert SCCs apply broader knowledge sets, including the psychosocial knowledge of athletes and staff and how to optimally coach them (Dorgo, 2009; LaPlaca & Schempp, 2020). It is plausible that due to the nature of ECCs' roles, dynamic cognitive qualities are not required, and therefore, they have a low appreciation for cognitive agility as well as diminished abilities to be effective in less stable, high-pressure environments.

5.3.4 Building Confidence Through Connections

Lave and Wenger (1991) outlined that the most effective SCCs establish an understanding and method of communicating with each athlete by learning their names and being clear with their instructions. Communication was referred to several times in the present study, but with ambiguity surrounding what constituted effectiveness. For example, ECC 5 stated the following: 'Like, I've always been a strong communicator but now I can communicate confidently'.

Notably, an examination of responses revealed connections with athletes to be oriented towards gauging levels of satisfaction and enjoyment, as opposed to a deeper psychosocial understanding. In the ACTA responses, it was typically implied that the participants were able to develop and sustain strong relationships. When seeking to describe the importance of connections, ECC 4 stated the following:

> I think it's probably a skill that's hard to pick up if you don't already have it. In terms of the hard stuff like trying to get a programme to enhance athletic performance, if you're trying to get that to go with a player you need their buy in and that respect with the athlete, and if you don't have that, you're not going to get the desired outcome.

This perception of relationship building as an innate quality is problematic, as it ultimately implies that no further development is required. This also led me to question the degree of the ECCs' self-awareness. Both interpersonal and intrapersonal skills have been found to be important for SCCs (Grant & Dorgo, 2014). Given the frequency of their experiences with athletes, the need to create opportunities to develop and nurture authentic interpersonal skills in ECCs is high. Noteworthily, participants' inability to recall situations involving decisions at an interpersonal level with athlete(s) and coaches highlighted a lack of experience in this area. Gilbert and Baldis (2014) identified that an SCC's understanding of their own beliefs, behaviours, and values is crucial in determining quality coaching practice

and ongoing personal development. Notably, this study found that ECCs demonstrated an absence of a clear coaching philosophy, as illustrated by ECC 6:

> I think at the moment its I'm trying to figure out what strength and conditioning coach I am… as I'm working with different S&Cs picking up like how they cue and how they question and stuff so I guess I'm still figuring out what S&C I want to be.

5.4 A Case for Deeper Thinking

Through the various roles ECCs occupy in S&C environments it is evident that they are required to work in similar conditions to HLCs and as such are required to make decisions in dynamic, high pressure, time constrained conditions. However, what was both perceived by HLCs (Chapter 4) and evident in the present research was that less experienced SCCs cannot be considered as engaging in PJDM as they were unable to demonstrate the nested blend of NDM and CDM that Collins and Collins (2016) consider necessary within PJDM processes. More recently, concerning outdoor instructors, Mees et al. (2022) described how CDM may be evident as part of planning decisions prior to sessions and NDM could be evident within a content and scaffolded by the prework that utilised CDM.

Within the present study there was a lack of evidence to demonstrate the ability of ECCs to blend CDM and NDM when responding during ACTAs. An example of this can be seen within Figure 5.1 where, unlike Figure 4.1, the task diagram of ECCs is not presented as a series of sequential steps. A common example of Figure 5.1 within S&C environments could be an ECC conducting a speed testing session for a group of athletes and taking only the time recorded against some normative benchmark data to determine what focus to apply to a subsequent training programme. In a cohort of age grade athletes with a low training age, an athlete deemed to be fast according to benchmark data may be perceived to need a power or specific speed programme if seen as already advanced. However, a more complete process could be completed through the stages offered in Figure 4.1.

The depth and breadth of responses across this stage, and indeed the ACTA, lacked considered of wider contextual factors and alternative approaches and this was consistent with the perceptions of more experienced HLCs. It therefore seems unsuitable to describe ECCs to be engaging in PJDM within their role. Rather more suitable would be to discuss the DM of ECCs until such time that evidence exists that they demonstrate the ability to intentionally reflect on and utilise CDM and NDM in tandem across the course of their coaching process. The absence of a broad experience base within S&C, coupled by an apparent lack of intentional reflection, can be envisaged to restrict ECCs to consider appropriate and necessary alternatives and determine an optimal solution to a problem unless existing development strategies for SCCs address these gaps. The present results, with examples provided within Figure 5.1 and Table 5.1, suggest that ECCs are not able to formulate a complete situational assessment. Consequently, ECCs require strategies to gather more relevant information from their contexts and enhance the quality of their DM. Against the four themes discussed, it is crucial to consider which key skills are required to develop an ECC's PJDM. Till et al. (2019) stated that SCCs need to make decisions daily for the effective implementation of their practices. In a wider context, but certainly applicable within S&C, Jones and Wallace (2005) have stated that coaches' decisions are typically made based on incomplete information.

5.4.1 Metacognition

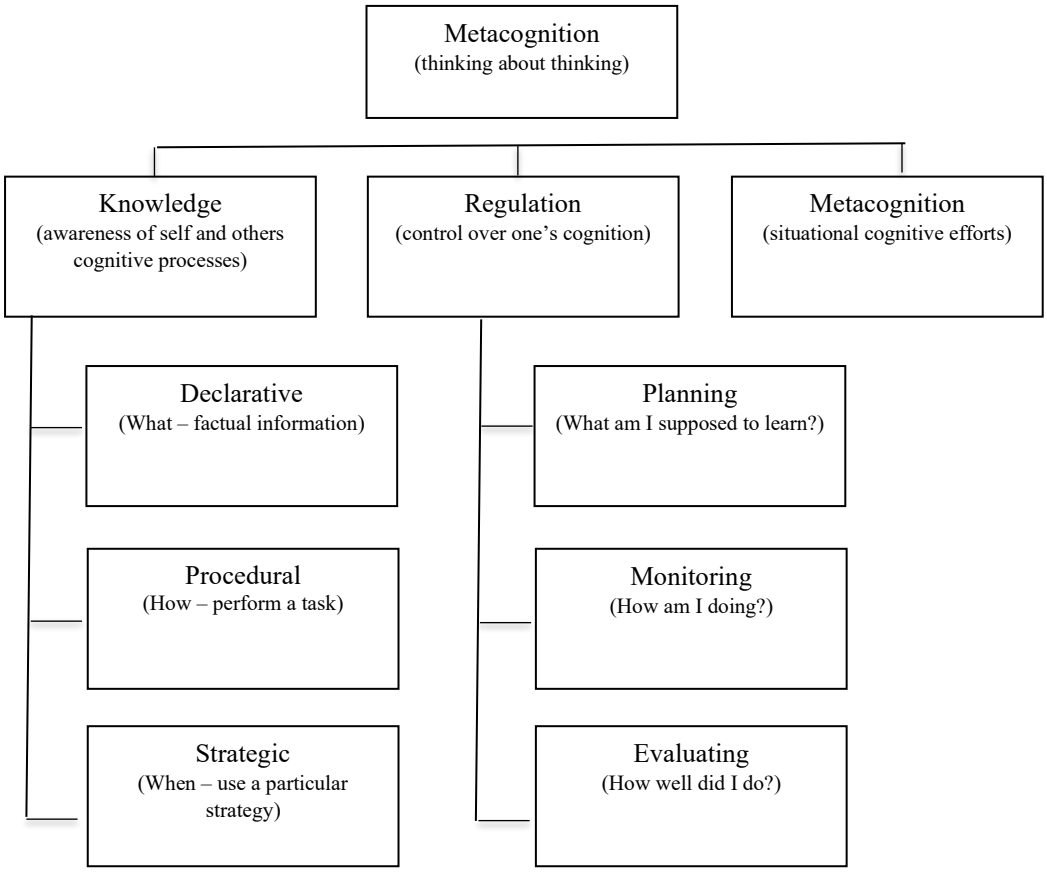
In the absence of resources within S&C to assist one's understanding of deeper thinking, guidance can be sought from education psychology, specifically through the concept of metacognition. In an early paper, Flavell (1979) suggested that metacognition includes the knowledge of strategy, task, and person variables. This is consistent with SCC requirements, which are acknowledged to include professional, interpersonal, and intrapersonal knowledge (Grant & Dorgo, 2014). Pintrich (2002) described the goal of

metacognition as being to develop an awareness of one's own thinking and then to use that awareness to help further one's learning. This has a clear appeal in its possible application to advancing the performances of ECCs and indeed also experienced SCCs. Notably, Mahdavi (2014) separated metacognition into metacognitive knowledge, metacognitive regulation, and metacognitive experiences (Figure 5.2). These components are useful when considering how to effectively develop preparation materials and experiences for SCCs, particularly ECCs.

With reference to the knowledge dimension, ECCs are not necessarily aware of or able to replicate the depth of preparation underpinning within-role S&C tasks undertaken by experienced others, such as training programme design or delivery.

Figure 5.2

Component of Metacognition (Mahdavi, 2014)



Previous research into the characteristics of both expert and competent SCCs (LaPlaca & Schempp, 2020) described these coaches as possessing a high degree of comprehension of what to do and how to do it. At all stages of the ACTA, the ECCs demonstrated a preference for relying on previously acquired frameworks and theories to support the decisions they make within their roles, without describing alternative approaches or a broad consideration of context. In addition to declarative and procedural knowledge, a third component of metacognitive knowledge is strategic knowledge, which affords an individual the use of a particular strategy or tactic (Haywood & Getchell, 2019). Parallels also exist here with previous descriptions of PJDM. The present findings highlight the need and value that strategic metacognitive knowledge could have in improving ECCs' impact through the lack of collaboration and preference for prioritising movements in their recalled approaches. This suggests a tendency to operate in isolation and with DM intentions focused solely on biophysical outcomes.

Metacognitive regulation addresses what the learner does about learning and has been associated with the stages of planning, monitoring, and evaluation (Mowling & Sims, 2021). Previous literature supports the need for SCCs to be prepared and engage in planning (Favre, 2017; Gilbert & Baldis, 2014; Till et al., 2019). Crucially, the present study identified ambiguity surrounding the depth and breadth of planning within the DM processes of ECCs. Access to metacognitive regulation strategies offers development opportunities for these coaches. Similarly, ECCs can only respond to what they notice or monitor, although self-regulated learners will draw from varied sources and previous experiences to solve problems (Dail, 2014).

In addition, the results demonstrated that ECCs are still developing their philosophy and coaching identity, and therefore, their self-regulation ability is compromised. Within the knowledge audit, responses were primarily limited to athlete satisfaction, session flow, and

movement proficiency when evaluating session effectiveness. The ability to evaluate the degree of thinking after completing the task is critical if ECCs are to sufficiently review and develop effective PJDM. Improvements in metacognitive proficiency will enable ECCs to make sense of environmental variables, both in the planning and delivery stages of coaching, and also to respond to a more informed selection of options.

5.5 Key Implications

5.5.1 Focusing ECC Development Beyond Declarative Knowledge

To date, attention within the literature has been directed towards the characteristics of experienced SCCs. However, this chapter contributes valuable evidence of the DM characteristics of SCCs at the start of their careers. It appears that ECCs require more effective preparation strategies to apply and review within dynamic contexts. I propose that a greater appreciation and consideration of metacognitive skills, along with their existing biophysical knowledge, will increase ECCs' impact in their environments through engagement in PJDM rather than surface-level DM. As important as these findings are, the challenge presented is to consider how to most appropriately actualise any strategies aimed at impacting this area of SCC development.

The HLCs investigated in Chapter 4 had a strong understanding of 'self'. Tarricone (2011) previously stated that new knowledge and learning experiences can be generated through self-reflection by scrutinising new concepts and comparing them against one's prior knowledge, thus creating new sets of ideas.

I believe that teachers of S&C content will limit the capacity of learners to think more critically about a context and fail to heighten their metacognitive skills if the approaches they deliver are too simple and linear, and if they only introduce concepts and theories rather than embed them in contexts to operationalise them. The ECCs interviewed were relatively new to the S&C domain. Their findings provide insights regarding the DM processes that can be

anticipated following traditional preparation through teaching methods underpinned by an understanding of theoretical concepts and training methods without the associated contextual applications. An absence of dynamic S&C workplace experiences and/or practical activities for testing, understanding, applying, and refining thinking processes in dynamic settings demonstrates a barrier to developing the metacognitive capabilities possessed and valued by HLCs.

5.5.2 Approaching the Need to Develop Contextual Intelligence

The reductionist nature of the within-role DM processes of ECCs, compared with HLCs, may well be related to the manner in which they are able to construct meaning from contextual stimuli. The more an SCC's internalised knowledge structures are limited to declarative knowledge, the more they can only be anticipated to notice movements and metric-derived outcomes. To enhance the depth and breadth of the interpretations that SCCs can make concerning a given context, I encourage the consideration of wider contextual influences, examples of which were included in Figure 4.1 and Table 4.2. Further exploration of the within-role PJDM processes of SCCs would present an opportunity for generating empirical findings to stimulate discussion among accreditation bodies and academia surrounding how to develop learners' awareness beyond the biophysical.

Furthermore, the low level of situational awareness and factors reported to be considered in DM suggest that these ECCs are limited in what they are able to notice within their given contexts. In the S&C workplace, this is a crucial skill, as what is occurring around an SCC is constantly evolving and emerging in accordance with the interaction of multiple relationships and environmental factors. Such continuous, dynamic interactions increase the requirement for SCCs to be able to be present and understand what, how, and why they are interpreting the stimuli they are attending to.

5.5.3 Where to Next?

The ability of an SCC to understand their own beliefs, behaviours, and values was previously identified as crucial in determining quality coaching practice (Gilbert & Baldis, 2014). Building on this, following an interview with four SCCs, Gillham et al. (2015) proposed that novice coaches must find their own path and be authentic. They stated that this approach is best represented by the phrase 'learn from all, copy none'. For learning to occur through each experience, however, a requirement exists for the coach to be able to consider their own thinking and make decisions regarding what they will or will not 'copy' *and why*. Recently, Weldon et al. (2022) suggested that completing S&C internships can increase the likelihood of employment. However, in light of the ACTA findings offering ECCs the opportunity to engage in contextual considerations, collaboratively solve problems, and have a generally low understanding of themselves, I propose that the value that an aspiring SCC can take from an internship, or indeed from any experience, will be influenced by several personal attributes and professional skills.

Extending this, a case has been presented for the consideration and inclusion of metacognitive skills to be developed in learning materials and workplace tasks to heighten the contextual effectiveness of SCCs, regardless of their experience level. An examination of previous coaching literature revealed a preference for informal learning by sports coaches (Stoszkowski & Collins, 2016); however, a crucial distinction must be made regarding what an SCC wants to learn and access, which is not necessarily what they 'need' to access and learn according to their professional composition and role requirements (current and future). The student experience during tertiary education is often very different from what goes on in the life of an SCC (Desai & Seaholme, 2018). In the next chapter, focus group research with small cohorts of experienced SCCs is described to further explore the ACTA findings generated with HLCs and ECCs as well as other within-role tasks in the S&C workplace.

5.6 Reflections

Reflecting on the present findings, it is possible that the ECCs, through their experiences, have established philosophies and values towards S&C that have gone unquestioned or challenged, and that this enabled a relatively dualistic perspective of their environments, limiting their options for PJDM. This is consistent with the recent suggestion of Cushion (2019), who proposed that a sole reliance on experience as the primary source of learning for novice coaches will 'reinforce certain ideological interpretations of knowledge and practice' (p. 364). In the previous chapter, HLCs referred to the value of collaborating with others in navigating difficult situations; furthermore, the present findings indicate a need for experienced others to promote deeper consideration by ECCs across all aspects of the coaching process if they are to advance their metacognitive skills. I believe that future initiatives that seek to advance the S&C domain will support potential SCCs and ECCs in extending themselves beyond the accumulation of experience and a reliance on the generation of informal knowledge to support the PJDM processes that underpin their performances.

CHAPTER 6. Study 3: Perceptions From the Northern Hemisphere: A Focus Group Examination of ACTA Findings

6.1 Introduction

In seeking to better understand why SCCs think the way they do, ACTA (Militello & Hutton, 1998) was employed to elicit the knowledge and on-task cognitions of both HLCs (Chapter 4) and ECCs (Chapter 5) within S&C. Across the themes generated from the HLCs' responses, evidence existed for commonality concerning the PJDM related to the planning of training programmes and the cognitive strategies used to navigate difficult elements of their role. The findings stressed the importance of planning and metacognition in the PJDM of HLCs. Based on the findings, SCCs would be encouraged, regardless of their experience, to involve athlete perceptions, contextual observations, coach perceptions, and integration with others in the performance environment within their thinking processes prior to finalising a training programme.

Through using the same interview technique, ECCs demonstrated a more basic and limited approach, with their DM focused on less complex and straightforward outcomes. The decisions that SCCs make within their contexts come under greater scrutiny as the level of performance increases. In the opinion of more experienced SCCs, ECCs require the ability to explain the reasoning behind their selected training programmes (Gillham et al., 2015). However, this ability was not evident through the investigation of ECCs (Chapter 5), who demonstrated only a limited ability to explain the reasoning – or the *why* – that underpins their programme decisions.

While the sample size for robust ACTA research was satisfied, scope existed to gain more perspectives from a broader range of SCCs with different experiences in the S&C domain. Generating responses through qualitative research, such as focus groups, would identify any potential cultural impacts associated with the environments and philosophies that

have informed SCC preparation in different cultures. The dynamic interactions afforded through focus groups can also draw out the broader implications of how PJDM processes can influence within-role performances.

6.1.1 The Context

Experienced SCCs, who occupy roles such as programme directors, editorial board members, or department supervisors (Gearity et al., 2021), are often involved in the design and delivery of tertiary education and accreditation content. Gaining insights from such personnel into the current demands of S&C roles can assist in delivering more relevant content. The findings within Chapter 4 demonstrated commonality across HLCs' PJDM regarding training programme design and the cognitive strategies used to navigate difficult elements of their role. These included a shared mental model seemingly born of reflection on practice, albeit individually rather than centrally encouraged or facilitated. By contrast, ECCs demonstrated a more basic approach, with their DM being focused on less complex and straightforward goals.

6.1.2 Current Objectives

Weldon et al. (2022) recently stated that, as S&C continues to evolve and additional responsibilities are assigned to SCCs, it is crucial to understand their current practices in a range of sports, countries, and expertise levels. Supporting this, the purpose of the current research was to generate deeper insights regarding the findings within Chapters 4 and 5 on the PJDM processes of SCCs across a broader range of experiences than previously examined. This was regarding training programme design as well as the exploration of wider aspects of an SCC's role. Through accessing more diverse opinions on specific aspects of the S&C domain and the cognitive strategies implemented by experienced SCCs, the intention was to discover new information and improve the understanding of the strategies used to navigate within-role S&C situations. Specifically, the findings were intended to stimulate

coach developers and current employers to design content that more effectively prepares SCCs for the demands of the S&C workplace.

6.2 Methods

Building on the evidence generated concerning the cognitive and metacognitive skills of HLCs and ECCs, the current study employed a focus group methodology to compare and contrast those earlier findings in experienced and less experienced SCCs (Chapters 4 and 5).

6.2.1 Participants

Following approval from the Institutional Review Board, a criteria-based, purposeful sampling strategy (Sparkes & Smith, 2014) was used to invite SCCs to participate in focus groups. The suitability of focus group research within qualitative research was already discussed in Chapter 3. In accordance with the recommendations of Kitzinger (1994) outlined in Chapter 3, SCCs with at least 5 years of experience of full-time coaching in a full-time environment were recruited. The participant summary for each focus group is presented in Table 6.1, overall there were 7 focus groups that ranged between 3 and 6 participants each. Opinions were then obtained from experienced SCC participants who worked with male and female as well as able-bodied and disabled athletes. The athletes coached by the participants encompassed elite and developmental athletes who had competed in team and individual sports. Information regarding the depth and breadth of experiences was sought to provide a high degree of ecological validity and application of findings and recommendations.

Table 6.1

Sociodemographic and Work Experience Characteristics of the Focus Group Participants

Number of Coaches	29
Age of Coaches	36.4 ± 4.2 years
Years Coaching	11.8 ± 4.0 years
Sports Coached at the Elite Level (International/Professional)	Adventure Racing, AFL, Athletics, Badminton, Basketball, Bob Skeleton, Bobsleigh, Boxing, Climbing, Cricket, Cycling, Cyclocross, Equestrian, GAA Camogie, GAA Gaelic Football, GAA Hurling, Golf, Handball, Hockey, Ice Hockey, Judo, Military, Motocross, Mountain Bike, Netball, Para Equestrian, Para Sailing, Road Cycling, Rowing, Rugby League, Rugby Union, Soccer, Sport Climbing, Squash, Swimming, Track Cycling, Trampoline, Tennis, Volleyball, Wheelchair Basketball, Wheelchair Rugby, Wheelchair Tennis
Sports Coached at the Non-Elite Level	American Football, Archery, Athletics, Badminton, Basketball, BMX, Canoe Polo, Cricket, Curling, Cycling, Deaf Soccer, Equestrian, Fell Running, Field Hockey, Golf, Hockey, Ice Hockey, Judo, Korfball, Lacrosse, Netball, Para Cycling, Para Swimming, Powerlifting, Rowing, Rugby League, Rugby Union, Sailing, Skiing, Soccer, Swimming, Table Tennis, Tennis, Ten Pin Bowling, Triathlon, Ultimate Frisbee, Weightlifting, Wrestling

6.2.2 Data Collection Procedure

A primary contact was identified for each focus group, who advised me regarding the preferred environment for conducting the focus group. This not only added convenience for the SCC participants but also allowed them to feel relaxed and comfortable during the interview. To provide consistency in setting among the focus groups, environmental notes were circulated prior to the meetings. These included recommendations to have a do-not-disturb sign on the meeting room door and ensure the availability of comfortable seats.

To ensure confidentiality, participants were told that data would not be attributed to them and that names mentioned during the interview process would be omitted from the transcribed data. The interviews began with some general questions to develop rapport and familiarise participants with the format of the discussion. Then, groups were asked to comment on the initial priorities/findings on the PJDM of HLCs presented in Figure 4.1.

The purpose of this discussion was to establish the level of agreement and disagreement with the findings as well as to identify any considerations the respondents perceived to be missing and, if so, why. The same process was followed for the data regarding ECCs (Figure 5.1). This was followed by a discussion that explored a summary of the knowledge audit data (Table 4.2) on HLCs to determine levels of agreement and disagreement and again seek opinions on any characteristics that might have eluded the ACTA process. Finally, a discussion was held around ECCs' strategies concerning aspects of DM within their role, with solutions being discussed for how to develop the perceived cognitive strategies required to be effective as an SCC. Crucially, to increase the trustworthiness of the data, time was spent at the conclusion of each focus group to check for understanding by summarising the main themes that I, as the primary researcher, had interpreted during the session. Participants were asked to respond if the summary statements were valid and to add anything further, which ensured that their opinions had been fairly

captured. It is crucial to note that none of the participants in the present study were involved in the previous research discussed in the focus groups.

6.2.3 Analysis

The data gathered through the focus groups revealed the naturalistic generalizability as well as transferability of the results. Focus groups invite transferability through gathering direct testimony, providing rich descriptions, and writing accessibly and invitationally (Tracy, 2010). The participants were SCCs who were able to reflect on and share a breadth and depth of experiences within S&C contexts (Table 6.1) at both developmental and elite levels of sport, which enhanced the transferability of the generated findings (Tracy, 2010). Furthermore, the richness of responses permits other SCCs to engage in the findings and recognise the concepts and examples discussed in relation to their own experiences (Smith, 2018; Smith & McGannon, 2018). The topic satisfies the criteria of being relevant, timely, and significant by extending the research presented in Chapters 4 and 5, along with other recent research that has advocated the use of constructivist approaches within S&C development (Gearity et al., 2021; Szedlak et al., 2021). I intended that examination of the findings should provide a stimulus for coach development strategies within S&C.

Moreover, a rigorous RTA was applied to the qualitative data set following the six-phase procedure outlined by Clarke et al. (2019), which was previously discussed in Chapter 3. Braun and Clarke (2019) explained that there can be both an inductive and deductive orientation to coding within TA. Demonstrating its flexibility as a methodology, an inductive approach was used to analyse the data in Chapters 4 and 5; however, in the present study, both deductive and inductive approaches to the analysis were employed. The deductive approach was shaped by the intention to test previously collected and reported ACTA findings. An example of deductive code development was the generation of ‘observe the athlete with the head coach’ through a combination of ‘observing the athlete’ and ‘speaking

with the head coach', as identified and discussed within the task diagrams of HLCs (Figure 4.1) and ECCs (Figure 5.1). Extending this, an inductive analysis process was performed to examine broader questions about the data, and codes and themes were generated from the data content.

I performed all coding and initial theme development. The construction of themes was an active process, with checks conducted to ascertain whether they worked in relation to coded extracts and the entire data set. As part of checking and gaining wider insights into the data, my supervisor acted as a critical friend. Specifically, their role was to encourage me to reflect upon and explore alternative interpretations as they emerged in relation to the data and writing. The intention of our discussions was not to produce a consensus, but rather to gain greater initial insights through sharing each other's perspectives on the data. In line with good practice, my supervisor also independently reviewed three of the eight focus group data points. In the next section, data extracts are used as exemplars of the data found within themes and are analytically discussed in more detail.

6.3 Results

Within this section, the analysed focus group data are presented in three subsections. The first subsection identifies the level of agreement held towards the HLC and ECC task diagrams (Figures 4.1 and 5.1, respectively). These figures concern the recalled PJDM of HLCs and of ECCs, respectively, when designing training programmes. The second subsection focuses on additional factors concerning the aforementioned process that were identified and considered by the focus groups. Lastly, the third subsection summarises the difficult cognitive demands, such as managing oneself within the training environment and responding to unexpected changes to it, to demonstrate significant influences on experienced SCCs when operating in their environment. An analysis of the discussions identified

situational awareness, improvisation, and metacognition as influential skills that SCCs require to navigate difficult situations.

6.3.1 Expanding on the Training Programme Design Process

Participants were in agreement with the stages proposed previously in Figure 4.1, which deal with HLC PJDM when considering training programme design. They expressed similar agreement and understanding with the two-stage approach for ECC DM in relation to programme design (Figure 5.1). In exploratory discussions, each stage was elaborated upon regarding secondary themes. In addition, two more primary themes were generated that participants considered relevant to the training design process – namely 'input from environmental lead' and 'consider logistics'. Moreover, the original 'observing the athlete(s)' stage was reconsidered to become 'observing the athlete(s) with the head coach' (Table 6.2). The participants consistently referred to decision-makers and influencers as holding roles superior to those of the head coach. When reflecting on national institution environments, an example was a programme director, and examples from team sports environments included general managers and sporting directors. These people were coded as 'environmental leads'.

During focus group discussions, participants consistently referred to their current and previous experiences, ascertaining the role of S&C within an organisation and clarifying the purpose of SCCs' role within the PJDM concerning training programme design. One participant described their considerations for gaining input from an environmental lead as follows:

> What's the coach's philosophy, what's the team's philosophy, what's the club's overall structure and where do you (the SCC) fit in? Have they had S&C before, [and] was it well accepted? So [as a coach] you are getting a feel for when you go in what are you going to face; you know are you in a situation where these athletes have done S&C [and] do they love S&C [,] and you are just taking it [to] next level. Or are you in a

> situation where it has never been done before and it's going to be completely new? (SCC 4)

Taking these variables into account, the participants agreed that, if contextual appreciation was elevated, future aspects of PJDM would be more aligned across departments, and communication and collaboration would be more effective.

Deeper conversations into the training programme design process highlighted the need to consider logistics and the impact that their inclusion, as well as exclusion, could have on the success of any programme delivered. According to SCC 8, an example of logistical considerations was the size of a training group: '[While] organising a larger group of athletes within a confined space, the logistics of that has to somehow drive your ability to programme'. This participant was describing how by not including group size in their DM, through a constraints-based approach, they might develop an ineffective programme through mismanaging the sessions due to poor within-session flow and/or too little equipment.

In addition, discussions surrounding role requirements and thinking tasks that extended beyond typical S&C theory manipulation and session delivery were prevalent in the focus groups, and they contributed to the inclusion of logistics in the overall reconsidered process model (see Figure 6.1). With reference to Figure 6.1, it is crucial to highlight the revision of 'observing the athlete(s)' to 'observing athlete(s) with the head coach', as participants emphasised the value of a strong relationship with coaching staff. One participant stated the following:

> I think, in this environment, one of the first things I thought about doing was just observing them with their technical coach in practice rather than worrying about assessing them straight away off the back, so spent a lot of time with coach, observing on court practice. First and foremost, it gives you what the coach is looking for in the athlete, so what are they asking the athlete to do, to do well and do repeatedly,

because then that can obviously influence your practices as a[n] S&C coach and, maybe, not only the demands of the game but [also] the demands of the coach and their style within that game. (SCC 17)

This explanation alludes to the benefits of the heightened contextual appreciation and improved collaborative processes achieved through investing time into operating and conversing with the head coach and other technical coaches.

Table 6.2

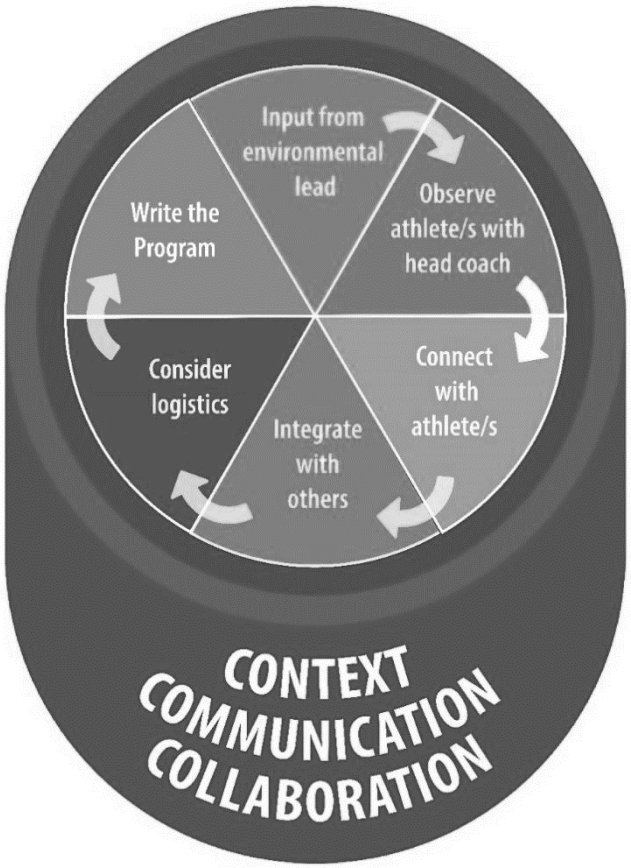
Primary and Secondary Themes From Focus Groups on the Decision-Making Process for Initial Training Programmes

Primary Themes	Sub-Themes	Influenced By
Connect with the athlete(s)	Motives	
	Background	
	Learning style	
	Language	
Observe the athlete(s)	in competition	
*with the head coach	in training (the sport)	
	in training (S&C)	
	in testing/screening	
	Socially	Type of sport (team/individual)
		Level of sport (elite/development)

Primary Themes	Sub-Themes	Influenced By
Integrate with others	Past technical coaches	Degree of collaboration
	Past SCCs	Experience level of SCC (HLC/ECC)
	Social influences	Degree of communication
		Appreciation of context
	Language	
	Expectations	
Input from environmental lead	Identity of organisation	
	Philosophy(ies)	
	Role of S&C	
Logistics	What can be done	
	Why it should be/not be done	
	How it should be done	
	Where it should be done	
	When it should be done	

Figure 6.1

Operationalised Model of Decision-Making to Help Strength and Conditioning Coaches Enhance the Training Programme Design Process



6.3.2 The Role of Context, Communication, and Collaboration

Analysis of the focus group data on the previous PJDM and DM associated with training programme design by HLCs and ECCs offered five stages of consideration. They followed a logical order, since each one impacts the effectiveness of the next. These five stages and their sequence are illustrated in Figure 6.1. Discussions revealed that SCCs perceived each of these stages as plausible and recommended them for both ECCs and HLCs. The current findings indicated that the depth of engagement and effective execution of each stage by SCCs would be influenced by their awareness of context, quality of communication, and investment in collaboration.

In discussions oriented towards the successful or unsuccessful execution of PJDM when designing training programmes, participants used examples of how ECCs have been observed to behave. The role of experience on contextual appreciation was highlighted by SCC11 when they explained: 'The ability of young coaches to understand context I think is influenced by how much exposure have they had to people across different spectrums of lie, different ages, different stages and experience'.

Furthermore, participants acknowledged the impact of coaching across a range of contexts on future awareness. Indeed, these embedded experiences were perceived to also relate to the communication skills of SCCs. Contextual factors prominent in discussions were the level of sport under consideration (elite or developmental), the type of sport (team or individual), and the experience level of the SCC in question (ECC or HLC; see Table 6.2). Participants explained that communication was a key skill in their role and, according to SCC 23, an absence of experience creates a threshold in ECCs:

> With early career coaches that I've seen, they might have some communication skills that are good that can get them to a certain point in delivering sessions. But it's the ability to understand it that needs to be delivered in different context to different populations and even to different athletes within a sport.

An analysis of responses identified that causal factors for the approaches taken by ECCs occur due to a combination of the nature of their educational preparation and previous coaching experiences. The latter were described as likely to be shaped by personal training or working with student-athlete populations. When discussing ECCs and the experiences they accumulate at university, the participants were consistent in the differences they perceived in the orientation of those ECCs whose further education had a coaching orientation and those whose learning was focused on sports science research. These common views are exemplified by the thoughts of SCC 24, who stated the following:

> I see a massive difference in the ability to coach and to teach, to communicate effectively and have confidence in being in front of the group. The coaching ones [students] are really good, but they maybe don't have the underlying scientific knowledge, but they kind of intuitively know how to get things going … yeah I've had some absolutely first-class students come out, and they are really good at building acute chronic work their databases. But they can't have a chat with the coach, and so and I think, I think of balance between the two is really good, but yeah I definitely think there's a bit of shaping that goes on depending on the weight in; this if you're coming from a coaching-dominant domain even if it's not sport science and then you're coming from a, in a sports science you definitely see a difference in probably what they see is important and then which avenue they go down.

Discussions regarding the impact of these perceptions on subsequent coach development and coach preparation for careers in S&C were oriented towards the suggested inclusion of genuine coaching experiences to examine and, specifically, generate athlete–coach interactions. Crucially, although agreement existed that the four stages included in the HLC PJDM should remain the same in any operationalised model, the yielded data demonstrated that Figure 4.1 was incomplete. The stages were not necessarily in the appropriate order if one seeks to provide guidance to SCCs on their PJDM in terms of context, communication, and collaboration and add depth to the PJDM process of training programme design. In this regard, SCC 14 stated the following:

> Ideally you would have a good framework of what the sport is requiring in the first place. This way you've got a bit of background knowledge when the athlete comes in to see you to try and match those bits up. Because if the athlete's got this idea but it's actually totally different to what the sport is after from them in terms of trying to speak to them, and the head coach, there will be confusion about where they [the

> athlete] should actually head. Sometimes, the athlete is the best person to give you information and sometimes they're the worst.

In this example, an SCC is supposed to have a greater understanding of the big picture, which is facilitated by input from the environmental lead for understanding the framework. This contextual understanding refers to being supported through communication and collaboration prior to connecting with the athlete, thereby improving subsequent collaboration and communication when connecting with them. This working example, together with the inclusion of the final suggested stages of integrating with others and considering logistics, is presented in Figure 6.1.

6.3.3 Managing Difficult Situations

As part of the focus groups, discussions were held to ascertain the level of agreement and disagreement regarding previously reported strategies and cues that HLCs and ECCs use to manage difficult situations. The findings revealed that situational awareness, improvisation, and metacognition impact S&C performances. Moreover, SCCs' ability to be effective across contexts was a prevalent topic among participants, who had a high level of experience in different contexts. Reflecting on the current state of the S&C domain, SCC 1 stated the following:

> I think we're losing the ability to notice. What young, inexperienced coaches think is important – that's all they will notice; they will naturally focus in on what's the good score, what was the technique – very simple metrics – and miss the whole thing that's going on in the session.

These perceptions highlight the participant's opinion that ECCs are perceived to be metrically oriented in their DM and rule-bound to the coaching framework, as opposed to being able to adapt and demonstrate agile thinking based on the context. The notion of

adaptability, and indeed improvisation, is a skill that participants distinguished as being of high value in SCCs' roles; however, they agreed that it was poorly utilised by ECCs.

A discussion was oriented towards ECCs reducing the complexity of tasks and situations to reduce the degree of variability within their environment, leading to fewer, more stable decisions. This approach was perceived to be more for the benefit of SCCs and their level of confidence and competence than the most effective approach for the athletes. Regarding SCC confidence and improvisation, the participants' opinions are well summarised in the following statement:

> Underpinning improvisation for me is a lack of experience to be confident in making decisions to deliver an outcome. As an early coach, the outcome's what I'm after. I'm not after the modality or the stage setup; that can all be manipulated because the outcome is what I'm actually looking to achieve. I think improvisation is something that comes with experience and having confidence in yourself to be able to make that decision. (SCC 25)

A deeper level of thinking by SCCs, including the consideration of the impact variables within an environment, affects the outcomes of the decisions made and is regarded as another highly valued skill in the field of S&C. Participants referred to previous and current experiences to outline the impact that metacognitive processes can have within their roles. Within the focus group discussions, metacognitive abilities were consistently considered influential for all aspects of the coaching process. Indeed, metacognitive processes were described as effective at elevating SCCs' levels of situational awareness and improvisation within a coaching session. Crucially, when the acquisition and development of metacognition were discussed, the role of experience was prominent. Such opinions were exemplified by SCC 1 as follows: 'The only thing that I think evolves as you become more

experienced as a S&C coach in your sport or [when you are] moving across sports is you've become more efficient in your thinking and processes'.

This statement also indicates that experience plays a large role in an SCC acquiring and developing heightened levels of proficiency in their strategies. Participants suggested employing higher levels of metacognition, be it consciously or unconsciously, to acknowledge the what, why, and how of a context permits SCCs; thus, the range of possibilities considered when approaching and succeeding in difficult situations would be increased.

6.4 Discussion

The present study sought to establish the level of agreement and disagreement with previous findings regarding the PJDM of HLCs (Chapter 4) and the DM of ECCs (Chapter 5) within their roles; moreover, it aimed to identify anything that might have previously been omitted. Until recently, the exploration of the PJDM processes of SSCs has been sparse in the literature. The results support the benefits of focus groups described by Nyumba et al. (2018), who stated that this type of investigation provides an opportunity to explore issues that are not well understood and to build on group dynamics to explore the issues in depth and detail. Within their role, SCCs are required to perform a variety of tasks and possess a variety of skills. In a recent analysis of S&C job descriptions, Vernau et al. (2021) reported that programme design was the highest-ranked skill required among essential criteria. The present findings support SCCs and those responsible for designing coach development material in better understanding the PJDM processes of experienced SCCs within training programme design and, critically, other difficult aspects of their role.

6.4.1 Reconsidering the Training Programme Design Process

Regarding training programme design, the current findings demonstrate a need to reconsider the language and extend the original task diagram (see Figure 4.1). Specifically, it

should be extended to include improved awareness of the cognitive strategies implemented by SCCs of varying experience levels in relation to specific knowledge categories of expertise. As illustrated in Figure 6.1, the focus group approach generated two additional themes for the task diagram presented in Figure 4.1. The inclusion of input from the environmental lead was perceived to affect the direction of SCCs' decisions. This agrees with Till et al. (2019), who included the dimension of 'context, culture, and politics' in their proposed DM framework for SCCs. While a head coach is pivotal to an SCC's daily practices, the vision, values, and overall direction of an organisation – as directed from higher roles – must be considered. Participants included programme directors and general managers in their examples. Furthermore, Gearity and Mills (2012) stated that understanding the dynamics of power relationships and the subtle influences that dominant traditions have on the behaviour of athletes and the conduct of coaches may be useful in identifying and overcoming flawed approaches to S&C training. These are critical factors for SCCs to consider as part of gaining a full understanding of the role that the S&C department has within an organisation and the desired requirements of their role.

Earlier research identified the significant influence that planning was deemed to have on coaching performances (Gallimore & Tharp, 2004). Szedlak et al. (2015) identified that planning includes logistical skills, which agrees with the present finding that logistics should be considered an important stage of programme design. This stage requires SCCs to be well prepared if they are to effectively make decisions within their coaching context. Although our findings identified the consideration of logistics as a crucial skill for supporting the training programme design process, previous literature in the S&C domain on planning has typically been oriented towards the concept of periodisation (Haff, 2016). However, Vernau et al. (2021) recently confirmed the importance that employers place on the skill of programme design, and therefore, a stimulus exists for SCC development to ensure that logistical

considerations become part of an SCC's holistic skill set.

When discussing communication in the context of explaining the what, why, and how of SCCs' methods to coaches and athletes, the findings indicated that HLCs' communication is more effectively developed than that of ECCs. This was attributed to their ability to tailor their language to contextual factors. As an example of this within team sports, SCCs may need to consider factors such as the squad status of an athlete. They may be a consistent bench player and disgruntled with a lack of starting opportunities or they may have been completely deselected for a fixture. An athlete may be suffering from a long run of injuries or made some high profile errors in the last fixture. All of these are examples of athletes that may have subsequent low energy, effort or mood within a S&C session on a given day and as such would need SCCs to be aware and tailor their communication accordingly to get a positive outcome from an interaction or session.

As such, coach development strategies are recommended to facilitate the development of ECCs' strategies regarding training programme design and improve how they communicate complex matters. Clear and simple explanations for diverse populations are a characteristic of expert SCCs (LaPlaca & Schempp, 2020). Forms of communication that have been described to assist in the formation of positive learning environments include facial expressions, gestures, positioning, and posture (Arthur-Kelly et al., 2003). Specifically, concerning the S&C domain, Holt (2016) stated that pedagogical methods such as the instructional technique, demonstration, and questioning can be used, but the success of any method will be influenced by the quality of the SCC's communication skills. In addition, communication should not be constrained to an athletic performance focus but should also include psychosocial variables to consider the athlete as a person.

Chapter 4 reported that HLCs include information about athletes on a personal level within their PJDM processes, while Szedlak et al. (2015) reported that athletes perceive more

effective SCCs to build relationships through developing trust, demonstrating high approachability, and displaying a sense of humour. Based on the present study, I recommend that to develop effective communication skills among SCCs, future learning strategies should be authentic and ideally situated in S&C environments to support the testing and refinement of communication skills. Such strategies would be indicative of a constructivist approach and supportive of recent S&C development literature (Gearity et al., 2021), which advocates their suitability for developing the psychosocial skills required for everyday S&C practice.

Figure 6.1 provides SCCs with an empirically supported model for facilitating effective programme design through the identification of stages perceived to be important by a range of experienced SCCs. The depth component illustrated in the figure acknowledges the role of experience in operationalising the stages associated with programme design. Although it is plausible that both HLCs and ECCs may be aware of the five stages in Figure 6.1, their ability to deliver efficiently and effectively in each of them will be influenced by context, communication, and collaboration.

6.4.2 Situational Awareness

The management of athletes in a team setting has been identified as a key coaching skill (Côté & Sedgwick, 2003). With specific reference to S&C, a characteristic of expert SCCs that differentiates them from competent SCCs was reported to be their ability to manage a large group while also coaching athletes on an individual basis in a large group setting (LaPlaca & Schempp, 2020). The present findings suggest that an SCC's level of situational awareness will influence their ability to manage difficult situations. This concurs with Till et al. (2019), who described how SCCs can only intervene within a training session if they notice the need to act in the first place. The authors proposed that the ability to notice is reliant on coaches consciously attending to moments of importance or disruption. Crucially, future preparation methods should include opportunities to elevate SCCs' level of

situational awareness. Scaffolding these opportunities by examining the decisions made with an experienced partner would benefit SCCs in better attuning their senses to the environment they are in, evaluating what they notice, and making decisions. Another learning opportunity for developing situational awareness is through coaching different populations with a low level of experience. Doing so would rationally expose SCCs to a range of technical errors, making them selective in their use of coaching cues when dealing with athletes of low experience levels.

Furthermore, what SCCs interpret and improvise on is influenced by what they notice, and the present findings suggest that ECCs are drawn to stimuli associated with task completion against technical or metric markers within their contexts. As per the opinions of our participants, enhanced situational awareness will improve the impact of SCCs in the workplace. A recently investigated approach in the S&C context is the use of vignettes. A description and example of the application of vignettes were provided in Chapter 2 with reference to Szedlak et al. (2018). Such an approach could be encouraging for ECCs who lack breadth and depth of delivery experience and could help them to consider approaches to situations that are yet to come as well as safely examine those that have already transpired.

Finally, I recommend that vignette- or scenario-based training should be introduced as ‘real play’ rather than ‘role play’ to readily stress the importance of SCCs’ engagement if the rehearsals they perform are to have meaning transferred to their eventual delivery. This could look like a HLC or experienced S&C supervisor having a camera set up to film their training session without the learners in attendance. Following the session the learners could watch the session back with the lead SCC and have it periodically paused to consider “what if” scenarios, question what the learners are noticing, and probe into how they might respond and why. Applying this to sport specific environments, resistance training sessions and physical

testing contexts would offer valuable insights to learners as to what can unfold in S&C contexts and extend their considerations beyond the theories of the classroom.

6.4.3 Improvisation

There is a dearth of literature surrounding improvisation and its role in coaching; however, Falkheimer and Sandberg (2018) described strategic improvisation as combining the need for planning and structure with creative action and a normative idea of how to work in an efficient manner. With direct reference to the delivery of S&C, this is where planning and execution occur simultaneously; consequently, thinking and doing must occur in the moment. While negotiating a situation, it is difficult for SCCs – especially those low in experience – to consider all necessary aspects of delivery and environmental variables. The present study agrees with the previous findings presented in Chapter 4 that perceived ECCs' DM is dependent on metrically derived technical frameworks and outcomes. Such approaches are restricted to what is supposed to happen because of what is programmed, rather than what is being done based on the dynamic context that unfolds, which can limit their effectiveness.

Improvisation also depends on awareness and therefore the preparation of what could occur more strategically, directing an SCC's listening and noticing within a session and promoting their ability to be present. Awareness of oneself as well as others will increase SCCs' ability to be impactful in their DM. In other domains, such as education (Lobman, 2002), the use of improvisational techniques has been investigated, but research in the field of S&C is still lacking. The present findings support the need for SCCs to be able to innovate, think, and adapt to changing contexts according to the knowledge and skills at their disposal. An opportunity exists for future research and coach development methods to incorporate improvisation, such as through evolving situated learning content that requires SCCs to test different approaches to a particular problem.

6.5 A Growing Case for Metacognition

In the previous chapter, I proposed metacognition as an influential concept in advancing the thinking skills of ECCs. The present study provides supporting evidence that metacognition is indeed a crucial and regularly used skill for experienced SCCs with PJDM, albeit subconsciously and unlabelled. Describing deep, multilayered thinking processes as metacognitive is not commonplace within S&C. This is likely due to the paucity of research regarding metacognition in this field and a lack of attention to PJDM within existing SCC preparation methods. Research in other domains, such as mathematics (Wilson & Clarke, 2004), has demonstrated that metacognitive thinking plays an essential role in facilitating professional development and improving problem-solving processes, which supports the present findings.

The present study, in conjunction with the previous chapters, is in agreement with MacIntyre et al. (2014), who found that ability-related differences in metacognition exist. Furthermore, in their review of the use of metacognition by proficient and poor performers in academic and psychomotor tasks, Martini and Shore (2008) suggested that higher-level performers tend to use more planning strategies and monitor and evaluate their performance more accurately. By contrast, inexperienced performers tend not to plan, monitor, or evaluate cognitive performance. These findings draw parallels with findings related to the use of simplistic cognitive processes in difficult situations, as described by ECCs in Chapter 5, in comparison with the use of metacognitive approaches discussed by the focus group participants and recalled by HLCs in Chapter 4.

6.5.1 Reconsidering Metacognition as 'the Work Before the Work'

Through reflecting on my own personal S&C experiences as well as considering the literature, I believe that for metacognition to be more readily accepted as a means for positively impacting the development of SCCs, it needs to be rebranded. In a domain where

traditional approaches have had a clear focus on biophysical fields, the addition of psychological concepts is envisaged to be treated tentatively at best. However, scope exists to transition from the seminal definition of Flavell (1979) of 'thinking about thinking' to 'the work before the work'. With the S&C coaching process being succinctly described by Till et al. (2019) as the planning, delivery, and review stages, I feel that this 'new' description is likely to resonate better with the S&C fraternity. Although written with reference to a wider sports coaching context, Stodter and Cushion (2019) described the coaching process as dynamic and subject to myriad situational, contextual, and social factors. I believe that this readily applies to and deepens the abovementioned, rather simplistic, S&C coaching process as well as highlights the role that metacognitive skills can play in differentiating levels of thinking and performance at each stage.

As an example, within the planning stage, Jeffreys (2020) recently highlighted the value for SCCs of pre-evaluating the range of factors that have the potential to derail a training programme and developing strategies to mediate for these factors in advance. The author provided the following two questions as simple examples that could be used in this process to help stimulate thinking: What could go wrong to stop this intervention from working? What would need to be in place for this intervention to be most effective? These questions promote the engagement of metacognitive processes and also support Figure 6.1, which deals with considering context when designing programmes and the role that metacognition was perceived to have for SCCs in managing difficult situations. Here, a subtle promotion of asking ECCs to engage, for example, in a level of 'work before the work' or thinking before doing represents a safe mention of metacognition within an unfamiliar domain.

Within the wider literature, Collins and Collins (2016) stated that the outcome quality of decisions is directly related to their appropriateness, which is in turn based on a coach's

knowledge base and experience with PJDM. I propose that SCCs' engagement in deep, insightful premortems is an example of this as well as one that yields the potential for them to better notice and focus attention within tasks.

Furthermore, the importance of intra- as well as inter-personal skill development was highlighted by the current participants. A broad, deeper development of these skills can be achieved through coach developers within S&C considering the metacognitive dimensions of regulation and experiences. This can be seen within Figure 5.2 (Mahdavi, 2014). I believe that engaging in such considerations will develop learners' ability to control how and why they think in a particular way as well as raise the level of intrapersonal awareness. This holds importance, based on the work of Gilbert and Baldis (2014), for the ability to understand oneself as an SCC as it relates to performing to a high standard. With regard to the experiences dimension, I envisage SCCs of all levels of experience being prepared to ask exploratory questions before, during, and after performances to more deeply consider who and what might require their attention as well as how and why within a given task. Within the various considerations raised, the present findings strongly imply that inevitable interactions will occur with other stakeholders, hence the requirement for well-developed interpersonal skills.

6.6 Key Implications

Within their role, SCCs are required to make decisions across various contexts. The present study brought together experienced SCCs, and their critical discussions offer considerations for coach developers regarding how to advance the strategies being designed to improve PJDM. The diverse range of sports and experiences that the SCCs reflected provided a broader and deeper level of representation to the previous findings from Chapters 4 and 5, thus making greater contributions to the overall understanding of the PJDM of SCCs. Furthermore, concerning the transferability of the findings, the SCCs who participated in the

ACTA and focus group research had varying levels of coaching experience and, at the time of the research, were coaching, and in some cases also studying, across Australia, New Zealand, England, and Scotland. This provides important context for S&C research concerning current practices and philosophies, as some earlier studies (Ebben et al., 2004; Ebben et al., 2005; Simenz et al., 2005) were conducted more than 15 years ago and thus may not reflect the changes that have occurred. These assessments of the practices of SCCs have principally involved SCCs with a high level of experience working within North American sports. A more comprehensive description of the nature and development of studies characterising S&C practices was provided in Chapter 2. Expanding on these studies and adding some diversity, a recent review of the practices of 156 SCCs with a mean of 8.35 (± 6.89) years of S&C experience found that they were best represented across the United States (33%), United Kingdom (21%), China (18%), and Spain (12%; Weldon et al., 2022). Therefore, the present findings offer much-needed diversity and representation of S&C approaches, which have not previously been offered.

To operationalise the cognitions of experienced SCCs and their approach to training programme design, this chapter offers an empirically supported model in Figure 6.3. The model is intended to assist SCCs in more readily navigating the common scenario of not only what to prescribe athletes but also how and – crucially – why. I contend that within education and accreditation settings, coach developers could incorporate this model when considering various S&C contexts. The present study contributes to the current S&C literature by building on recent research (Gearity et al., 2021; Szedlak et al., 2021) that has advocated for a constructivist approach to SCC development. To successfully implement a constructivist approach, it is important for coach developers to consider learners' existing level of experience and knowledge. This determination can positively influence the nature of the content designed and language used. Learners' adaptability can determine how receptive they

are to alternative ways of thinking. This will also influence their ability to access previous knowledge and experiences.

In addition, the consideration of context was critical in the PJDM discussed by the participants. As part of a constructivist approach, the inclusion of authentic, situated S&C experiences of varying levels of diversity and complexity would facilitate the development of SCCs' situational awareness. This will help them to more readily know when, how, and why/why not to intervene in different contexts. Previous experiences provide the resources for SCCs to interpret and make sense of new contexts. The delivery of content that is too unfamiliar or diverse for their current capacity would limit the extent to which a learner can notice and interpret. Therefore, in designing constructivist S&C approaches, I encourage progressive exposure to increasingly diverse and complex problems.

Furthermore, higher-level cognitive domains were described by Anderson and Krathwohl (2001) as including creation, critical thinking, and extended abstract thought. Specific to demands in S&C, the present findings include metacognition, situational awareness, and improvisation as stimuli for consideration by coach developers. Through group-based work, learners consider different contexts, such as the story-telling of experienced SCCs (Szedlak et al., 2021), vignettes (Szedlak et al., 2019), or the observation of prerecorded S&C content (Gearity et al., 2021). Learners can collaborate to construct and compare meaning with what is presented to them. As not all aspiring SCCs have access to authentic workplace learning experiences, encouraging sense-making in this manner could aid future problem-solving by considering the interaction of different variables. These approaches are considered in the upcoming chapters as I discuss future approaches to SCC learning.

Moreover, social negotiation and interaction have previously been identified as crucial elements in knowledge acquisition. The importance of effective communication skills in the

present study is in agreement with other S&C research, where expert SCCs have been found to communicate effectively with large groups of athletes (LaPlaca & Schempp, 2020), play a critical role in working relationships with sports coaches (Gillham, 2019), and influence engagement with athletes (Szedlak et al., 2021). S&C learning opportunities can be created for learners to verbalise their thinking processes and practice their use of language.

Additionally, a strong understanding of theories and disciplines within the S&C domain provides a platform for SCCs to learn new content. While the value of developing a comprehensive theoretical base is acknowledged, the present study highlights the importance of being able to access knowledge, make associations with new content and contexts, and respond accordingly. Those responsible for designing learning content and environments for prospective and current SCCs must have a clear understanding of the current levels of knowledge and experience that learners possess as well as the demands of the S&C workplace. This understanding will support the design of authentic situated learning content that addresses various contexts that learners can collaboratively engage in to prepare themselves more effectively for the demands of the S&C workplace. I anticipate that SSCs, across a range of experience levels, can relate to the content discussed in this study, as well as coach developers, and use it to stimulate future approaches as part of a sustained commitment to learning. Through constructivist approaches, I suggest that learning can be a more personal and active process, and one that will enable individuals to construct their own meanings within contexts, feeling the interaction and influence of different variables within them.

Considering the findings of this chapter in accordance with those from Chapters 4 and 5, I believe that the direction of professional training available to SCCs in the future should consider not only the knowledge of direct deliverables to athletes but also challenge the depth and breadth of SCCs' cognitive processes as well as draw out the underpinning *why* behind their PJDM process. The mechanisms that underpin the development of PJDM are not fully

understood, which is certainly the case within S&C. The findings of the ACTA and focus group research offer evidence from which frameworks can be constructed to progress S&C learning materials. While the three investigations discussed in this thesis have identified some commonalities, a need exists to operationalise, test, and review these concepts within appropriate learning tools.

6.7 Advancing the S&C Domain Requires the Status Quo to Be Challenged

The qualitative research conducted thus far has been novel with regard to traditional approaches to S&C investigations. These approaches, in conjunction with popular opinions on the role purpose and primary skills required by SCCs, suggest that I should be cautious as to how the findings may be received across the S&C community as well as how they may be perceived as being operationalised in coach development materials. Scope exists for what has been discussed to not be considered 'new' knowledge by more experienced SCCs who, through their years of deep practice, have engaged – albeit subconsciously – in the various metacognitive skills identified when performing their within-role tasks. Crucially, however, the evidence presented makes such previously invisible, tacit skills visible – from anecdotal to empirically supported. This provides vital integrity to support any future approaches intended to be developed and promoted by regulatory bodies.

On the surface, why the acquisition of more declarative – and to some extent procedural – knowledge and practical competencies is seductive to SCCs is understandable. They are easily accessed and, with sufficient investments in time and attention, can generally be developed while direct changes in behaviours can be observed. Through exams, theoretical knowledge can be measured, and practical assessments directed at demonstrations and explanations of various technical frameworks can be assessed in much the same manner. As a means of recruitment for entry-level positions and roles where purely physical adaptations are created as a practitioner, these knowledge and skills may be considered to predict within-role

performance. However, the research findings stress that far more is required to navigate the uncertainty and complexity associated with the S&C workplace.

Within this chapter, metacognition, situational awareness, and improvisation have been identified as critical higher-order thinking skills for SCCs. These skills were found to be supported by a higher regard for context, collaboration, and communication. Encouragingly for coach development in the S&C domain, these are all skills – and skills can be taught. I believe that through a constructivist lens, one can take an optimistic approach that, in seeking to raise the standards of practice across S&C workplaces, considers the improvement of thinking processes to not need to wait until years of experience have been accumulated by SCCs. The creation of learning environments that more authentically situate learners within the demands of the workplace will, I feel, facilitate the consideration of various approaches, engagement, and refinement of the identified higher-order thinking skills and PJDM.

A conceptual example is the use of carefully constructed scenarios designed to expose the default thinking and behaviours of SSCs. Observation of and reflections on what SCCs repeatedly do, the alternatives they consider (if any), and why would offer a development of current approaches within S&C development and assessment. The following chapters present a case for how future learning environments can be designed, implemented, and refined in the context of S&C through using Cognitive Apprenticeship (CA).

6.8 Reflections

SCCs' dispositions can be significant and, as previously observed in the wider sports coaching literature, content within coach education strategies may be repelled if perceived to contrast with any currently held, entrenched philosophies (Cushion & Partington, 2016). This chapter has highlighted the need to present a more concerted focus on the metacognitive skills possessed by SCCs as part of advancing the S&C domain. I advocate for the application of and engagement with metacognitive strategies at each stage of future SCC pedagogical

approaches to promote more open-minded, flexible consideration within task execution. Chapter 5 provided evidence of a limited approach to problem solving by ECCs in describing their navigation of difficult tasks, while the previous chapter suggested that engaging with higher-order thinking skills as part of the consideration of S&C contexts was problematic, certainly for younger participants with less coaching experience. With more competition for S&C roles becoming apparent and their importance growing in organisations, SCCs who cannot effectively problem solve and adapt to their circumstances may not be afforded the time of others to learn from failure. Consequently, in accordance with the value that experienced SCCs place on metacognitive skills in assisting them in the workplace, I believe that their inclusion early in their development is preferable to leaving them to develop instinctively through years spent in the workplace.

CHAPTER 7. Developing Strength and Conditioning Coaches: A Case for Cognitive Apprenticeship

7.1 Introduction

The previous three chapters have generated novel insights, which may provide a stimulus to review current S&C pedagogical approaches as well as to consider how to include problem solving and contextual factors when SCCs are operating within various coaching processes. Notably, the research findings included little mention of the fundamentals of role success reported within the S&C literature in the last 10 years. The open, exploratory nature of the questions asked and discussions across the ACTA and focus group research afford the opportunity for the biophysical and discipline-specific knowledge sets to be prominent and influential in PJDM, should this have been the case.

Despite these novel studies and their insights identifying that effective PJDM is influential on the impact that SCCs can have within their environments, the development and evaluation of the components of PJDM are not commonplace within training and accreditation schemes. Undoubtedly, possessing knowledge and conducting oneself with competent and professional behaviours are crucial to the effectiveness of SCCs. However, it is plausible that well-intentioned, knowledgeable SCCs can become distracted, confused, and ultimately ineffective when faced with new contexts and ever-changing variables.

Therefore, a need exists to challenge traditional approaches to how learners are prepared to enter the S&C workplace. Previous studies have highlighted that entering an applied coaching environment can be daunting for SCCs, especially if they have minimal background in such an environment (Massey & Maneval, 2014; Massey, 2010). Without more authentic preparation, this will continue to be a concern for those new to the S&C domain. Interpretation of the qualitative research conducted within this thesis has consistently indicated that learning approaches that develop one's metacognitive capabilities would more

readily prepare potential SCCs for the dynamic, within-role tasks they are likely to encounter. Reflecting these considerations, this chapter presents a case for CA to be considered as a practical and feasible solution for future SCC preparation.

The argument that I present is that CA is a suitable approach for improving the PJDM of SCCs of all experience levels. This includes the associated development of the metacognitive, situational awareness and improvisation capabilities that were identified by experienced SCCs, through the ACTA and focus group research, as being important in supporting their within-role PJDM.

7.1.1 Requirements for Future Progress

Based on the evidence presented across the previous chapters, I can confidently state that variation exists between the roles, responsibilities, behaviours, and cognitions of HLCs and ECCs within S&C. The previous chapters have summarised the literature to date concerning the knowledge, behavioural, and cognitive characteristics of SCCs. In the wider context of coaching, Cushion et al. (2003) stated that the development of each individual is unique and that each will use various situations and associated stimuli in diverse ways. Indeed, such is the multifaceted nature of coaching effectiveness and coaching in general that it is critical to select a specific competency to focus on when seeking to improve, despite the interactive application of these competencies being the ultimate goal. I therefore agree with Abraham and Collins (2011), who stated that coaches must focus on developing specific aspects of their trade and constantly consider how this fits with their overall approach.

Furthermore, Resier (2004) stated that a principled analysis of the manner in which tools can influence learning begins with an analysis of learners' needs. In the domain of psychology, a case conceptualisation – completed as the first step in working with any client – strives to describe and understand the client's presenting problem in terms that can be clearly operationalised, encompassing its cognitive, affective, and behavioural aspects (John

& Segal, 2015; Martindale & Collins, 2013). Placed within the context of S&C, case conceptualisation as a tool presents an encouraging opportunity to enable SCCs to better organise their cognitions. Through making more connections and associations concerning their current knowledge and experiences, I suggest that SCCs would more effectively see the big picture and understand environments and situations in context.

7.2 Introduction to Cognitive Apprenticeships

In seeking to understand how skills have been introduced and developed in domains outside of S&C, the wealth of literature pertaining to apprenticeships is helpful. De Jong (1991) described traditional apprenticeships as an on-site reality-based training method within which learners acquire skills under the supervision of an expert or trade master, and that the tasks performed increase in complexity. Even earlier, Jordan (1987) identified a list of characteristics of traditional apprenticeships, which included (a) commencing with easier skills with low consequences of mistakes; (b) progression of task complexity; and (c) a focus on learners 'doing', as opposed to explaining.

Although traditional apprenticeships have been found to be successful in improving capability and fostering heightened learning, they have also been considered a poor fit for domains that require a high degree of tacit or metacognitive knowledge. Early research highlighted reasons for an ill fit due to traditional apprenticeships being highly instructional in their approach (Collins et al., 1991; Greer et al., 2016). The previous chapters have indeed identified that SCCs are required to have well-developed metacognitive skills to be effective at solving problems within their context. As such, a traditional apprenticeship would seem a poor fit as a developmental tool. However, an alternative approach has been proposed in the literature in the form of CA.

Oriol et al. (2010) described CA as differing from traditional apprenticeship learning through its focus on the development of cognitive and metacognitive knowledge and skills,

rather than the development of physical skills alone. In one of the earliest papers on CA, Collins et al. (1991) described it as a model of instruction that works to make thinking visible, offering a close match to the goals of ACTA-based investigations as used earlier in the thesis. Early research in domains such as nursing (Woolley & Jarvis, 2007), education (Collins et al., 1987), and statistics (Dimakos et al., 2010), as well as more recently in food and beverage service (Tsui & Chen, 2020), has demonstrated CA to be a pedagogical method that engages learners through the creation of authentic, effective learning situations. This is described further in the next section, which presents the dimensions of CA.

7.3 Dimensions of Cognitive Apprenticeships

Four dimensions have been described within CA approaches, namely content, methods, sequencing, and sociology (Berryman, 1991; Collins et al., 1987; Lai & Yen, 2018). This section provides an overview of each dimension to provide context to subsequent sections as part of presenting a case for the application of CA within S&C.

7.3.1 Content Dimension

This dimension of CA considers the types of knowledge required for expertise (Collins et al., 1989) and has the following four components: (1) domain knowledge; (2) heuristic strategies; (3) control strategies; and (4) learning strategies. In simple terms, domain knowledge refers to a particular subject matter, specific concepts, facts, and procedures, while heuristic strategies can be thought of as the generally applicable techniques used to accomplish tasks. Collins et al. (1991) described control strategies as approaches used to control the process of conducting a task and considered them to have monitoring, diagnostic, and remedial components. Finally, Berryman (1991) described the component of learning strategies as knowing how to learn, which includes exploring new fields, acquiring more knowledge in a familiar subject, and reconfiguring the knowledge that one already possesses.

According to Massey (2010), learning through CA should be staged so that the learner builds the multiple skills required in expert performance and discovers the conditions under which they apply. Through possessing such strategies, learners can develop deeper and broader declarative knowledge bases concerning what methods are possible for achieving a desired result. Then, they can crucially begin to access, test, and review these methods to develop effective metacognitive processes that support impactful decisions and behaviours.

7.3.2 Methods Dimension

Collins et al. (1989) proposed six teaching methods that promote situated learning through helping learners to acquire both cognitive and metacognitive skills and focus their observation of expert performance in practice, thereby facilitating the development of their own problem-solving skills. These six methods are modelling, coaching, scaffolding (supported by fading), articulation, reflection, and exploration. Collins et al. (1989) described modelling as involving an expert performing a task such that learners can observe and build a conceptual model of the processes required to accomplish it. Within the coaching component, the teacher observes the learner(s) engaging in and attempting to solve previously modelled problems. In a common, practical S&C context at a one-on-one coach to athlete level this could be through a learner attempting to teach an Olympic lift to an athlete and correcting various technical error within the lift. At a more complex group level during sports practice a teacher may observe a learner taking a warm up or conditioning practice with a large group of athletes of different abilities or capacities where variance is demonstrated in performance of the same desired task.

Regarding scaffolding, Berryman (1991) expressed the importance of teachers being aware of the need to provide support for learners as they complete tasks, while simultaneously understanding the value of appropriately fading any support to ultimately hand control of the learning process to the learner. According to Lai and Yen (2018), both

articulation and reflection are designed to focus learners' observations of expert problem-solving and gain control of their own problem-solving strategies. It is within these two components that learners are encouraged to consider what they have observed and understood and – critically – to make sense of the model tasks using different perspectives. Finally, exploration is aimed at encouraging learners to formulate and pursue personal learning goals Beckman et al. (2003) and solve problems independently.

7.3.3 Sequencing Dimension

The sequencing dimension has the following three components: (1) increasing the task complexity; (2) increasing the diversity of problem-solving situations; and (3) progressing from global to local skills. This dimension describes how one can order learning activities, such as through gradually increasing the difficulty and variability of tasks, beginning by conceptualising a given task in its entirety before executing specific parts. The latter component assists learners in considering a problem or situation in its entirety, after which they will be able to interpret smaller, possibly more complex tasks in a broader context.

7.3.4 Sociology Dimension

The sociology dimension focuses on situating the learning environment, allowing learners to work on realistic tasks, develop communities of practice, and develop cooperation skills while increasing their overall intrinsic motivation (Tariq et al., 2021).

In describing the social characteristics of learning environments, the following four subcomponents are employed: (1) situated learning; (2) communities of practice; (3) intrinsic motivation; and (4) cooperation. Unpacking these further, situated learning refers to students being able to learn in the context of working on realistic tasks, while communities of practice consider how learners can communicate with one another regarding the different ways to accomplish a given task. Within intrinsic motivation, learners are considered to establish

individual goals as part of seeking skills and solutions, while cooperation considers the extent to which learners are able to work together to accomplish a particular goal.

7.3.5 Summary

Collins et al. (1991) stated that, within a CA approach, the challenge is to present a range of tasks, varying from systematic to diverse, and to encourage learners to reflect on and articulate the elements that are common across tasks. The next section describes how CA might be applied within the S&C workplace as part of advancing the performance of SCCs in the workplace.

7.4 Conceptual Application of CA Within S&C

The manner and preference through which SCCs learn will evolve over the course of their careers, with methods including formal, nonformal, and informal learning. It is important to consider how these skills will be assessed in the integrated fashion that real-life practice requires. To date, accreditation processes for SCCs have predominantly occurred through competency-based assessments (Szedlak et al., 2020). However, the findings from Chapters 4 and 5 with HLCs and ECCs, respectively, support the need to transition the focus of learning and development strategies beyond practical delivery and knowledge acquisition. Here, the following question arises: It is not appropriate, or realistic, to learn or develop higher-order cognitive skills, such as situational awareness, improvisation, and indeed metacognition, to be learned and changed over the course of, for example, a 2-day workshop but they can be introduced conceptually to be followed up on intentionally. These are skills to learn and habits to change through the acquisition and examination of many experiences, with new habits being subsequently tested and reinforced.

Learning has previously been described as not being detached from the world of action; rather, it exists in complex social contexts that are constituted by people, actions, and situations (Dimakos et al., 2010). The consistency and immediacy with which HLCs

demonstrate coaching techniques, cues, and behaviours can make it difficult for learners, and indeed HLCs themselves, to understand why they acted in a certain way. Harder still is the ability to accurately model and articulate why these HLCs do what they do. This inability to model – and further, to model within an authentic context – is a barrier to the learning and development of ECCs using traditional instructional methods.

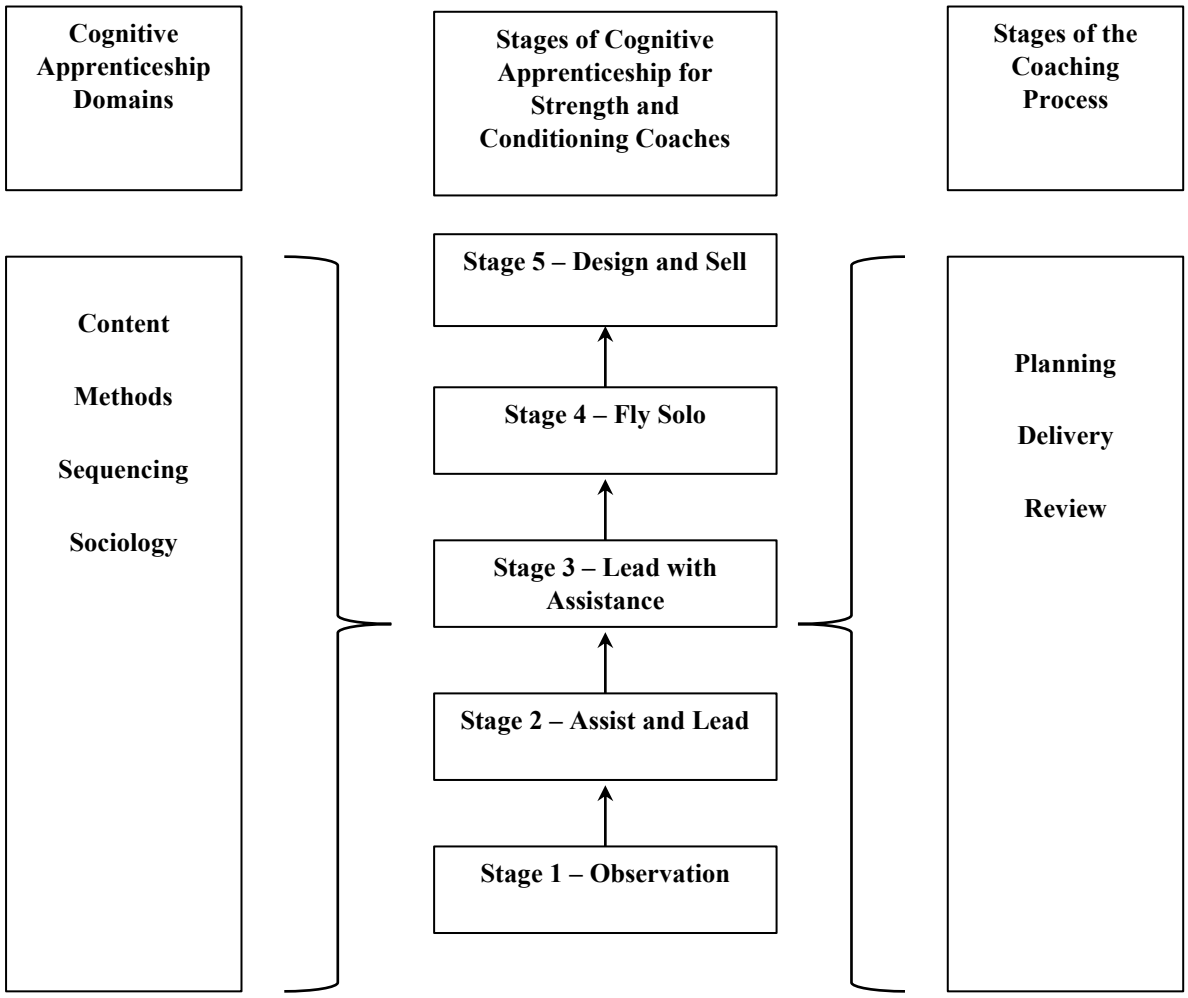
Unfortunately, an examination of the S&C research uncovered little reference to the consideration of CA as a teaching method. In discussing SCC development, Magnusen and Petersen (2012) did direct some attention to CA; however, they only presented aspects of the methods domain. If CA is to be adopted by S&C coach developers, it is important for teachers to carefully consider the context in which tasks are presented so that they make sense to the learner. To assist in conceptualising how CA principles could be applied with S&C, Table 7.1 provides examples of how each element of the four aforementioned dimensions might be included in these environments. These range across the plan, do, and review stages of the S&C coaching process, which have been highlighted as aspects of the SCC's role in accordance with physically preparing athletes to achieve sports-specific performance outcomes (Till et al., 2019), while also adding in the consideration of why, which underpins approaches such as PJDM (Crowther et al., 2018).

Chapter 4 supports previous suggestions that effective organisational and planning skills are essential behaviours of SCCs (LaPlaca & Schempp, 2020; Szedlak et al., 2019); and would be crucial to model and include within S&C CA methods. The consideration of delivery aspects from both a psychosocial and PJDM perspective using CA supports the view that coaching is a social process (Bowes & Jones, 2006); moreover, it supports the view that effective S&C coaching extends beyond technical frameworks and performance objectification, such as loads lifted or times achieved (Gearity et al., 2021). Finally, when SCCs review their practice, their reflection process should encompass the context they were

situated in, the social interaction that occurred between the athletes, and the interaction that occurred between the SCC themselves and the athletes (Mills et al., 2018; Szedlak et al., 2021). Figure 7.1 provides a conceptual model of how CA methods could be applied over five stages with SCCs across the coaching process:

Figure 7.1

Conceptual Model of the Application of Cognitive Apprenticeship Methods to Support Developing Strength and Conditioning Coaches Throughout the Coaching Process



The first three stages proposed for SCCs in Figure 7.1 follow the teaching methods previously described within the CA literature. These stages rely on teachers appropriately and effectively modelling their techniques, strategies, and PJDM processes. It is important to highlight that modelling exists in isolation but can be amplified through its interaction with the content, sequencing, and sociology domains. Teachers must understand the characteristics of effective decision-making in SCCs and the necessary environmental demands for manufacturing levels of sequencing. The findings from Chapter 4 provide encouragement for

teachers in this area. With reference to the social domain, teachers who are cognizant of what intrinsically motivates their learners will have a more engaged cohort of SCCs to teach. Moreover, learners who are not encouraged to ask questions are at risk of being ineffective in identifying future problems and examining alternative approaches in the same context. Careful consideration of the social domain will facilitate the development of SCCs who are solution-rich when approaching complex and diverse tasks.

Within stage 4 (Figure 7.1), SCCs will engage in more independent coaching and experience levels of adversity through various contexts, which will shape their future PJDM and outcomes when flying solo. The 'design and sell' stage (stage 5) is crucial in appropriately preparing learners for the required demands of SCCs. As evidenced in the behavioural characteristics recently reported by LaPlaca and Schempp (2020) and the PJDM of HLCs (Chapter 4), there is far more to consider than simply designing and delivering training programmes when determining effective S&C provision. The design and sale stage takes the learner beyond a training session and encompasses critical psychosocial skills, including interactions with coaches, support staff, and athletes. This combination of psychosocial, PJDM, and self-skills has previously been identified as an important requirement for effective SCCs, from the perspectives of S&C employers (Vernau et al., 2021), athletes (Szedlak et al., 2015; Tiberi & Moody, 2020), and SCCs themselves (LaPlaca & Schempp, 2020; Szedlak et al., 2021).

Reflecting these considerations, I propose that experienced SCCs should conduct a case conceptualisation for the learner SCC to identify areas for development. Consequently, an informed CA should be initiated through the modelling of relevant areas – examples of which are provided in Table 7.1. Such an approach will enable the learner to gain real-time – or at the very least near-time – feedback on their performances, resulting in a timelier impact on their coaching process. This presents a more meaningful strategy than the one to two times

per year evaluation process suggested to be optimal by Gleason et al. (2020). Due to the dynamic contexts that SCCs operate within, and the cognitive challenges associated with them, feedback needs to be far more relevant and timely.

Table 7.1

Overview of Principles for Designing Cognitive Apprenticeship Environments With Supporting Examples From the S&C Workplace

Content	***Plan:*** Teachers model the decision-making processes underpinning programme design
Domain Knowledge: Subject matter-specific concepts, facts, and procedures	***Delivery:*** Teachers explain the considered techniques and strategies to address a range of errors across a range of athletes for the same task/exercise
Heuristic strategies: Generally applicable techniques for accomplishing tasks	***Plan:*** Learners develop metacognitive approaches to address macro-/meso-/micro-cycle planning tasks
Control strategies: General approaches for directing one's solution process	***Review:*** Learners can observe the self and others through video content to create greater awareness of and overall meaning for coaching experiences
Learning strategies: Knowledge about how to learn new concepts, facts, and procedures	***Delivery:*** Teachers verbalise their decision-making processes and demonstrate to learners the various methods to coach the same exercise
Methods	
Modelling: The teacher performs a task so that students can observe	

Coaching: The teacher observes and facilitates while learners perform a task	***Delivery:*** Learners are able to practice what they have observed in controlled, stable settings, such as one on one with athletes or in within coaching peer group
Scaffolding: The teacher provides supports to help the learner perform a task	***Delivery:*** Teachers available within a session to provide support concerning practical corrective strategies, athlete engagement, or the use of coaching cues
Articulation: The teacher encourages learners to verbalise their knowledge and thinking	***Plan:*** Learners explicitly state the rationale for training method selection and session design
Reflection: The teacher enables learners to compare their performance with others	***Review:*** Learners invest time after delivery to consider their coaching behaviours and decisions with other coaches using peer feedback, video content, and other forms
Exploration: The teacher invites learners to pose and solve their own problems	***Plan:*** Learners consider new situations and problems and devise sessions and supporting content to solve
Sequencing	***Delivery:*** Within sports conditioning sessions, learners actively adapt to navigate varying fitness levels in the same task or manage variables within small-sided games
Increasing complexity: Meaningful tasks gradually increasing in difficulty	
Increasing diversity: Practice in a variety of situations to emphasise broad application	

Global to local skills: A Focus on conceptualising the whole task before executing the parts	***Plan:*** Consideration of achieving physical adaptation outcomes in resistance training sessions across a range of athletic statuses, such as para-athletes or post surgery ***Review:*** Learners determine the session effectiveness from surface-level outcomes, such as loads lifted to deeper psychosocial factors for athletes (e.g., motivation and engagement) and themselves as coaches (e.g., improvisation and situational awareness)
Sociology	
Situated learning: Learners develop in the context of working on realistic tasks	***Delivery:*** Learners are in settings such as sports-specific conditioning sessions, requiring the demonstration of effective S&C coaching behaviours and decision-making
Community of practice: Communication about different ways to accomplish meaningful tasks	***Plan:*** Learners can work together to determine upcoming roles according to intended session content, existing skill sets, and targeted development areas
Intrinsic motivation: Learners set personal goals to seek skills and solutions	***Plan:*** Teachers assist learners to consider the coaching philosophy and beliefs to support the selection of training methods and environmental design
Cooperation: Learners work together to accomplish their goals	

	Review: Work with peers to consider alternative solutions to experienced problems

With reference to Table 7.1, a key point for CA that can be related to the previous ACTA research, is that as part of this process teachers could verbalise what actions if any they would take. As part of such modelling teachers could also explain what they think is going on (situation awareness), and what information led them to a particular situation assessment and associated actions (critical cues). One further valuable opportunity here could be to voice what errors they, as experienced SCCs, believe an inexperienced SCC would be likely to make in this situation. The benefit of this latter point would help to locate the learner within the context and, hopefully, promote them to consider the reality of being in such a situation in the future.

When discussing SCC development, it is also crucial to consider the learning environments available to the learner. The preparation of SCCs has traditionally been achieved through a combination of classroom-based learning (Gillham et al., 2015), competency-based accreditations (Szedlak et al., 2020), and workplace internships (Martin, 2020; Read et al., 2017). However, these methods have been acknowledged, at least to date, to have a predominantly biophysical focus, and a growing body of literature advocates for the inclusion of constructivist learning strategies for SCC preparation (Gearity et al., 2021). Certainly, CA methods offer pedagogical tools for elevating learners' practical, psychosocial, and PJDM capabilities required in the S&C workplace. However, it would be remiss not to highlight that a need exists to evolve how CA, and indeed all the aforementioned preparation methods, could be delivered in the future due to the recent COVID-19 pandemic.

Based on statistics from UNESCO, Amemado (2020) reported that in March 2020, 90% of the world's student population was unable to attend school or university. Despite

concerns that online education may be impersonal and students may feel disconnected from teachers and their cohort (Ko & Rossen, 2017), future teaching methods are likely to require the versatility that online approaches provide. Adopting CA methods through simulated online learning as a means of SCC preparation is presented in Table 7.2. The coding system applied is intended to help one conceptualise the possible effectiveness of delivering CA teaching methods within the four learning environments. Due to its conceptual nature, the coding applied in Table 7.2, are a subjectively composed proposal of effectiveness from myself but, importantly, supported through the critical review of the literature and evidence generated in the thesis so far. Each environment offers differing degrees of potential for learners to observe, test, review, and adapt according to various S&C content across the coaching process. Table 7.2 is intended to stimulate coach developers to consider how CA can be incorporated into their respective settings.

Table 3.2

Proposed Effectiveness of Four S&C Learning Environments for Delivering on the Principles of Cognitive Apprenticeships

Principles of Cognitive Apprenticeships	Education (classroom)	Education (simulation)	Accreditation Programmes	S&C Workplace
Content				
Domain knowledge	3	3	3	4
Heuristic strategies	4	4	4	4
Control strategies	3	3	3	4
Learning strategies	3	3	3	4

Principles of Cognitive Apprenticeships	Education (classroom)	Education (simulation)	Accreditation Programmes	S&C Workplace
Method				
Modelling	3	3	4	4
Coaching	2	3	4	4
Scaffolding	2	3	4	4
Articulation	3	3	3	4
Reflection	3	3	3	4
Exploration	2	3	3	4
Sequencing				
Increased complexity	2	4	2	4
Increased diversity	2	4	2	4
Global to local skills	2	4	2	4
Social				
Situated learning	2	3	2	4
Community of practice	3	3	2	4
Intrinsic motivation	3	3	2	4
Cooperation	3	3	2	4

Note. **Coding:** The assignment of 1–4 demonstrates the potential of each learning environment to achieve the respective principle of cognitive apprenticeship (1 = not a lot; 2 = somewhat; 3 = the majority; and 4 = completely).

Table 7.2 highlights the compromised ability of classroom settings to provide situated learning experiences. Within the classroom, opportunities exist for learners to be exposed to the knowledge and strategies in the content domain; however, deeper experiences obtained through modelling and independently tested by SCCs are limited. Similarly, the short-term nature or indeed lack of assembled time with peers to establish relationships for supporting learning, such as within the sociology domain, places constraints on the adoption of a CA approach. Nevertheless, through carefully examining the principles of designing CA, teachers can develop approaches using simulations to build on elements in each domain to support SCC preparation for the workplace. Consistent with literature pertaining to CA, Table 7.2 places the S&C workplace as the optimal environment for providing situated learning experiences for SCCs.

7.5 Reflections

A real challenge is to make SCC learning more accessible and attractive to coaches at all stages of their careers. Methods and delivery focused on nurturing academically oriented, theoretically oriented, and framework-limited SCCs appear to be insufficiently preparing ECCs and potential candidates for the dynamics associated with the S&C workplace. For example, Jeffreys and Close (2013) previously encouraged employers offering intern programmes to assess the characteristics, skills, and knowledge of effective S&C coaches and base their programme on developing said qualities. A continual focus in research studies on behavioural characteristics and foundational and practical skills, such as those outlined by Dorgo (2009) and indeed the recent summary of desired skills from S&C employers (Vernau et al., 2021), leave a paucity of detail or prioritization concerning the metacognitive capabilities of effective SCCs.

Furthermore, those in the S&C domain who lead departments are inundated with external demands, such as scheduling, travel, meetings, and strategy. Therefore, with time at a

premium, they are not always willing or able to commit to meaningful, focused development for themselves and their department. The detrimental consequence of such scenarios is two-fold: first, learning is primarily assumed to occur as a result of hands-on experience, and second, coaching teams are at risk of developing tribal or fixed mindsets, where the overwhelming theme is to agree rather than challenge. When seeking to identify potential 'gaps' in an SCC's knowledge base, the supervisor or manager of the learner coach must carefully consider what needs to be known and understood to more readily aid the learner in being more effective in their environment.

Within this chapter, I have presented a case for S&C environments to use CA as an instructional model for developing higher-order cognitive skills in learners. The methods discussed and conceptually illustrated offer opportunities for those responsible for coach development to teach learners to ask questions and consider multiple contextual solutions. This approach to learning more readily addresses the skills gap regarding the qualifications learners possess and the actual requirements of the S&C workplace. Equipped with metacognitive skills that have been modelled, tested, critically reviewed, and retested, learners will be better prepared to make both intuitive, in-the-moment decisions as well as more strategic decisions that include a wider range of considerations in the process.

I propose that the application of CA provides a pedagogical approach to teaching that encourages learners to attain more practical and authentic experience following the modelling of expert practice and processes. Teachers must understand and balance the domains strategically to critically select according to the learner(s) and context(s) in question. Lastly, I propose that the design and assessment of a learning approach in which CA principles are applied with the intention of enhancing the learning of SCCs are worthy of investigation.

CHAPTER 8. Study 4: Application of an Online Cognitive Apprenticeship Model to Facilitate Professional Judgement and Decision Making in Strength and Conditioning

8.1 Introduction

The chapters thus far have contributed to the existing literature within S&C by generating previously unknown empirical data regarding the PJDM of SCCs of differing levels of experience. Following these crucial findings, in the previous chapter, I conceptualised how CA could offer value to S&C coach developers regarding the design and delivery of learning content that could install and elevate PJDM. Within this thesis, a case has been made for SCC pedagogical approaches to extend their scope as well as diversify from a predominance of competency-based instructional practices and a reliance on foundational frameworks. Such an accumulation of declarative and, to an extent, procedural knowledge is often without contextual appreciation.

Within this chapter, I first provide a case for using online approaches as part of future S&C research targeting the elevation of PJDM. Following this, I direct my attention to online learning with specific consideration of (a) postgraduate learners, (b) learning environments, and (c) teachers. Through doing so, I intend to provide context around the subsequent research presented in this chapter. Before this, however, I must clarify and introduce postgraduate education as encompassing a range of qualifications from postgraduate diplomas and certificates to research at the PhD level, a growing means of education. Hill et al. (2016) discussed how attributes such as critical thinking skills and personal attributes such as self-awareness and self-confidence have gained favour in universities. Both are valuable additions that deserve attention.

8.1.1 A Case for Online Learning

More than 10 years ago, Oriol et al. (2010) postulated that, for many students and working professionals, online education was the only option for pursuing graduate-level

education. More recently, the COVID-19 pandemic resulted in nearly all universities switching courses to online formats (Hollister et al., 2022). With specific reference to the S&C workplace, I believe that this form of online development can be considered increasingly appealing in an industry where candidates are required to travel as part of within-role requirements and move between environments due to the transient nature of this occupation. The reality of SCCs being able to commit to being in one academic location or attend predetermined sessions within a predetermined academic schedule in conjunction with the varied hours of S&C employment is, at the very least, problematic.

In consideration of how CA can be applied using online approaches, an examination of other domains demonstrates that such an application of CA is not a novel concept. Ding (2008) reported that the use of CA in virtual settings provides a venue where experts and students can collaborate and interact to actively support the progressive process of learning. Recently, Alwafi (2023) examined the impact of designing a CA online learning environment based on participants' critical thinking skills within a master's level programme.

In the absence of real-world, in-the-moment access to S&C workplaces but acknowledging the need to expand from traditional classroom knowledge acquisition approaches, opportunities exist to consider an online approach to the use of CA. Notably, responses to questions surrounding how, where, and when to adopt CA within the preparation and continuous development of SCCs remain at a conceptual level. Nevertheless, Table 7.2 provides a comparison of the possible effectiveness of applying CA within online learning environments against other approaches.

8.1.2 Considerations for Online Postgraduate Learners

Concerning research into understanding the characteristics of learners and how online learning can be designed and delivered to meet their needs, Martin et al. (2020) recognised that the following six broad domains have been identified: demographics, academic,

cognitive, affective, self-regulation, and motivational characteristics. When determining an individual's level of readiness to enrol in online further education, greater consideration must be given to these domains. By their very nature, online learning programmes result in learners having limited face-to-face interaction with their cohort and teachers. Given the nature of online programmes' structures and delivered content, successful learners are likely to require a degree of academic motivation, a desire to succeed, and high levels of self-organisation and time management. This is due to the content being readily accessible and recorded, which results in the depth and breadth of engagement being at the discretion of the learner. The learner is also required to manage these academic commitments around other lifestyle variables, which may include family and current employment.

8.1.3 Considerations for Online Postgraduate Teachers

Effective teaching provides maximum opportunities for all learners to learn. In an early definition of teaching, Amidon (1967) defined teaching as an interactive process that primarily involves classroom talk, which occurs between the teacher and pupils and during certain definable activities. However, face-to-face classrooms are no longer the only setting where teachers interact with learners, with online programmes growing in popularity globally. More recently, teaching was described as a scientific process with the major components of content, communication, and feedback, and teaching strategies were indicated to have a positive effect on learners (Rajagopalan, 2019).

Across the literature pertaining to teaching, agreement exists that teachers play a crucial role in the learning process, and that if teachers are to be effective within the emergent digital era, then a need exists to clearly understand the different roles they can adopt. Through an appreciation of Rosenshine's principles of instruction (2012), teachers can begin to maximise the potential of learners and have agile approaches regarding their role through the

ability to transition from an instructor and deliverer of content to a more facilitator-based approach.

8.1.4 Considerations for Online Postgraduate Learning Environments

Through the aforementioned considerations, I acquired insights into online learning environments by examining the wider literature. Although it is important to establish the readiness of learners for online postgraduate study and understand the role of the teacher in supporting learners, one cannot discount the influence that a carefully designed and facilitated learning environment has on the success of online programmes. As previously highlighted, postgraduate learners have a myriad of responsibilities and constraints that are synonymous with adult life. To potential learners, time is a valuable commodity, and teachers are encouraged to consider how to most effectively engage their cohorts and maximise the opportunities offered by online approaches. Indeed, learners must be engaged if teachers are to mitigate the risk of learning becoming a passive activity. As part of addressing engagement, Fredricks et al. (2004) stated that learners are unlikely to engage in instruction if they do not perceive it as meaningful or stimulating.

Through an understanding of learners, one can suppose that teachers would become more effective at determining their role in supporting the design and construction of effective online environments for them. Supporting the determination of which learning style to adopt within a learning environment, Knowles (1984) differentiated between two distinct learning styles – namely pedagogy and andragogy. Pedagogy was described as the art and science of teaching children, whereas andragogy was described as the art and science of helping adults learn. Extending this, pedagogical models have been considered content models within which teachers transmit skills, information, and skills in a planned manner to learners. By contrast, andragogical models help learners to acquire information and skills through the provision of procedures and resources (Holmes & Abington-Cooper, 2000). Given the previously

explained characteristics of learners, however, it is critical for teachers in online programmes to identify the needs of their learners since, although they may be considered adults due to their biological age, they may not be appropriately self-sufficient or have the necessary prerequisite knowledge to support andragogical models. Investing time in the early stages of a programme is encouraged to help both learners and the teacher to more accurately determine how to approach design, delivery, and engagement within the programme materials. That teachers should be well versed in both pedagogical and andragogical principles so that they know which philosophy to apply in helping mature learners learn in the traditional classroom or virtual environments.

Regarding the teaching style adopted, Lamon et al. (2020) recently contended that online learning must be carefully scaffolded to ensure deep learning, and that the impact of the transition to online learning on performance and commitment should be considered. This is especially the case when directed at inexperienced learners.

8.1.5 The Present Research

Examining the S&C literature revealed a lack of insights into the optimum development of new SCCs, certainly regarding PJDM. This gap must be considered against how it may optimally be addressed. In a wider sports coaching context, coach education researchers have used a multitude of learning theories from both cognitivist and constructivist perspectives to explain how and why coaches learn (Gilbert & Trudel, 2004). With specific reference to S&C, a growing body of literature advocates for the application of constructivist learning strategies for SCC preparation (Gearity et al., 2021).

With direct reference to the S&C literature to date, only Magnusen and Petersen (2012) have referred to CA and how it may be applied within the development of SCCs. However, they only discussed the methods domain and, within this, only referenced three of the six components. I believe that the application of all four dimensions within CA offers an

opportunity to extend what is already being delivered in S&C learning content. Accordingly, extending the conceptualisation of how CA could be applied within S&C development, the purpose of the research presented in this chapter was to investigate the influence of a purpose-designed series of S&C modules on coaches' PJDM. The modules were delivered to postgraduate students within an online learning environment, and the design was based on the underpinning principles of CA.

8.2 Methods

8.2.1 Participants

Participants were deemed eligible for inclusion in the present study if they held an undergraduate degree in sport science and/or S&C and were enrolled in a postgraduate programme with the intention of developing as an SCC. Two tertiary institutions, each with cohorts of nine participants, were purposefully sampled to participate in the study as part of their current postgraduate studies. As with the other studies, participation was voluntary, and informed consent was provided by all participants. A general information form was issued to each participant to obtain basic demographic information, which is presented in Tables 8.1 and 8.2. Within the preliminary procedures, participants were required to attend an online orientation session, during which the information sheet contents were further explained, opportunities for questions were provided, and participants could further reflect if they wished to be involved in the research.

Group 1 – Less Experienced Participants. The participants in this group attended an institution that offered a postgraduate diploma to students in applied science (Table 8.1). The course content was intended to deepen and broaden students' knowledge bases of the theories and procedures required to operate in sporting environments as well as to increase their awareness of the various roles and requirements of different disciplines. Among these roles is that of an SCC. Graduates of the programme have previously attained employment in the S&C

workplace, and the programme has a strong professional reputation for preparing students for the demands of the S&C domain. A minimum entry requirement for the course was a Bachelor of Applied Science (Level 7) or an equivalent qualification at the bachelor's level in a related discipline, such as sport and exercise science or strength and conditioning. The programme offers students the opportunity to focus on areas of performance analysis, physical conditioning, and exercise leadership, with graduates who choose to focus on physical conditioning being eligible for accreditation with the ASCA.

Table 4.1

Characteristics of Participants in the Less Experienced Group (Group 1)

Participant	Age (years)	Years S&C Coaching Experience	Sports Coached	Roles Held
1	22	0.25	Rugby Union	Intern
2	21	0.5		PT
3	21	0.5	Soccer, Swimming	PT
4	21	0.25	Rugby Union	Intern
5	22	0.5		PT
6	25	2.5	Rugby Union	Academy S&C, Intern, PT
7	20	2	Rugby Union	Amateur Lead, Intern, PT
8	21	1.5		PT
9	22	1	Gymnastics, Hockey	Rehabilitation Intern
MEAN	21.7	1.0		
STD DEV	1.4	0.8		

Group 2 – More Experienced Participants. This group of participants was enrolled at an institution that offered a Masters in Sport, Exercise, and Health (Table 8.2). To be eligible to enrol in the course, students were required to have completed a Bachelor of Sport and Recreation, or equivalent, with at least a B grade average. Within the programme, students were taught modules that focus on coach and athlete development, outdoor learning, physical activity and nutrition, sports leadership and management, and S&C. Students were able to advance their knowledge and practical skills by specialising in S&C within the course content and project work. Among the anticipated graduate profiles for students in this programme were the ability to demonstrate expertise in their field of study; the ability to assess, interpret, and evaluate issues in their chosen area of knowledge; and the ability to demonstrate advanced critical thinking and DM skills.

Table 8.2

Characteristics of Participants in the More Experienced Group (Group 2)

Participant	Age (years)	Years S&C Coaching Experience	Sports Coached	Roles Held
1	31	5.5	Rugby Union, Netball, Soccer	Amateur Head, Academy S&C, PT, Intern
2	22	3	Soccer, Rugby Union, Netball, Basketball	School Head, Intern, PT
3	27	0.25	Rugby Union	Intern
4	22.5	0.75	Rugby Union, Track and Field, Soccer	Intern

5	25	3.5	Cycling, Hockey, Water Polo, Netball, Rugby Union	School Head, Intern, PT
6	24	5.5	Weightlifting, Badminton, Sprinting, Hockey, Canoe Slalom	Amateur Head, School Head, Intern
7	24	2.5	Soccer, Track and Field	School Head, Intern, PT
8	30	4	Swimming, Gymnastics, Netball	School Head, PT
9	29	3.5	Rugby Union, Rugby League	Amateur Head, PT
MEAN	26.1	3.2		
STD DEV	3.3	1.8		

8.2.2 Training Materials and Delivery

Within the taught CA modules, participants had various concepts introduced and, importantly, contextualised within S&C as well as the modelling of numerous S&C case studies. These spanned the full S&C coaching process and specifically addressed; macro level planning (module 1), training session design (module 2), practical delivery (module 3) and review processes (module 4). Within the Appendix are examples of some content delivered and discussed across the modules. These include the consideration of the athlete when planning a training cycle(s) (Appendix 12) and consideration individualisation within training programme design (Appendix 13).

Regarding contextual examples that were discussed within the delivery module (module 3) examples included different warm up approaches with groups (Appendix 16) and

one on one with a wheelchair athlete (Appendix 17). The use of technology to provide feedback on physical performances within resistance training sessions is commonplace and a video example of this was considered in module three (Appendix 19). It was important to extend S&C environmental learning beyond the traditional context of the gym and, as part of supporting participants to consider such circumstances, examples were modelled from various water-based sports (Appendix 20) where events may be delayed through wind and tidal influences.

It is vital to reinforce my credentials as a HLC in the S&C domain, as they enabled me to act as a subject matter expert and identify critical cues, respond to participants' questions, and model to the level required within CA approaches. A critical reflection is that I acknowledge the problems that could be associated with subject matter experts being the constructors and deliverers of learning content. I also acknowledge, as I have throughout, the possible potential for bias through my role as both instructor and researcher. However, for practical and logistical reasons I feel the benefits outweighed the limitations. Primarily, these concerns reside in the assumption that, just because they did it well, individuals may not know why they were effective. I was cognizant of this and frequently questioned my thinking, referring to the ACTA and focus group findings as well as the dimensions of CA as part of accurately constructing and deconstructing learning content.

Following this initial modelling, I encouraged participants to examine the presented content more deeply for alternative approaches and to ask questions regarding what was conducted. I provided scaffolding through offering perspective and in-the-moment feedback when insights were being offered. Similarly, such feedback was available in the first week of the case study work being conducted as part of consolidating learning experiences between modules (Figure 8.1).

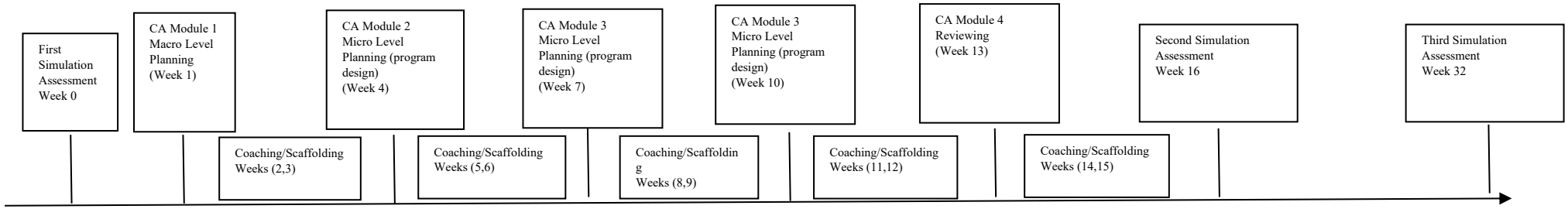
In the first 7 days of the 2-week period between CA modules, participants were encouraged to be proactive in collaborating with each other and myself as primary researcher as part of working on an associated task, which required them to explore and articulate their PJDM regarding the S&C context. If communications were required, participants made use of personal calls, text messages, emails, and online platforms. A collaborative period was included to maximise the benefits associated with scaffolding within the methods domain of CA. Similarly, cooperation and communities of practice were included for the sociology domain of CA. The second week between modules was intended to encourage participants to be self-sufficient in their development and cognitions and thus engage in the reflection aspect of the methods domain.

The requirement of participants to submit a final, individual response to the S&C context presented to them at the end of each CA module provided them with an opportunity to articulate their position and interpretations concerning the problem and gain an appreciation of the depth and breadth of their PJDM. At the start of each new CA module, time was allotted for participants to further reflect on the contextual problem, and I highlighted the main themes that were generated with relation to what participants noticed, what solutions were offered, and what alternatives were considered.

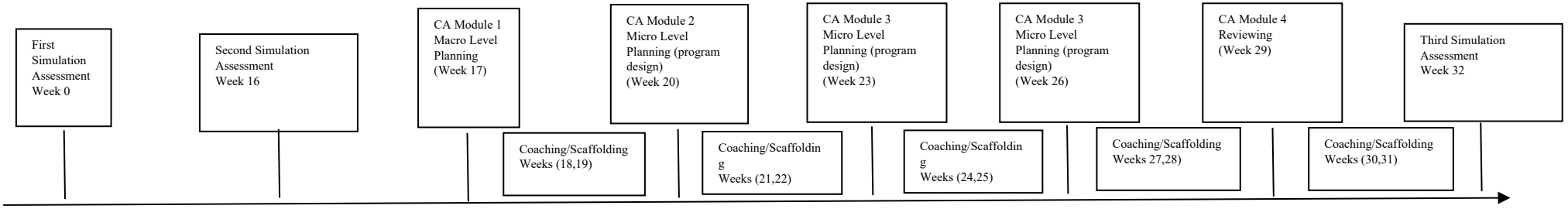
Figure 8.1

Timeline of Participants' Involvement in the CA Module

Group 1 Timeline



Group 2 Timeline



8.2.3 Procedure

Each participant participated in an initial scenario assessment, which is described further below. Then, each group completed a 16-week course that involved four 2-hour modules separated by 2 weeks (Figure 8.1). Following the final module, a further scenario assessment was completed. As part of the A–B design approach, group 1 (low experience) completed an initial scenario assessment and then directly proceeded to complete the 16-week course. This was immediately followed by a second, post-course scenario assessment, followed by a 16-week period of no interaction with myself before undertaking a third scenario assessment. By contrast, group 2 (more experienced) completed an initial assessment at the same time as group 1. Following this, the participants had no contact with me and, at the end of 16 weeks, completed a second scenario assessment before undertaking the 16-week course, which concluded with a third scenario assessment. This A-B design (Kennedy, 2005) was adopted as a way of catering for 'natural' development.

8.2.4 Assessment Through Authentic S&C Simulations

The purpose of the assessment simulations was to provide a simulated experience through which participants could engage in the complex undertaking of noticing, interpreting, and responding to several sources of information (both revealed and unknown) within a typical S&C context. Within each assessment, they were required to consider an evolving S&C scenario and respond to four probe questions within each of the six phases. A combination of video- and text-based content was provided for participants to reflect on and respond to, with new elements added every 15 minutes. This approach was an adaptation of the simulation interview component of ACTA (Militello & Hutton, 1998).

In their explanation of the simulation interview stage, Militello et al. (1997) stated that after exposure to a simulation, subject matter experts are asked to identify key incidents. Crucially, these simulations have events within them, and each is probed using questions with

the intention of illuminating the respondent's cognition surrounding situational assessment, actions, critical cues, and potential errors. In the present study, each stage of the simulations used consistent probe questions with two strands. For clarity across the 6 slides that participants were presented with as part of their assessment content the slides contained either a) a slide with text only descriptions as part of the evolving simulation or b) a slide with text and supporting video content.

When the aspect of the simulation assessment was presented to participants using only a text-based description, the probes used were as follows: (1) What is your understanding of the situation at this time? (2) What action, if any, would you take at this point in time? (3) What information led you to this assessment and action? (4) Is there any other information you would want at this point in time?

By contrast, when participants were presented with text and authentic S&C video content in a slide to consider, the accompanying probes were as follows: (1) What do you notice? (2) Why did you notice this/these? (3) Based on what you notice, how would you respond (if at all)? (4) Is there any other information you would want to know before coming into this situation?

To mitigate any learning effect from a previous assessment, the content was consistent but varied across the two scenario assessments. To control any differences in assessment difficulty, the presentation order was crossed. That is, four of the participants in each group completed Scenario Assessment A, while the other five completed Scenario Assessment B. Each group then considered the other in a second scenario assessment.

8.2.5 Rubrics and Instrumentation

Previous research in other domains has examined the role of rubrics in the performance assessment of learners. Goldberg (2014) defined rubrics as a scoring guide that outlines features of work at different levels of performance. In the present study, a rubric was

designed and delivered to support the determination of any development of participants' thinking processes. This form of instrumentation is commonly applied in higher education research and offers a means to provide feedback to learners accordingly (Jonsson, 2014; Reddy & Andrade, 2010). The intention of the designed rubric was to support the assessment of participants' performances regarding their interpretations and responses to authentic S&C content concerning the preparation, delivery, and review dimensions of the S&C coaching process. As part of the design process, relevant dimensions were identified through critically reflecting on the ACTA and focus group findings from previous chapters.

An initial, gradual scale was proposed with supporting descriptors and then reviewed by two independent raters. Each rater had more than 10 years of S&C coaching experience and satisfied the criteria of a HLC applied in Chapter 4. Each participant independently reviewed the evaluation criteria and language associated with each stage of the rubric and provided feedback in discussions between themselves and myself as the primary researcher. With specific reference to the research of Goldberg (2014), particular attention was directed towards any perceived lack of consistency and parallelism within the design, any defining of 'orphan' and 'widow' words and phrases, any redundancy in descriptors and unevenness in incremental levels of performance, and inconsistencies across the suite of rubrics.

Following the outcomes of discussions between the raters and I, the language used to describe each of the criteria was simplified. The scale finally applied was 0–3, ranging from 0 (No Evidence Provided) to 1 (Remember/Understand), 2 (Analyse/Apply), and 3 (Evaluate/Create). The revised rubric, which was discussed with the two raters, is provided in Table 8.4 (see appendix):

8.2.6 Use of Raters Within the Assessment Process

Two independent, experienced S&C coaches were recruited to independently rate participant responses for each scenario assessment against criteria within the purpose-designed rubric (Table 8.4 – see appendix). Prior to the analysis, a number code was assigned to each participant to ensure that their identity and status within the investigation were anonymous. Each rater was then randomly allocated half of the responses across the pre- and post-CA module scenario assessments to assess, using the rubric to determine performances. Furthermore, the raters were given assessments to analyse as a means of determining the level of interrater reliability present.

8.3 Establishing Rigour

Colton et al. (1997) described how interrater reliability scores can be influenced by several factors, including 'the objectivity of the task/item/scoring, the difficulty of the task/item, the group homogeneity of the examinees/raters, speediness, number of tasks/items/raters, and the domain coverage' (p. 4). The authors also asserted that rater inconsistency can also be caused by the inadequate training of raters, inadequate detail of rubrics, or 'the inability of raters to internalize the rubrics' (p. 9).

To ensure the rigour of this research, the two groups discussed in this chapter were purposefully sampled. This is important to acknowledge, as Patton (1990) and later Suri (2011) have both identified that the cases selected should provide rich information on the phenomenon of interest. Based on the case that has developed for investigations into developing the PJDM of SCCs, I feel that this research and its findings have the potential to offer a novel, meaningful contribution to the domain of S&C and address a gap in the literature concerning pedagogical strategies for developing the cognitive capabilities of SCCs to navigate within-role tasks. Through both groups being contextualised regarding the age and experience of the participants, Yin (2009) has explained that this allows for 'theoretical

generalisation' to be possible and therefore the insights offered by each group can extend to other cases that are contextually similar. This would be critical if future research considers designing and applying CA in coach development strategies within S&C.

8.4 Results

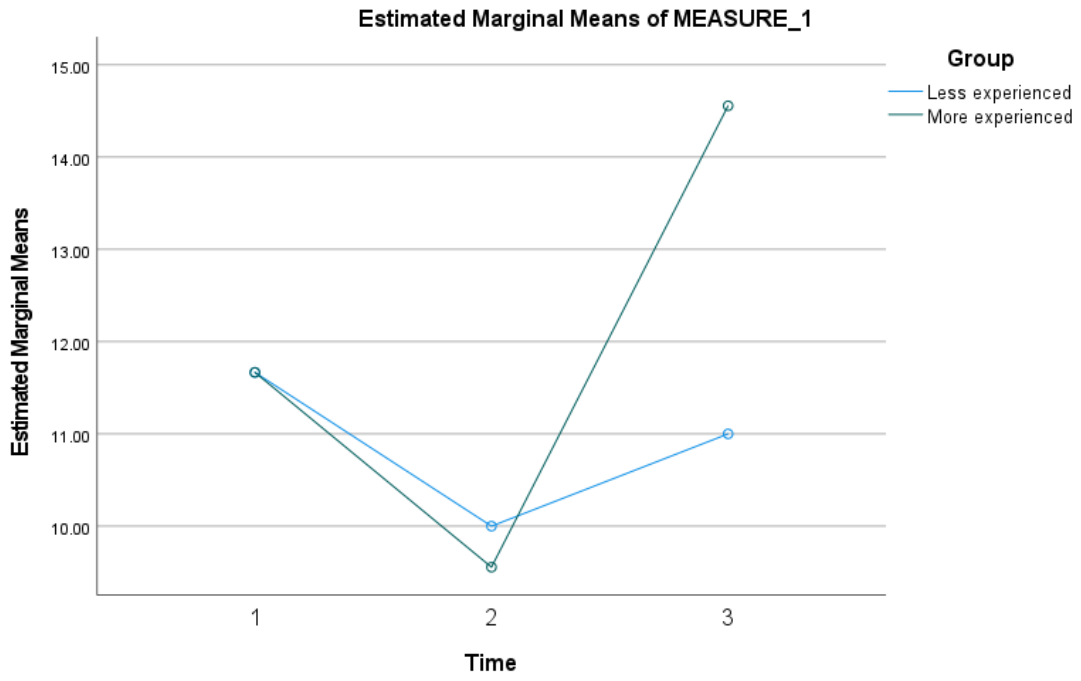
In the present study, the units of analysis were participant performances in scenario assessments. The performances of participants in this section are discussed at (a) a group mean level across time and (b) an individual level across groups. Following the latter, I provide examples of the responses of participants in each group to illuminate the scores assigned by the independent raters. Regarding the determination of interrater reliability, weighted Kappa was used because the categories of data (scores) were ordinal in nature. The weighted Cohen's kappa (k) = 0.82 represented strong agreement according to the classification from McHugh (2012) in relation to the nine responses that both raters marked.

8.4.1 Group Level of Analysis

Initially, given the A–B design, the six stages within each scenario assessment, and the fact that there were three assessments, a repeated-measures analysis of variance (ANOVA) was selected to analyse the data sets. The repeated-measures ANOVA was related to estimated marginal means across the three time points for each group (Figure 8.2). The profile plots in Figure 8.2 provide estimates of the marginal means of the lower- and higher-experience cohorts at three time points. For group 1, only the PJDM slope exhibits a mean decrease of 1.54 in performance across the six stages from pre- to postintervention (time point 1 to 2). By contrast, group 2 had a mean increase of 5.00 from pre- to postintervention (time point 2 to 3). While this was useful at a surface level of examination, the repeated measures ANOVA and subsequently Figure 8.2 did not allow for variance between participants to be considered, as only the mean ratings of each participant across the six stages were considered.

Figure 8.2

Estimated Marginal Means For Group 1 and Group 2 Across Intervention Period



Another problem associated with this form of analysis was that time points 1–2 and 2–3 were at different stages of the intervention process for each group. Specifically, for group 1, time points 1 and 2 represented the pre- and post-scenario assessments, but for group 2 this was a period of no direct involvement with the CA modules and associated content. Therefore, a comparison of the performances of the groups at this point in the study was not suitable to discuss, other than to say that no change – positive or negative – was experienced by group 2 through no involvement with the CA intervention.

In continuation of this, Figure 8.2 did offer some inference of positive change in performance for group 2 between time points 2 and 3 however this could not be deemed to be substantial. Across the same intervention period (albeit 1 and 2) for group 1 a decrease in mean performance across participants was demonstrated. By contrast, students in group 2 were able to generate more options and deeper insights on the second and third simulations

following the CA modules. Through the participants in group 2 being assigned higher ratings post modules than those in group 1 there was the suggestion that these learners were more readily able to situate themselves within a simulation and contextualise the content against their current knowledge base.

8.4.2 Individual Level of Analysis

The initial level of analysis highlighted problems with the research design, which I discuss further in the reflections section of this chapter. However, seeking to understand the performances of participants further, I felt that it was unlikely that participants in group 1 would have exhibited deteriorated PJDM capabilities following the CA modules. To this end, I referred to the raw data tables for group 1 (Table 8.5 – see appendix) and group 2 (Table 8.6 – see appendix) to better understand the individual performances. These tables are insightful, offering a simple, granular way to view individual performances. As demonstrated in Figure 8.2, the overall mean performances of each group in their initial, baseline scenario assessments were very similar (11.33 for group 1 and 11.67 for group 2). These initial baselines suggest that the PJDM capabilities were similar across groups and that the differences in age and prior S&C experience (Tables 8.1 and 8.2) were not influential on scenario assessment performance.

8.4.3 Further Exploration of Results

Given the indication of a decrease in participants' overall PJDM performance by the less experienced group following the CA modules (Figure 8.2), I revisited Table 8.5 (see appendix) for more insights. Other than stage 6 (review aspect of the S&C coaching process), the mean performance for these nine less experienced participants was lower in all other examined stages. This was a curious result. Upon examination of performances at an individual level in this group, it was evident that six of the nine were rated as having poorer performance compared with their baseline. Interestingly, the four lowest performers in the

post-CA module assessment (Table 8.5 – see appendix) were participants B1, B4, B5, and B8. Given that their ratings were determined to have a rubric score of primarily ‘1’, which implied only responding at a level of ‘remembering’ or surface-level understanding against the rubric (Table 8.4 – see appendix), a question of engagement was raised. An example of a response that was rated ‘1’ is provided below from the same participant in group 1.

Examples regarding a response to stage 1 in the first assessment and a response to the same stage but within the post assessment following the CA modules are provided in Table 8.6 (see appendix) from A4 and B4. To offer a contrast to these responses and provide an example of how the raters determined a ‘3’ at stage 1 against the rubric, please see the responses of participant C16 in Table 8.3:

Table 8.3

Participant C16's Response to Stage 1 Aspects of the Simulation Assessment

What is your assessment/ understanding of the situation at this point in time?	What would be your priorities, if any, at this point in time?	What information led you to this assessment and these actions?	Is there any other information you would want at this time?
I need to prepare and develop a programme that prepares 26 U10 boys for the purposes of achieving selection in a Gymnastics NZ programme. The time constraint placed upon me is 6 months.	The fact there is a selection coming up has led me to believe there is a deliberate purpose to the 6 months, and Gymnastics NZ believe I can help the boys be ready for selection (based upon the fact they	I would want to know the following ASAP: What is it, in very clear terms, that the actual coaches and management want? Is this meant to be individualised or just one block to suit everyone? How do they see the S&C training of these athletes fitting into the NZ Gymnastics framework?	Where will this be happening and how long before it commences? What will be available to me in terms of time, facilities, venues, and any other resources I should be aware of? How often are the boys expected to train with me? What will they be doing outside of their time with me in terms of gymnastics-related activities?

What is your assessment/ understanding of the situation at this point in time?	What would be your priorities, if any, at this point in time?	What information led you to this assessment and these actions?	Is there any other information you would want at this time?
Ultimately my decisions and processes will be fed to and judged by the management who I am reporting to.	have asked me to do this role).	Who is running the programme? What does proficiency for a 10-year-old in gymnastics look like? What happens once selected? Am I in fact preparing them for something bigger than just selection in 6 months?	Are all of the athletes coming to me in one large group? What youth gymnast phase are they in? What are the selection criteria? What is expected of me in terms of a time commitments both at the facility and in terms of admin etc.? Are parents involved on the floor/ at the straining sessions too?

Table 8.1 provided evidence that each of these participants had a low level of prior S&C experience; three had less than 6 months of experience; and all only had experience at the personal trainer (PT) or intern level of responsibility. A limitation of the research, which is discussed again later in the chapter, is that the engagement of participants could only be inferred, as this was not directly examined as part of the research. Indeed, although considered, this would have proven difficult due to the distance learning nature of the conditions. An example of this can be seen in the apparent lack of progress of participants A5 and A6 in their second simulation assessment (i.e., B5 and B6 in Table 8.5 – see appendix).

8.5 Discussion

This study hypothesised that the application of an online CA approach would stimulate participants to engage in critical appraisals of scenarios and S&C content presented to them and to consequently develop elevated PJDM skills. The intervention aimed to provide insights into whether such an approach could provide a novel extension to the more traditional, procedural, and pedogeological strategies currently applied as part of preparing candidates for the S&C workplace. With reference to the previously outlined results, this discussion section specifically addresses the value of peer collaboration, of prior domain-specific knowledge, and of prior domain experience when using a CA approach to learning. Critical reflections are provided concerning the research design, and recommendations are outlined to support future online CA research.

However, before the above are discussed the results demonstrated that there should have been measures in place to determine participant engagement as some of the findings were subject to inference and assumption in the absence of these measures. Outside of the S&C domain, the engagement of learners has been described to have three dimensions, these being behavioural, cognitive and affective (Fredricks et al., 2004; Mandernach, 2015). The active responses (behavioural engagement) of participants to CA content delivered could be

supposed as high through a surface level observation that all participants in both groups attended all four delivered modules. However, attendance and or participation in the two week period between modules were not directly measured or recorded. When designing the learning content for each module the intention was to stimulate a high degree of mental effort (cognitive engagement) within participants through the provision of authentic S&C content. However, this was assumed during the intervention period and no measurement occurred. Finally, the degree of emotional investment (affective engagement) by participants in CA modules and associated tasks was not recorded. This resulted in an absence of evidence concerning the reactions of participants to, for example, content and concepts delivered and the learning environment itself.

8.5.1 Value of Peer Collaboration

Researchers claimed that a person's thinking can be affected by those they work alongside (De Laat & Lally, 2005). In the less experienced group, this cohort of nine postgraduate learners had, both as a collective and as individuals, a low level of experience within the S&C domain. I qualify this use of 'low' against previous criteria used to define ECCs (Chapter 5).

As part of the four delivered CA modules, all participants had the opportunity to listen and observe the modelling of various approaches as part of solving authentic problems across the planning, delivery, and review elements of the S&C coaching process. During the modelling, participants were invited and encouraged to question what was modelled, reconceptualise the content, and consider alternative approaches as part of constructing more extensive mental models for approaching each specific context. Although not specifically measured, the level of peer interaction and development of inquiry, both for myself as a modeller and for other participants' input, may not have been as extensive in the less experienced group. In short, they may not know what they do not know.

Figure 8.2 illustrates a mean decrease for group 1 from pre- to post assessment across all six stages of the simulations, and the variability across participants is clearer in Table 8.5 (see appendix). As a researcher and an SCC with extensive experience in the domain, I feel that it is unlikely that the CA modules decreased the PJDM of participants in group 1. Previous research also reported variability in the quality of online approaches with younger learners (Sorensen, 2012). In the absence of participants initiating sufficient dialogue between themselves, it is rational to suggest that the articulation component of the methods domain of CA as well as the sociology domain are unable to be satisfied. In the case of more presumed monologues than dialogues, the effectiveness of approaches seeking to use CA will be compromised.

8.5.2 Value of Prior Knowledge in CA Approaches

Callary et al. (2023) recently summarised that S&C practice entails multiple and complex cognitive, emotional, and behavioural factors. One can suppose that the more experienced group could have possessed a more comprehensive declarative knowledge base than the less experienced group, which may have helped learners to more readily comprehend the content and contexts presented to them. This is supported by the greater mean improvement in PJDM performance in group 2 than in group 1 across their respective intervention periods (Figure 8.2) as well as at an individual level (Table 8.5 and 8.6 – see appendix).

I speculate that the more experienced participants may have been supported by reflecting on previously acquired theories and frameworks against previous S&C domain experiences as part of considering alternative approaches and how they would adapt and respond to the stimuli presented to them. More concisely, prior experience could be assumed to support their engagement in PJDM, enabling them to reflect on alternatives at a deeper level than less experienced participants. Through the participants in group 2 being assigned

higher ratings post modules than those in group 1 there was suggestion that these learners were more readily able to situate themselves within a simulation and contextualise the content against their current knowledge base.

8.5.3 Value of Prior Experience

When seeking to understand more about the influence of prior experience and knowledge, insights can be gained through referring to early problem-solving research. Alexander and Judy (1988) stated that learners with less prior knowledge of a topic selected – and executed – less sophisticated strategies compared with learners with higher levels of prior knowledge. Another study that inferred that the possession of prior knowledge may account for variation in strategic approaches was that of Hmelo et al. (2000), who reported that learners with high prior domain knowledge were able to conduct well-structured, goal-oriented inquiries, compared with the less systematic approach of those with less knowledge. I consider such research to be supportive and similar to the outcomes of the present research where, following involvement in the CA modules, the higher experience group provided deeper, layered responses to simulation assessment content compared with less experienced participants. While research on experts being more agile in their demonstration of knowledge and strategies compared with novices is not novel (Feltovich et al., 1997), the present findings suggest that these differences are not exclusive to the expert and novice ends of the experience spectrum. Indeed, differences in PJDM were evident in the 16 weeks between groups of learners, despite both groups possessing the same level of undergraduate education and satisfying the criteria of ECCs; however, what differentiated the groups was the level of previous domain experience.

Furthermore, the CA modules provided content for introducing different learning strategies for participants and used authentic S&C examples with the intention of supporting participants in comprehending how the content presented could support future PJDM within

the S&C workplace. For example, the value of engaging in a deep, insightful premortem as part of the planning aspect of the coaching process was promoted as part of offering the opportunity to better notice and focus attention during any practical S&C delivery. Indeed, Collins and Collins (2021) recently stated that the outcome quality of decisions is directly related to the appropriateness of decisions, which are in turn based on the coach's knowledge base and experience within the PJDM process. I propose that broadening the awareness of SCC coach developers as to the potential impact of CA would more readily support ECCs to make more effective decisions in uncertain, complex situations. For example, participation in deliberate, evidence-supported CAs as part of completing postgraduate degrees and accreditations could elevate the PDJM of ECCs when they are required to plan, deliver, and review within S&C contexts that involve wide-ranging considerations. Such circumstances could include the need to differentiate between developmental versus elite populations, able bodied versus para-athletes, individual versus large group sessions, operating within previously unencountered cultures, or working with athletes in a second language.

8.5.4 A Deeper Dive Into Participant Engagement

In the present study, the content and concepts within CA modules were consistent in each group, yet the results varied. A possible reason, as raised previously, could have resided in how engaged the participants were. While various researchers have considered engagement to exist in different forms (Anderson et al., 2004; Bosch, 2016; Fredricks et al., 2004), cognitive engagement is nearly always present within the forms offered. Anderson et al. (2004) referred to cognitive engagement as the degree of thoughtfulness and willingness that one is required to employ to sufficiently comprehend complex ideas and conquer difficult skills. To this end, it seems plausible that the cognitive engagement of participants in group 2 (more experience) may have been higher than in group 1. Reasons for the higher cognitive engagement with participants with more S&C experience could include an ability to reflect

on alternative approaches and more complex components of CA dimensions compared with previous workplace experiences.

Other forms of engagement have been described, including emotional engagement and psychological engagement. Emotional engagement was described by Fredricks et al. (2004) as involving positive and negative reactions to teachers and peers, while Christenson and Anderson (2002) referred to psychological engagement as relating to the sense of belonging and relationships that learners have with teachers and peers. In the present study, participants in both groups could have been limited or not affected by these forms of engagement.

When discussing the engagement of online learners, it is crucial to consider the inevitable challenges associated with detecting such engagement. Research has classified three existing methods as automatic, semiautomatic, and manual. The viability of automatic and semiautomatic methods within S&C online learning is likely very low, and therefore, manual methods seem the most rationale for exploring and administering in future approaches. When I reflect on the present study, the construction and delivery of a survey to ascertain participants' levels of attention, distraction, excitement, or boredom would have aligned with research by O'Brien and Toms (2010) and possibly explained the lack of improvement in group 1 (Table 8.5 – see appendix).

8.5.5 A Case for Flipped Learning

In the present study, where CA modules introduced and discussed content at a declarative level and endeavoured to access the tacit knowledge of experienced SCCs, it is plausible that these concepts were too far removed from participants' current level of understanding. While the baseline level of PJDM was similar for both groups (Figure 8.2), only the more experienced group demonstrated an improvement in their PJDM performance. In more effectively supporting participants to comprehend theories and concepts presented as

part of a CA approach, an examination of previous research suggested a consideration of a flipped learning approach to be of merit.

Within a flipped classroom, learners are able to access foundational material prior to a lecture and consider their level of comprehension with the intention of using the direct teaching time to explore and question material at a deeper, applied level (DeLozier & Rhodes, 2017). The Flipped Learning Network (2014) suggested that the following four pillars need to be present if learning outcomes are to be achieved: (1) a 'flexible environment' that accommodates various modes of learning; (2) a 'learner-centred' approach where class time is devoted to active participation and engagement; (3) the 'intentional selection of content' by teachers regarding what needs to be delivered and what should be independently explored by the learner themselves; and (4) the 'presence of a professional educator' to guide reflection and be able to facilitate active learning and engagement.

When considering the dimensions of CA and what was present within the current research design, all of these FLIP pillars were available to learners. Notably, however, new content was always delivered first within a module to participants, and they were then asked to reflect on it further after the session. If the study was to be repeated with participants of similar S&C experiences, it would be interesting to observe whether the rate of improvement would be elevated with the addition of a flipped approach. This would seem probable given the findings of enhanced engagement and reports of more enriched learning experiences from previous authors who have used flipped learning (Chun & Heo, 2018; Mahasneh, 2020).

8.6 Elevating the Application of CA Dimensions

Martindale and Collins (2013) highlighted that PDJM can be developed through CA if practice environments have sufficient levels of authenticity, validity, and contextual accuracy as well as if high-quality feedback is present. My intention in using an online CA approach was to provide these environmental attributes to participants within S&C contexts that may

not otherwise be possible without being employed or acquiring an internship. I feel that the materials presented and considered within the approach satisfied the features of the methods dimension, and that explanations for the lack of holistic improvement in all participants may be found in revisiting the content and social dimensions.

At the content level, four features refer to the types of knowledge required for experts. The first is a level of domain knowledge, specifically in the case of the present research, which would be S&C theoretical knowledge and previous S&C experience. Differences between the two groups in the research were evident (Tables 8.1 and 8.2) regarding previous S&C experience. Given that the more experienced group of participants demonstrated a greater improvement in their PJDM following the CA modules, one can speculate that they were able to benefit from reflecting on previous experience to make better use of heuristics and learning strategies.

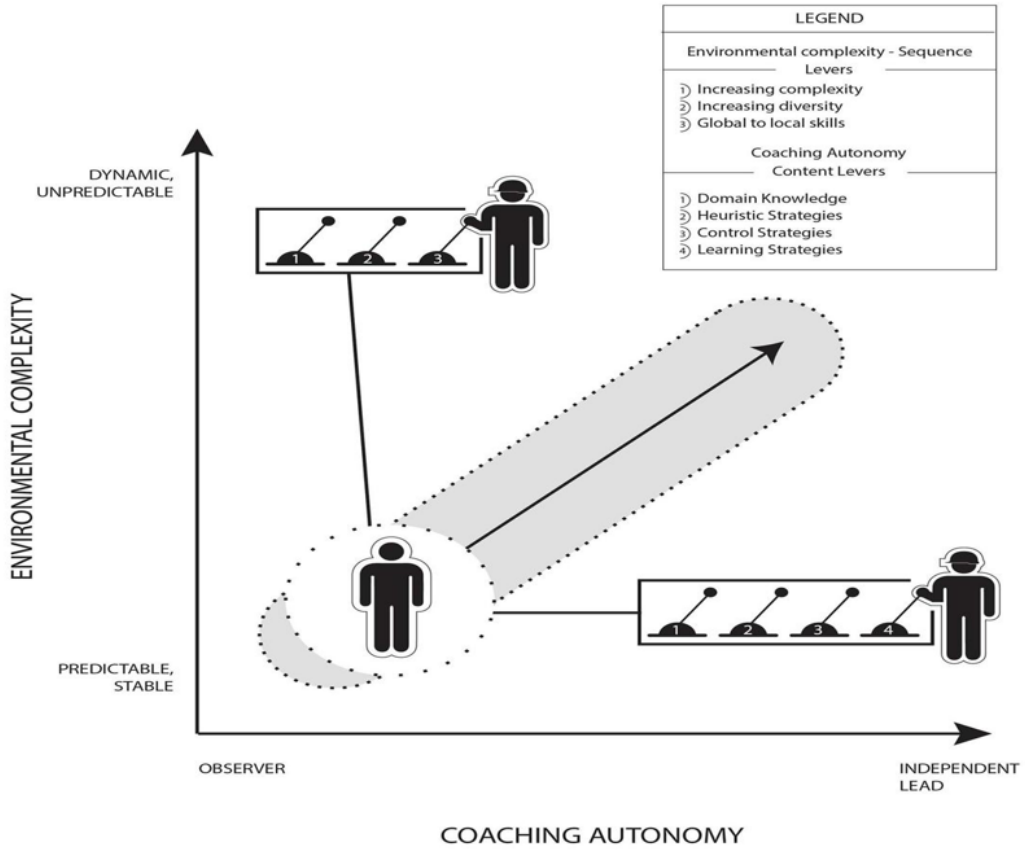
In Figure 8.3, I conceptualise the role that the sequencing and content dimensions can have in developing a learner's level of autonomy within a context as well as their ability to navigate increasingly complex environments. Based on this figure, I propose that those responsible for designing and delivering SCC learning content can more strategically 'pull' on the sequencing lever. Deliberate sequencing offers the potential to progress individuals from comprehending – or ideally coaching – within predictable and stable environments to dynamic and unpredictable environments. Coach developers should be reminded that the three levers of sequencing are (1) increasing complexity, (2) increasing diversity, and (3) progression from global to local skills. Through appropriate sequencing, I believe that SCCs can obtain an enhanced understanding of how to notice aspects of the situation they are – or might be – in.

Such a consideration would support SCCs in improvising according to and more appropriately for what is noticed in the future. Throughout this thesis, the predominance of

SCC learning materials enhancing practical delivery has been emphasised; however, there is value in all three sequencing components being considered at the planning stage of the S&C coaching process as part of elevating any practical delivery.

Figure 8.3

Preparing Coaches to Lead Within Complex Environments by Applying the Sequencing and Content Domains of a Cognitive Apprenticeship Model



(Adapted From Intent-Based Leadership International, 2021)

The S&C literature, such as recent research by LaPlaca and Schempp (2020), has identified that it is crucial for SCCs to be able to lead independently within their role. As part of more effectively preparing candidates for such independence, the improvement of the PJDM of group 2 provides an indication that an online CA approach can be effective in

developing learners' abilities to access and control the knowledge they possess through interacting with components of the content domain. The emerging body of psychosocial S&C research has highlighted the interpersonal requirements within an SCC's role (Szedlak et al., 2021); therefore, it is not sustainable or suitable for SCCs to outsource their relationships or interactions with athletes and other staff. Moreover, it is becoming clearer that effective SCCs acknowledge the value of collaboration and engage in dynamic interactions with various people. Through strategically pulling on the four content levers in Figure 8.3, I propose that individuals can progress from being surface-level observers to independent leaders. At this end stage, SCCs would be able to solve problems and use strategies to control themselves and others.

8.7 Reflections and Limitations

When reflecting on the research design, the CA modules, in theory, created an environment that encouraged participants to develop a more open dialogue with themselves and their peers. The stimuli for dialogue included, but was not limited to, inquiring into what was possible when interpreting contexts, solving problems, and considering alternative approaches. Improvements to the research design would have been to include means of determining participant adherence, for example keeping a record of participant's access to online learning platforms and measuring participant engagement with content. This consideration of engagement would have been valuable to determine, for example, how motivated were participants to learn about content being delivered and how well were they understanding content and concepts at a point in time. One other limitation to note is that of the use of the A-B design. I acknowledge that within this design it could be argued that Group 2 had been exposed to more simulation type exercises (i.e., more practice prior to the intervention). Whilst this was not the case the two groups could, and in hindsight, should have run at the same time.

I acknowledge that there was not a global level of improvement across the participants and the groups themselves; however, the improvement of group 2 and some participants in group 1 provides evidence that an online approach to CA for SCCs as part of developing learners' PJDM is worthy of more research. It is also worth future research considering whether in-person modelling would be even more effective (and engaging) and indeed this could further bridge the gap between embedded workplace CA and online CA forms of learning.

Lastly, the analysis of the results suggested that learners may require a comprehensive base of procedural knowledge and S&C domain experience if they are to use the benefits of the CA approach to learning. Such an approach is aimed at moving participants beyond CDM to engage in PJDM. I note that being able to engage in PJDM is particularly critical at the delivery stage of the S&C coaching process for SCCs, where these contexts require the use of declarative and tacit knowledge as part of their PJDM to solve role-related problems. Prior to this research, such suggestions remained anecdotal, without SCCs necessarily being able to label the processes they engage in. Thus, a contribution to the literature has been made.

CHAPTER 9. General Discussion: Concluding Thoughts and Next Steps

Throughout the duration of study for this thesis, I have passionately immersed myself to answer the questions surrounding how and why SCCs think about and approach problems within their role. The aim of the thesis was to investigate the nature of PJDM processes of SCCs of various experience levels. Novel insights were generated through a constructivist approach to big Q research, and I believe that the empirical findings within Chapters 4, 5, and 6 make original contributions to the S&C literature. I also believe that the research conducted, and the supporting findings presented, have demonstrated the influence of PJDM across the S&C coaching process. Furthermore, how SCCs – if they can elevate their proficiency in this area – can have a greater impact in their role and across contexts. In concluding the thesis, and in addition to these noted contributions, a summary of the limitations is now provided, along with reflections concerning practical applications of the findings and directions for future research. Finally, as part my personal reflection of the PhD journey, I offer some closing remarks as part of PJDM becoming more recognised within the S&C domain.

9.1 Limitations of the Research

Whilst ACTA, as a means of knowledge elicitation, has been established as an effective tool with subject matter experts, the present research highlighted that using this tool to generate deep insights with less experienced participants is problematic. Because of a lack of experience and, possibly a lack of intentional reflection on experiences to date, conducting ACTA with those of low domain experience was more effective at highlighting what was *not* known when contrasted with responses of those with experience. In short, whereas ACTA with subject matter experts generates knowledge through a one-time evaluation, use with less experienced may best be considered as a two-stage process. This does not negate the findings

but does need to be considered when the comparisons and contrasts are considered, and applications sought.

Regarding the online CA research discussed in the previous chapter there were, on reflection, limitations within the research design and lack of measurement of engagement by participants. A more effective research design would have been to run the two groups in a parallel fashion to be able to more accurately determine the time points at which any changes in PJDM occurred. Furthermore, there was no direct measurement of participant engagement within the online CA modules, and this might have resulted in discussions regarding changes in PJDM being relatively speculative, both when considering improved and decreased performances. It should be acknowledged that these stated limitations are in addition to those already identified in each empirical study.

9.2 Initial Reflections On The Thesis Findings

I consider this thesis to be a practioner's thesis and, as such, I have endeavoured to include contextual examples to support the points made and support SCCs to locate the findings different S&C workplace and learning contexts. The research was orientated towards understanding the reasoning of SCCs within their various roles and responsibilities. A key reflection is that, whilst PJDM can be regarded to support SCCs to have greater impact in their roles, the findings of chapter 5 and 8 suggest NDM, and consequently PJDM, to be a blind spot and capability gap for ECCs. Therefore, it can be stated that learners need to have developed a sufficient base of CDM through the practice of applying their previously acquired procedural and declarative knowledge in stable conditions before being expected to extend themselves in NDM conditions.

Of the figures and tables developed and produced across the thesis, I feel Tables 4.3 and 5.1 are worthy of further reflection prior to those responsible for teaching SCCs designing new learning materials. It was evident from these tables that ECCs preferred safe,

stable environments and that such conditions supported them to reach relatively predictable decisions. The evidence presented throughout the thesis, exemplified within the incomplete DM processes shown in Figure 5.1, established a platform to argue that constructivist learning approaches and promotion of PJDM would extend the current preparation methods of learners for the S&C workplace.

The findings of Chapters 4 and 6 make clear the nuances and, if you will, the shades of grey that are associated with the PJDM of experienced SCCs when solving workplace problems. Within future S&C learning content I feel it would be beneficial to utilise the key strategies and cues from Table 4.3. These identified the PJDM of HLCs when approaching difficult aspects of their role including considerations towards program design, management of self during delivery and how they respond to stimuli during delivery. The HLCs interviewed used their previous experience, tacit knowledge and heuristics within their strategies and cues. To this end, I suggest that ECCs and learners who are yet to enter the S&C workplace need to be afforded opportunities to consider and test their thinking, both conceptually and practically, prior to beginning any S&C role if they are to be truly impactful.

The research findings in the thesis have also highlighted the role of metacognition as part of supporting SCCs, of all levels of experience, to be effective in cognitively difficult situations. Through understanding one's own thinking better, an SCC will be supported to be able to notice more and subsequently respond to more. Promoting SCCs to engage in the consideration of multiple approaches to the same problem will develop a wider range of possible solutions that, in turn, will help to nurture NDM processes in SCCs and extend them beyond CDM. The blend of CDM and NDM is at the centre of PJDM but for it to be accepted as part of any future approach within S&C learning materials there will be a requirement to demystify PJDM.

If PJDM is to become a more commonplace and valued element within S&C learning approaches and workplace development, then support is required for learners to understand the dual processes of CDM and NDM, and their need to interact, if PJDM is to be developed. It is important to emphasise that all aspects of the S&C coaching process should be considered when doing this.

I have previously alluded to the value of investing time and space for thinking with respect to the planning stage of the S&C coaching process, and how consideration of the what-ifs and contextual possibilities can support SCCs to be more effective in delivery moments. What became evident in the research conducted for the thesis was that ECCs were supposed, by HLCs (Chapters 4 and 6), to lack the experience and tacit knowledge to form timely, accurate connections within their S&C contexts and to determine optimal approaches for solving a particular problem. Furthermore, the findings from Chapter 8 suggested that although, in principle, using CA to underpin a learning strategy for aspiring SCCs could support participants in locating procedural knowledge and deepening declarative knowledge processes, the level of engagement may have varied more authentically.

In Chapter 8, I proposed flipped learning as a possible extension to pedagogical approaches that use online CA to further promote the development of independent, self-sufficient learners. This willingness to engage in prework would, I believe, benefit SCCs through elevating their overall declarative and procedural knowledge base and elevate their engagement in deeper, broader exploration of problems when exploring with their peers. Without this form of structure to promote learners' active engagement in work and thinking before an event, such as a lecture or training session, aspiring SCCs may well continue in their preference for being self-directed – but without a destination.

9.3 Applying Key Findings Within Team Sports

Reflecting on the aim of the thesis, the findings of research conducted were intended to inform the design and testing of learning content to support the development of PJDM in SCCs. Amongst the key insights created, the value of collaboration was evident in the focus group discussions. Through a commitment to sharing the PJDM of SCCs with other support staff that comprise inter or multidisciplinary teams, the potential to develop aligned ways of working can heighten the impact made by SCCs, and others, in their environments. An example of where SCCs are required to collaborate with professionals from other disciplines to support the performance of athletes is within team sports.

Varying factors that can influence the PJDM of an SCC at any given point in time within a team sport environment may include; stage of season, selection/deselection of athletes, athlete status across a squad and travel. These psychosocial and well as ecosystem variables result in a multitude of possible approaches to solving a particular problem. The options an SCC perceives themselves to be afforded will be influenced by their experiences to date and ability to engage in CDM and NDM, and optimally PJDM.

With reference to CDM and the coaching process in team sports, SCCs can be considered to have more time at the planning stage to deliberate different options according to both known and unknown problems. Examples here include the construction of an annual plan for a team and then each individual athlete within it. The more responsibility an SCC has within a team or department, the more they may also be required to collaborate with others around squad loading across a campaign and travel plans (domestically and overseas). I offer that Figure 4.1 offers a series of introductory steps that SCCs could follow beyond training programme design as part of determining how to design a plan of action. Directly referencing Figure 4.1, SCCs could readily include connecting with athletes, speaking with the head

coach and integrate with others as foundations for contexts where they have time to engage in CDM and consider multiple approaches.

Throughout both the review of the S&C literature and the evidence generated across this thesis, the need for SCCs to be effective in programme design and delivery has been highlighted. Until now though what has been less clear has been what are the PJDM processes that SCCs of different levels of experience engage in as part of the training program design process. The initial Figure 4.1 was refined and extended following focus group research (Figure 6.1) and the PJDM process depicted to be deepened according to the level of engagement by SCCs in context, communication and collaboration.

I believe that Figure 6.1 has greater potential to support SCCs in their PJDM in various areas of team sport programme planning as it firstly considers the environmental lead. In team sports these leads may be a General Manager, an Owner or a Director of Sport. These role holders are charged with ensuring the vision of the team or organisation is communicated across functions and thus the role of the S&C department will be to contribute to this vision through the strategies it delivers. A key addition within Figure 6.1 is how it tasks the SCC with working with a head coach to observe athletes. This alignment of approaches will support SCCs to find common language and develop a coaching eye that is similar to the head coach.

Throughout Figure 6.1 the need for SCCs to communicate is emphasised through their interactions with athletes, coaches and other stakeholders. Effective communication can therefore be a focus of SCCs and those that supervise or teach them through paying attention to how this occurs within the programming process in a team sport setting. Possession of a strong base of procedural knowledge alone without the supporting skills to communicate will leave SCCs limited in their effectiveness. Engagement in these CDM processes at the planning stages can be considered to elevate the NDM, and indeed PJDM, of SCCs of all

levels of experience when required to make decisions during the delivery stage of the coaching process or in planning discussions when time is compromised. Becoming familiar with Figure 6.1 should facilitate SCCs to become more efficient in their PJDM and determine a course of action in response to a stimuli more confidently than if little or no preplanning had been conducted.

The content within the online CA modules was informed by the findings from the ACTA research; specifically, the task diagrams, knowledge audit and cognitive demands tables. Through S&C department leads and S&C governing bodies using such findings or indeed conducting similar forms of knowledge elicitation in their own settings, I suggest that bespoke SCC education content and resources can be developed. Furthermore, a commitment to attaining a deeper level of understanding of SCCs at an individual level would support specific aspects of PJDM that may be required at a stage of career, and time of year, to be targeted as part of enhancing the impact of SCCs in their environments. I feel confident that these approaches would elevate the performances of SCCs in team sport environments where the daily contexts are dynamic and span a wide range of departments and individuals.

9.4 Implications For Higher Education

The nuances of S&C were evident across the qualitative data generated in the thesis and, as was suggested in the findings of Chapter 8, it cannot be assumed that all learners are ready to comprehend or receive approached that would challenge one's cognitive processes. Various, evidence supported, approaches were included within the CA modules in Chapter 8 with the intention of elevating the PJDM of learners. The results show that these approaches, whilst well supported, were not as successful as anticipated. Future approaches would be recommended to require learners to practically test their problem-solving skills as part of developing both their adaptability and creativity across the coaching process.

In operationalising the evidence produced in this thesis as part of developing learning content for S&C accreditation bodies and tertiary institutions, I offer that a logical flow would be to develop content from Table 7.2, interrelate with Figure 7.1 and also Figure 8.3. It is unquestionable that a broad, deep base of procedural knowledge base will support SCCs to have confidence in the theoretical approaches within the options they consider when solving a problem. However, across the P-D-R of the coaching process if a SCC is confined to CDM processes then there will be limitations as to what can be considered both before an event as well as, crucially, in the moment itself. The value of informed modelling by experienced SCCs will be highly influential in supporting learners to elicit the tacit knowledge that those modelling have developed over time.

The ACTA interviews conducted in Chapter 4 provided evidence of the strategies and cues used by HLCs to solve difficult problems in their role. In contrast to the PJDM of HLCs, Chapter 5 highlighted that ECCs had a low level of domain experience, reported making decisions in isolation of others and had a low predictive ability regarding the outcome of strategies chosen. Such findings are valuable in informing future S&C learning content. In addition to this are the reflections from the other Chapters regarding the data generated from the focus groups and the conceptual considerations to applying CA dimensions within S&C learning approaches that were subsequently tested in online environments.

An example of this being that although modelling has the potential to elevate the PJDM of the S&C learner it is necessary to remind ourselves that experienced SCCs need support themselves in eliciting their own tacit knowledge prior to attempting to describe it to others. Table 9.1 is intended to provide a summary of recommendations of initial guidelines for those responsible for designing and delivering S&C learning content that intend to improve the PJDM of SCCs.

Table 9.1

Recommendations For Those Responsible For Designing S&C Learning Content

Recommendations For Those Responsible For Designing S&C Learning Content
1. Applying Constructivist Principles to Promote Learning: Three key principles to consider in future approaches are; 1) Make learning an active process, 2) Include adaptive activities and 3) Situate learning in the context in which it will occur. 2. Understand Learner's Current Processes Using Task Analysis: Taking the time to ask learners about the steps they would go through to solve a problem and describe their reasoning offers a relatively simple, repeatable way to determine how they would currently approach a context. It is also a simple means to begin a process of reflection for learners. 3. Support The Modellers: Those responsible for modelling should be encouraged to elicit their own PJDM prior to modelling to others. Use of a Task Analysis process (from within the ACTA interviews) surrounding particular problems and probing into previous approaches to common problems are recommended. 4. Consider Flipped Learning If Using Online Methods: Flipped Learning places a requirement on learners to be responsible for preparing themselves with content and concepts prior to assembled sessions/classes. A prerequisite level of procedural knowledge is required for a learner to extended themselves beyond CDM and be capable of the required NDM, and ultimately PJDM, associated with the S&C workplace. 5. Provide Learners With A Variety of "Simulations" To Test Learning: Simulations (both practical and theoretical) have high potential to help teacher and SCCs themselves determine their current effectiveness regarding how they are able to interpret problems, consider approaches and reach a course of action. These simulations can support develop a library of experience to refer to in authentic workplace contexts and support engagement in PJDM processes. 6. Six Areas Of P-D-R To Focus On In Simulations: When assessing learner's understanding of PJDM for problem solving areas to include are: 1) Macro level planning, 2) training session design (the pre-mortem), 3) Simple delivery in a single skill (1 on 1), 4) Delivery and response to a change in situation (1 on 1), 5) Delivery and response to a change in situation (1 to many)

7. Contexts considered should be authentic and contextually accurate: To support learners have high quality feedback the problems designed and presented need to be realistic to the S&C workplace.
8. Consolidate with Content before Embracing Sequencing: With relation using CA dimensions to elevate PJDM, start with understanding and testing the Content dimension across the whole P-D-R process. Progress from "Observing" to "Flying Solo" (Figure 7.1) before repeating the process with elevating complexity and ---- associated with the Sequencing dimension.
9. Provide ongoing feedback to learners – self reflection and awareness of the effectiveness of one's DM was found to be limited in ECCs. Use of the Sociology dimension of CA can support learners through communities of practice in learning environments and discussing the why's and why nots of approaches chosen within problem solving.
10. Be Patient With Development: Teachers, supervisors and learners themselves should not assume the rate of learning to be linear. Allow and anticipate stall points at any time, embrace these and collaborate with other to solve.

9.5 Recommendations for Future Research

These limitations notwithstanding, the thesis still offers a significant contribution as a primary evaluation of experience-related differences. Nevertheless, at the time of concluding the thesis there is a continued absence of PJDM across the S&C domain and more work is needed before PJDM can be considered part of the common language of practitioners. The potential to apply ACTA findings as part of closing the gap between the PJDM processes of experienced and less experienced SCCs has been demonstrated in the thesis. Consequently, a platform for future research within the S&C domain using this tool has been created. Empirical findings regarding the PJDM and DM characteristics of HLCs and ECCs, respectively, having been generated and it would be valuable for those responsible for the design and delivery of development materials for SCCs to use these findings when intending to develop PJDM within these cohorts.

In parallel, a clearer picture has been provided regarding how experienced SCCs apply the knowledge that they possess. Encouragingly, these findings can be used to support the construction of learning strategies that include content that SCCs need to know and be able to apply within their role. This was attempted within the online CA modules and there was some evidence of progression in the more experienced group of participants that such an approach can elevate PJDM processes. Importantly, however, more research is needed to improve and build upon this initial attempt. Within future approaches, it will be important to understand the baseline of the learner, as highlighted in the online CA research. The value here resides in establishing and growing engagement in learners by attending to their level of domain experience and knowledge. In turn, this will enable the delivery to meet the learner where they are so that connections can be made between what is currently known and what needs to be learnt. Importantly, this approach enables exploiting an important and primary characteristic of adult learning or andragogy (Knowles, 1984).

9.6 Concluding Thoughts

Within this chapter I have acknowledged the limitations of the research process completed and identified opportunities for further research to build on what has been presented. From the research conducted original, and novel contributions have been made that address a previous gap in the S&C literature. Certainly, what has been investigated and delivered can be considered a paradigm shift concerning learning approaches in S&C. During the research period of this thesis, research pertaining to SCCs continued to focus on biophysical and psychosocial aspects. At the inception of my ACTA research, other work offered a conceptual framework for DM (discussed in Chapter 2), but no further investigations were evident across the S&C literature during the duration of this thesis.

Through my own research, however, a clearer picture has emerged – namely that if SCCs do not have the ability to accurately and concisely determine how and why they

understand a particular concept and context to be, then they will find it fundamentally problematic to reflect accurately within and after an event. The empirical findings of the big Q research were used to design, test, and subsequently reflect on an approach intended to elevate the PJDM capabilities of developing SCCs. Despite the online CA research not demonstrating noticeable improvements in PJDM, an exciting possibility resides in future CA methods to progress from this initial platform and aid learners to achieve a shift, albeit unknowingly, in their ontological position. It is from this shift that SCCs can be supported locate themselves in authentic S&C problems as part of pedagogical strategies founded in constructivism.

Traditional approaches centred on developing a deep and broad range of procedural knowledge do not offer sufficient transferability for the dynamic nature of S&C contexts. Nor do they prepare learners to accurately detect and respond to salient signals regarding various problems. Modes of learning for SCCs should continue to include traditional classrooms, industry-based internships, and accreditations, while future approaches are encouraged to consider where CA can be incorporated. Regardless of the mode engaged in, those responsible for curriculum design and delivery should endeavour to include methods that assist learners in understanding a range of approaches to authentic S&C problems and elevate PDJM through the comprehension of a range of possibilities when problem solving.

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Appendices

Appendix 1

Table 8.4

Content of the Rubric Used to Assess Performance at Each Stage of the Three Simulation Assessments by Participants

	No Evidence Provided	Remember/Understand	Analyse/Apply	Evaluate/Create
Assessment Focus	0	1 – includes but does not extend beyond 'who' and 'what'	2 – includes 'how' considerations with some appreciation for context	3 – generation of effective and justifiable solutions
1 – Macro Level Planning Consideration of the wider context	Does not notice the surface-level elements presented	Able to articulate an assessment of the situation, notice surface-level information, and determine at least one action	Able to analyse the situation presented and apply actions according to what critical cues are identified	Generates effective and justifiable solutions/action through clear evaluation of the situation and its critical cues

	No Evidence Provided	Remember/Understand	Analyse/Apply	Evaluate/Create
Assessment Focus	0	1 – includes but does not extend beyond ‘who’ and ‘what’	2 – includes ‘how’ considerations with some appreciation for context	3 – generation of effective and justifiable solutions
	Does nothing more than recount the situation presented	Understands how to develop a multi-level, goal-based training programme to develop athletic qualities	Understands how to develop a multi-level, goal-based training programme that considers variables across the context presented	Develops an approach that considers the implications of decisions across multiple possibilities/stakeholders/contexts
	Confusion and misinterpretation of the question evident	Understands that relationships exist with others	Appreciates and organises the context presented to include	Acknowledgement the plan is subject to change and reference to it being dynamic and adaptive according to variables

	No Evidence Provided	Remember/Understand	Analyse/Apply	Evaluate/Create
Assessment Focus	0	1 – includes but does not extend beyond ‘who’ and ‘what’	2 – includes ‘how’ considerations with some appreciation for context background information and relationships	3 – generation of effective and justifiable solutions
2 – Training Plan Design Pre-mortem	Does not recall appropriate theories/concepts	Recognises demands of the given sport, sport coach, practice sessions, competition Only focus is to develop athletic qualities / perform the sport response generated through the lens of disciplines - programme variables	Communicates complex training prescriptions and processes clearly and simply in accordance with context presented More than one approach offered with little further	Develops an approach that considers the implications of decisions across multiple possibilities/stakeholders/contexts Reference to the overall plan/purpose/vision to frame a premortem

	No Evidence Provided	Remember/Understand	Analyse/Apply	Evaluate/Create
Assessment Focus	0	1 – includes but does not extend beyond 'who' and 'what'	2 – includes 'how' considerations with some appreciation for context reasoning to distinguish them	3 – generation of effective and justifiable solutions
		Only one approach presented with little/no reference to wider context	Consideration of environment	Alternative approaches generated and justified
			Consideration of logistics/feasibility	Impact of decisions made considered
3 – Session Delivery Stable Situation	Does not notice the surface-level elements presented	Treats simulation in isolation as a short term delivery based decision making event	Communicates the need to effectively coach and communicates to a group of athletes at one time	Generates a range of alternative possibilities/outcomes to the simulation presented

	No Evidence Provided	Remember/Understand	Analyse/Apply	Evaluate/Create
Assessment Focus	0	1 – includes but does not extend beyond ‘who’ and ‘what’	2 – includes ‘how’ considerations with some appreciation for context while maintaining a strong control of the room and still be able to coach athletes on an individual basis	3 – generation of effective and justifiable solutions
		Recognises technical errors/opportunities in movements	Able to identify various pedagogical techniques with regard to situation presented	Evidence for consideration of wider context (for example past information and present circumstances) to anticipate future needs
		Able to draw on coaching cues to explain what they notice		

	No Evidence Provided	Remember/Understand	Analyse/Apply	Evaluate/Create
Assessment Focus	0	1 – includes but does not extend beyond ‘who’ and ‘what’	2 – includes ‘how’ considerations with some appreciation for context	3 – generation of effective and justifiable solutions
				Impact of decisions made considered
4 – Session Delivery Response According to Change in Circumstances – Single Person Interaction	Does not notice the surface-level elements presented	Through evaluating the simulation is able to determine what is most important to them Offers specific corrective feedback to athletes	Communicates the need to effectively coach and communicates to a group of athletes at one time while maintaining a strong control of the room and still be able to coach athletes on an individual basis	Generates a range of alternative possibilities/outcomes to the simulation presented Evidence for consideration of wider context (for example past information and present

Assessment Focus	No Evidence Provided 0	Remember/Understand 1 – includes but does not extend beyond 'who' and 'what'	Analyse/Apply 2 – includes 'how' considerations with some appreciation for context	Evaluate/Create 3 – generation of effective and justifiable solutions
		Treat simulation in isolation as a short term delivery based decision making event	Able to identify various pedagogical techniques with regard to situation presented	circumstances) to anticipate future needs
5 – Session Delivery Response According to Change in Circumstances	Does not notice the surface-level elements presented	Through evaluating the simulation is able to determine what is most important to them Treat simulation in isolation as a short term delivery based decision making event	Communicates the need to effectively coach and communicates to a group of athletes at one time while maintaining a strong control of the room and still be able to	Generates a range of alternative possibilities/outcomes to the simulation presented Evidence for consideration of wider context (for example past information and present

	No Evidence Provided	Remember/Understand	Analyse/Apply	Evaluate/Create
Assessment Focus	0	1 – includes but does not extend beyond ‘who’ and ‘what’	2 – includes ‘how’ considerations with some appreciation for context	3 – generation of effective and justifiable solutions
Group-level interactions			coach athletes on an individual basis Able to identify various pedagogical techniques with regard to situation presented	circumstances) to anticipate future needs Impact of decisions made considered
6 – Cycle Review	Not able to recall means/modes/methods to self-reflect	Recalls terminology regarding reflection with little rationale of application to simulation	Demonstrates a range of reflection opportunities (in action, on action)	Consideration of effectiveness against the contextual layers presented throughout simulation -

	No Evidence Provided	Remember/Understand	Analyse/Apply	Evaluate/Create
Assessment Focus	0	1 – includes but does not extend beyond ‘who’ and ‘what’	2 – includes ‘how’ considerations with some appreciation for context suitable to the context presented	3 – generation of effective and justifiable solutions including macro planning and session design
Determining effectiveness	Not able to recall alternative forms of performance evaluation	Offers examination on performance of athletes (e.g. objective markers or technical proficiency) in isolation of other factors	Considers reflection beyond self – including objective and subjective but importantly is able to organise and provide justifications	Impact of decisions made considered

Appendix 2

Table 8.5

Raw Data of Participants' Scenario Assessment Performance (Group 1)

Group 1 Assessment 1								Group 1 Assessment 2								Group 1 Assessment 3							
	S1	S2	S3	S4	S5	S6	Sum		S1	S2	S3	S4	S5	S6	Sum		S1	S2	S3	S4	S5	S6	Sum
A1	1	2	2	2	2	2	11	B1	1	1	1	1	1	1	6	C1	2	2	1	2	2	2	11
A2	3	3	2	3	3	2	16	B2	2	2	3	2	3	2	14	C2	2	1	2	1	2	2	10
A3	2	2	1	2	1	1	9	B3	3	3	2	1	1	1	11	C3	2	2	2	3	2	3	14
A4	2	1	1	2	2	1	9	B4	1	1	1	1	1	1	6	C4	2	1	1	2	2	2	10
A5	2	2	3	3	2	1	13	B5	1	2	1	2	1	2	9	C5	1	1	1	0	1	1	5
A6	3	3	1	2	3	1	13	B6	1	1	2	2	2	2	10	C6	2	2	2	2	2	2	12
A7	2	1	2	1	2	1	9	B7	2	2	2	1	2	2	11	C7	3	2	2	1	2	3	13
A8	2	2	3	2	2	2	13	B8	2	2	1	1	1	2	9	C8	2	2	2	2	2	2	12
A9	2	1	2	1	1	2	9	B9	2	2	2	2	2	2	12	C9	2	2	2	2	3	1	12

ME	2.	1.	1.	2.	2.	1.	11.		ME	1.	1.	1.	1.	1.	1.	9.		ME	2.	1.	1.	1.	2.	2.	11.
AN	11	89	89	00	00	44	33		AN	67	78	67	44	56	67	79		AN	00	67	67	67	00	00	01

Appendix 3

Table 8.6

Raw Data of Participants' Scenario Assessment Performance (Group 2)

Group 2 Assessment 1								Group 2 Assessment 2								Group 2 Assessment 3							
	S1	S2	S3	S4	S5	S6	Sum		S1	S2	S3	S4	S5	S6	Sum		S1	S2	S3	S4	S5	S6	Sum
A10	1	2	2	3	2	2	12	B10	2	2	3	2	3	2	14	**C10**	2	3	3	2	3	2	15
A11	2	1	1	2	2	1	9	B11	2	1	1	1	1	2	8	**C11**	2	1	2	2	1	2	10
A12	2	2	2	3	2	3	14	B12	3	2	2	1	2	2	12	**C12**	3	2	2	2	2	2	13
A13	2	2	2	3	2	3	14	B13	1	2	2	2	2	1	10	**C13**	2	2	2	2	2	2	12
A14	3	2	3	3	3	3	17	B14	3	3	2	3	2	2	15	**C14**	3	3	2	3	2	2	15
A15	2	2	2	2	2	2	12	B15	2	2	1	1	2	1	9	**C15**	3	3	3	2	3	3	17
A16	2	1	2	1	1	1	8	B16	1	1	1	1	1	1	6	**C16**	3	3	3	3	3	3	18
A17	1	2	1	1	2	1	8	B17	1	1	1	1	1	1	6	**C17**	3	2	2	3	2	2	14
A18	2	2	1	2	2	2	11	B18	1	1	1	1	1	1	6	**C18**	3	3	2	3	3	3	17

MEAN	1.89	1.78	1.78	2.22	2.00	2.00	11.67

MEAN	1.78	1.67	1.56	1.44	1.67	1.44	9.56

MEAN	2.67	2.44	2.33	2.44	2.33	2.33	14.56

Appendix 4

Participant Information Sheet

University of Central Lancashire

Research project title:

Requirements Of High Level S and C Coaches - Evaluating Perceptions From The Coalface

Thank you for reading this. You are being invited to take part in a research project. Please take time to read the following information carefully and discuss it with others if you wish. Feel free to contact one of the researchers if anything is not clear or if you would like more information (our contact details are provided at the end of this sheet). Please take time to decide whether or not you wish to participate as we will be conducting interviews from February 2019 until April 2019.

What is the purpose of this project?

As a profession Strength and Conditioning (S and C) is still relatively young with scope to broaden an understanding of how coaches in the field can be more effective at various stages of their career. The aim of this project is to evaluate the existing perceptions of high level S and C coaches on the types of knowledge and skills needed for their role. Investigations into existing practices of such coaches is intended to raise the quality and impact in the field across different levels of experience. It is commonly agreed that S and C coaches have various means of forming and developing their technical capabilities, or their "what" to coach. However development of the "how" and "why/why not" approaches of coaches is less clear and less clear with regards to appropriateness according to stage of career.

The findings of this study will be used in conjunction with other research we will conduct to help develop frameworks and resources to more purposefully guide the professional development strategies utilised by S and C coach's according to their stage of career and capabilities.

Can I take part in this study?

Upon sending this information to you it is understood that you;

- Have been coaching for at least 8 years
- Are currently in a lead role and practicing with athletes
- Have worked in at least 2 different environments
- Have completed some form of post graduate education
- Hold at least 1 professional accreditation (i.e ASCA, NSCA, UKSCA)

Why have I received this request?

This invitation email is intended to reach S and C coaches who have been coaching for a number of years and can lend insights into the knowledge and skills required to progress within the field.

Do I have to take part?

Your participation is entirely voluntary but your contribution would be much appreciated. You are free to refuse to take part. If you do decide to take part, you will be free skip questions you don't wish to answer or to withdraw from the project at any point, without giving a reason. As a participant you will be able to withdraw your data from the study for up to one week after the ACTA.

What will happen to me if I take part?

If you choose to participate in this study, you will be asked to participate in an Applied Cognitive Task Analysis (ACTA). This is a form of interview that we would like to conduct in-person or by means of video link (skype or equivalent) and should take approximately 75-90 minutes. The focus of the questions asked will be to briefly outline who you are and current role and then draw on your experiences to date within S and C.

What are the possible disadvantages and risks of taking part?

We cannot perceive of any direct risk, yet should you feel any discomfort related to the topic of the interview, you are free not to take part or stop at any time.

What are the possible benefits of taking part?

Through taking part in an ACTA there are opportunities to reflect on current and previous practice and discuss on a number of matters relating to your work. We hope that the research findings will inform better practice when offering support to coaches at all points of the coaching journey, from new comer to high level, with regards to development strategies.

What happens if the study has to be terminated?

It is highly unlikely the study will need to be terminated, yet if this is the case the reason will be explained to the participant.

What should I do if I want to take part?

Please contact the researcher via email or phone (contact details are included at the end of this sheet). It would be helpful if you could include the times and locations that would be most convenient for you to meet should you elect to participate in the ACTA.

Will my taking part in this project be kept confidential?

All information collected during the course of this research will be kept strictly confidential. Any information you give in the interview will be anonymised before data analysis begins. While your identity may be known to the researcher initially (in order

to arrange the interviews), the information you provide cannot be linked back to you in the research publications. Data generated by the study will be retained in accordance with UCLan's policy on Academic Integrity. Therefore, the data generated in the course of this research will be kept securely in electronic, password protected and encrypted form for 5 years from the end of the project.

What happens immediately after data collection?

You will be debriefed and provided with further information you might need in order to complete your understanding of the research. You will also be given the opportunity during and after the interview to comment on the answers collected from you. This is to ensure that we have understood your responses correctly.

What will happen to the results of the research project?

The results are intended to be published. If you would like to receive a summary of the results of this research, please email the researchers at
with the contact details you would like the results sent to.

Who is organising and funding the research?

The researchers are conducting this research as a project within the University of Central Lancashire (UCLan). This project is self-funded and has received no funding from external organisations.

Who has reviewed the project?

This project has been reviewed by the UClan Research Ethics Committee for Business, Arts, Humanities, and Social Science (BAHSS No. X). Should you have any concerns about the way in which the study has been conducted, you can contact our University Officer for Ethics at OfficerforEthics@uclan.ac.uk.

Contact for further information

Paul Downes, MSc, ASCC

Mob: [redacted]

[redacted]

Prof Dave Collins,

School of Sport & Wellbeing,

[redacted]

Thank you for considering taking part in this project!

Appendix 5

Consent form

Full title of Project:

Evaluating perceptions of high level S and C coaches on the types of knowledge and skills needed, and their relevance to work in the field.

Name, position and contact address of Researchers:

Paul Downes, Athletic Performance Director, Auckland Rugby. [redacted]

[redacted]

Prof Dave Collins, School of Sport & Wellbeing, [redacted]

Please read the following statements and tick the boxes to indicate agreement.

I confirm that I have read and understand the information sheet, dated ……. for the above study and have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☐

I understand that my participation is voluntary and that I am free to withdraw at any time, without giving a reason. ☐

I agree to take part in the above study. ☐

I agree that my data gathered in this study may be stored (after it has been anonymised) in a specialist data centre and may be used for future research. ☐

I understand that it will not be possible to withdraw my data from the study after final analysis has been undertaken. ☐

I agree to the interview being audio recorded. ☐

I agree to the use of anonymised quotes in publications. ☐

Name of Participant	Date	Signature
Name of Researcher	Date	Signature

Appendix 6

Participant Information Sheet

Research project title:

Requirements Of Developmental S and C Coaches - Evaluating Early Perceptions From The Coalface

Thank you for reading this. You are being invited to take part in a research project. Please take time to read the following information carefully and discuss it with others if you wish. Feel free to contact one of the researchers if anything is not clear or if you would like more information (our contact details are provided at the end of this sheet). Please take time to decide whether or not you wish to participate as we will be conducting interviews from February 2019 until April 2019.

What is the purpose of this project?

As a profession Strength and Conditioning (S and C) is still relatively young with scope to broaden an understanding of how coaches in the field can be more effective at various stages of their career. The aim of this project is to evaluate the existing perceptions of developmental S and C coaches on the types of knowledge and skills needed for their role. Investigations into existing practices of such coaches is intended to raise the quality and impact in the field across different levels of experience. It is commonly agreed that S and C coaches have various means of forming and developing their technical capabilities, or their "what" to coach. However development of the "how" and "why/why not" approaches of coaches is less clear and less clear with regards to appropriateness according to stage of career.

The findings of this study will be used in conjunction with other research we will conduct to help develop frameworks and resources to more purposefully guide the professional development strategies utilised by S and C coach's according to their stage of career and capabilities.

Can I take part in this study?
Upon sending this information to you it is understood that you;

- Have been coaching for less than 3 years
- Are currently practicing with athletes in some capacity

Why have I received this request?

This invitation email is intended to reach S and C coaches who are relatively new to the profession with the aim of gaining early insights into the knowledge and skills that such coaches feel are required to fulfill their role.

Do I have to take part?

Your participation is entirely voluntary but your contribution would be much appreciated. You are free to refuse to take part. If you do decide to take part, you will be free skip questions you don't wish to answer or to withdraw from the project at any point, without giving a reason. As a participant you will be able to withdraw your data from the study for up to one week after the ACTA.

What will happen to me if I take part?

If you choose to participate in this study, you will be asked to participate in an Applied Cognitive Task Analysis (ACTA). This is a form of interview that we would like to conduct in-person or by means of video link (skype or equivalent) and should take approximately 75-90 minutes. The focus of the questions asked will be to briefly outline who you are and current role and then draw on your experiences to date within S and C.

What are the possible disadvantages and risks of taking part?

We cannot perceive of any direct risk, yet should you feel any discomfort related to the topic of the interview, you are free not to take part or stop at any time.

What are the possible benefits of taking part?

Through taking part in an ACTA there are opportunities to reflect on current and previous practice and discuss on a number of matters relating to your work. We hope that the research findings will inform better practice when offering support to coaches at all points of the coaching journey, from new comer to high level, with regards to development strategies.

What happens if the study has to be terminated?

It is highly unlikely the study will need to be terminated, yet if this is the case the reason will be explained to the participant.

What should I do if I want to take part?

Please contact the researcher via email or phone (contact details are included at the end of this sheet). It would be helpful if you could include the times and locations that would be most convenient for you to meet should you elect to participate in the ACTA.

Will my taking part in this project be kept confidential?

All information collected during the course of this research will be kept strictly confidential. Any information you give in the interview will be anonymised before data analysis begins. While your identity may be known to the researcher initially (in order to arrange the interviews), the information you provide cannot be linked back to you in the research publications. Data generated by the study will be retained in accordance

with UCLan's policy on Academic Integrity. Therefore, the data generated in the course of this research will be kept securely in electronic, password protected and encrypted form for 5 years from the end of the project.

What happens immediately after data collection?

You will be debriefed and provided with further information you might need in order to complete your understanding of the research. You will also be given the opportunity during and after the interview to comment on the answers collected from you. This is to ensure that we have understood your responses correctly.

What will happen to the results of the research project?

The results are intended to be published. If you would like to receive a summary of the results of this research, please email the researchers at [redacted] with the contact details you would like the results sent to.

Who is organising and funding the research?

The researchers are conducting this research as a project within the University of Central Lancashire (UCLan). This project is self-funded and has received no funding from external organisations.

Who has reviewed the project?

This project has been reviewed by the UClan Research Ethics Committee for Business, Arts, Humanities, and Social Science (BAHSS No. X). Should you have any concerns about the way in which the study has been conducted, you can contact our University Officer for Ethics at OfficerforEthics@uclan.ac.uk.

Contact for further information

Paul Downes, MSc, ASCC

[redacted]

[redacted]

Prof Dave Collins,

School of Sport & Wellbeing,

[redacted]

Appendix 7

Consent form

Full title of Project:

Requirements Of Developmental S and C Coaches - Evaluating Early Perceptions From The Coalface

Name, position and contact address of Researchers:

Paul Downes, Athletic Performance Director, Auckland Rugby. [redacted]

[redacted]

Prof Dave Collins, School of Sport & Wellbeing, [redacted]

Please read the following statements and tick the boxes to indicate agreement.

I confirm that I have read and understand the information sheet, dated …….. for the above study and have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☐

I understand that my participation is voluntary and that I am free to withdraw at any time, without giving a reason. ☐

I agree to take part in the above study. ☐

I agree that my data gathered in this study may be stored (after it has been anonymised) in a specialist data centre and may be used for future research. ☐

I understand that it will not be possible to withdraw my data from the study after final analysis has been undertaken. ☐

I agree to the interview being audio recorded. ☐

I agree to the use of anonymised quotes in publications.

Name of Participant	Date	Signature
Name of Researcher	Date	Signature

Appendix 8

Participant Information Sheet

Research project title:

Making Sense Of The Industry – Validating Perceptions Of High Level S and C Coaches

Thank you for reading this. You are being invited to take part in a research project. Please take time to read the following information carefully and discuss it with others if you wish. Feel free to contact one of the researchers if anything is not clear or if you would like more information (our contact details are provided at the end of this sheet). Please take time to decide whether or not you wish to participate as we will be conducting focus groups from May 2019 until June 2019.

What is the purpose of this project?

As a profession Strength and Conditioning (S and C) is still relatively young with scope to broaden an understanding of how coaches in the field can be more effective at various stages of their career. The aim of this project is to use focus groups to validate data that has been collected from high level S and C coaches about their perceptions on the types of knowledge and skills needed for their role. Investigations into existing practices of such coaches is intended to raise the quality and impact in the field across different levels of experience. It is commonly agreed that S and C coaches have various means of forming and developing their technical capabilities, or their "what" to coach. However development of the "how" and "why/why not" approaches of coaches is less clear and less clear with regards to appropriateness according to stage of career.

The findings of this study will be used in conjunction with other research we will conduct to help develop frameworks and resources to more purposefully guide the professional development strategies utilised by S and C coach's according to their stage of career and capabilities.

Can I take part in this study?

Upon sending this information to you it is understood that you;

- Have been coaching for at least 8 years
- Are currently in a lead role and practicing with athletes
- Have worked in at least 2 different environments
- Have completed some form of post graduate education
- Hold at least 1 professional accreditation (i.e ASCA, NSCA, UKSCA)

Why have I received this request?

This invitation email is intended to reach S and C coaches who have been coaching for a number of years and can lend insights into the knowledge and skills required to progress within the field.

Do I have to take part?

Your participation is entirely voluntary but your contribution would be much appreciated. You are free to refuse to take part. If you do decide to take part, you will be free leave the focus group at any time of the session or to withdraw from the project at any point, without giving a reason. As a participant you will be able to withdraw your data from the study for up to one week after the focus group.

What will happen to me if I take part?

If you choose to participate in this study, you will form part of a focus group of 5-6 high level S and C coaches. The session will be conducted in-person and should take approximately 90-120 minutes will be recorded to assist in the transcription process. Access to the video footage will be granted only to those in the group and the research investigators. The location of the session will be agreed upon the focus group being finalised but it is intended that all coaches will already be at the same venue as a result of a corresponding event (for example conference or performance summit). As the principal investigator, Paul Downes will serve as the facilitator for the session and you will be welcome to take notes throughout.

The purpose of the session is to provide high level insights into previously collected data from high level S and C coaches with regards to their perceptions of skills and capabilities required to do their job. Currently in the S and C profession there is scope to distinguish further what is experienced based knowledge vs. classroom based knowledge. It is intended that the data collected from the focus group clarifies these knowledge (and skill) differences to help guide future interventions for coach development relative to stage of career and existing capabilities.

What are the possible disadvantages and risks of taking part?

We cannot perceive of any direct risk, yet should you feel any discomfort related to the topic of the interview, you are free not to take part or stop at any time.

What are the possible benefits of taking part?

By participating in the focus group you will had the opportunity to discuss various aspects of S and C coaching and provide your viewpoints against previously collected data. Of particular interest will be your thoughts on the role of experienced based knowledge and what is required to become a high level coach. The intention is to go beyond listening and ensure you have a meaningful open forum to lend your high level experiences to what is being presented. We hope that the research findings will inform better practice when offering support to coaches at all points of the coaching journey, from new comer to high level, with regards to development strategies.

What happens if the study has to be terminated?

It is highly unlikely the study will need to be terminated, yet if this is the case the reason will be explained to the participant.

What should I do if I want to take part?

Please contact the researcher via email or phone (contact details are included at the end of this sheet). Upon contact there will be discussions around the most suitable times and location for the focus group session you can attend (according to the circumstances of the conference or summit you are attending) should you elect to participate in the study.

Will my taking part in this project be kept confidential?

All information collected during the course of this research will be kept strictly confidential. Any information you give in the interview will be anonymised before data analysis begins. While your identity may be known to the researcher initially (in order to arrange the interviews), the information you provide cannot be linked back to you in the research publications. Data generated by the study will be retained in accordance with UCLan's policy on Academic Integrity. Therefore, the data generated in the course of this research will be kept securely in electronic, password protected and encrypted form for 5 years from the end of the project.

What happens immediately after data collection?

You will be debriefed and provided with further information you might need in order to complete your understanding of the research. You will also be given the opportunity during and after the session to comment on the answers collected from you. This is to ensure that we have understood your responses correctly.

What will happen to the results of the research project?

The results are intended to be published. If you would like to receive a summary of the results of this research, please email the researchers at
with the contact details you would like the results sent to.

Who is organising and funding the research?

The researchers are conducting this research as a project within the University of Central Lancashire (UCLan). This project is self-funded and has received no funding from external organisations.

Who has reviewed the project?

This project has been reviewed by the UClan Research Ethics Committee for Business, Arts, Humanities, and Social Science (BAHSS No. X). Should you have any concerns about

the way in which the study has been conducted, you can contact our University Officer for Ethics at OfficerforEthics@uclan.ac.uk.

Contact for further information

Paul Downes, MSc, ASCC

[redacted]

[redacted]

Prof Dave Collins,

School of Sport & Wellbeing,

[redacted]

Thank you for considering taking part in this project!

Appendix 9

Consent Form

Full title of Project:

Validating the perceptions of high level S and C coaches on the types of knowledge and skills needed, and their relevance to work in the field

Name, position and contact address of Researchers:

Paul Downes, Athletic Performance Director, Auckland Rugby [redacted]

[redacted]

Prof Dave Collins, School of Sport & Wellbeing, [redacted]

Please read the following statements and tick the boxes to indicate agreement.

I confirm that I have read and understand the information sheet, dated …….. for the above study and have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.	☐
I understand that my participation is voluntary and that I am free to withdraw at any time, without giving a reason.	☐
I agree to take part in the above study.	☐
I agree that my data gathered in this study may be stored (after it has been anonymised) in a specialist data centre and may be used for future research.	☐
I understand that it will not be possible to withdraw my data from the study after final analysis has been undertaken.	☐
I agree to the interview being audio recorded.	☐
I agree to the use of anonymised quotes in publications.	☐

Name of Participant	Date	Signature
Name of Researcher	Date	Signature

Appendix 10

Cognitive Apprenticeship In S & C, V2, 08/04/2022

PARTICIPANT INFORMATION SHEET

Application Of Cognitive Apprenticeship To Facilitate Strength And Conditioning Development

You are being invited to take part in research on decision making process within the domain of Strength and Conditioning. Paul Downes, a PhD candidate at the University of Edinburgh, is leading this research. Before you decide whether to take part it is important you understand why the research is being conducted and what it will involve. Please take time to read the following information carefully.

WHAT IS THE PURPOSE OF THE STUDY?

As a profession Strength and Conditioning (S & C) is still relatively young with scope to broaden an understanding of how coaches in the field can be more effective at various stages of their career. The aim of this project is to determine the effectiveness of applying principles of cognitive apprenticeship within current approaches to post graduate learning to improve the manner in which students consider authentic S & C work place situations. The findings of this study will further inform the design and delivery of learning frameworks to more purposefully guide the professional development strategies utilised by those responsible for coach development material within S & C.

WHY HAVE I BEEN INVITED TO TAKE PART?

You are invited to participate in this study because you;

- Have completed an undergraduate degree in Sports Science and / or Strength and Conditioning
- Have at least one year of experience as a Strength and Conditioning Coach – this coaching can be at any level of participation but includes designing and delivering physical training sessions within a sporting context.
- Are interested in Strength and Conditioning as a future career

DO I HAVE TO TAKE PART?

No – it is entirely up to you. If you do decide to take part, you are still free to withdraw at any time and without giving a reason. Deciding not to take part or withdrawing from the study will not affect your other study commitments or grades. Participation is entirely voluntary but your contribution would be much appreciated. As a participant you will be able to withdraw your data from the study for up to one week after the final simulation interview.

Please note that your data may be used in the production of formal research outputs (e.g. journal articles, conference papers, theses and reports) prior to your withdrawal and so you are advised to contact the research team at the earliest opportunity should you wish to withdraw from the study.

WHAT WILL HAPPEN IF I DECIDE TO TAKE PART?

If you do decide to take part, please keep this Information Sheet. You will be asked to complete an Informed Consent Form to show that you understand your rights in relation to the research, and that you are happy to participate. Consent will be achieved through your receiving a sheet via email, completing it and ticking you are happy to participate and then email the sheet back to Paul Downes as the primary researcher. This completed document will also then require a signature to finalise your decision to take part.

If you choose to participate in this study, you will be asked to participate in a 13 week research project. This research will commence with an online session during which you will be asked to consider and respond to a Strength and Conditioning scenario/simulation. To extend on this, it will be an evolving, 6-stage simulation that is common within Strength and Conditioning coaching environments. Each stage will provide an opportunity to consider and respond to what is presented. This includes consideration of macro level planning, training session design principles, within session delivery and session review processes. There will be 15 minutes provided to produce a response before the next stage is presented.

After this first simulation there will be 4 x two hour online modules within your current time table and each is to be supported by 2 weeks online learning through the use of the Moodle platform (or similar). Each module is intended to stimulate thinking surrounding common coaching requirements for Strength and Conditioning Coaches and extend the tools available to you and your thinking in each area, for example macro level planning and training session design. Following the fourth module a second 2 hour online scenario/ simulation is then to be considered. After this there will be a period of no contact with the primary researcher and then one final simulation. The responses you give within the simulations will be assessed by the primary researcher and two independent Strength and Conditioning Coaches and feedback provided after each module as well as after all three simulations.

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WHAT ARE THE POSSIBLE BENEFITS OF TAKING PART?

By sharing your experiences with us, you will be helping Paul Downes and the University to inform better practice when offering support to Strength and Conditioning coaches within future coach development materials. This is particularly relevant to those at the early stages of their coaching careers. By participating in the research project you will benefit from engagement in self reflection of your current and previous approaches to coaching experiences. In addition to this the cognitive apprenticeship approach to be employed will expose you to high level modelling of various decision making processes concerning aspects of the Strength and Conditioning profession. Within classroom session and post session online interactions you will have two platforms to gain insight into the mindset, philosophies and practices of other students and a high level support coach. At the end of the research project you will receive individual and group feedback in various forms that

is intended to help assist you in achieving heightened levels of metacognition (thinking about your thinking). Extending on this, your level of self awareness and appreciation for the various characteristics of high level coaches will be raised to assist you in more purposeful on-the-job decision making in the future.

ARE THERE ANY RISKS OR DISADVANTAGES ASSOCIATED WITH TAKING PART?

There are no significant risks associated with participation. As this is an online research project the risks associated with potential exposure to coronavirus (both exposure and transmission) are minimal.

WILL MY TAKING PART BE KEPT CONFIDENTIAL?

All the information we collect during the course of the research will be kept confidential and there are strict laws which safeguard your privacy at every stage. Ethical approval in line with MHSES ethics committee is currently being applied for and the processes associated with data protection will be followed accordingly.

HOW WILL WE USE INFORMATION ABOUT YOU?

We will need to use information from you as part of the description of participants for this research project within any formal write up (thesis and or peer reviewed article) so the readers are aware of the population from which data was collected. For example age, gender, number of years coaching experience, previous qualifications).

People who do not need to know who you are will not be able to see your name or contact details. Your data will have a code number instead. All information about you will be kept safe and secure and no information on yourself or other participants will be disclosed to other organisations. Extending on this your information will not be combined with other data. Unless they are anonymised in our records, your data will be referred to by a unique participant number rather than by name. If you consent to being video recorded, all recordings will be destroyed once they have been transcribed. Your data will only be viewed by the researcher/research team and two independent markers. These are Alex Cockram and Adam Wolski. All electronic data will be stored on a password-protected computer file and all paper records will be stored in a locked filing cabinet. Your consent information will be kept separately from your responses in order to minimise risk.

Once we have finished the study, we will keep data collected in the form of written transcripts to each of the three coaching simulations to be assessed within the study so we can check and revisit the results in future if required. We will write our reports in a way that no-one can work out that you took part in the study.

What are your choices about how your information is used?

- You can stop being part of the study at any time, without giving a reason, but we will keep information about you that we already have. Data intended to be retained is through any transcript responses to the three coaching simulations that will form the assessment of participant's decision making processes.

- We need to manage your records in specific ways for the research to be reliable. This means that we won't be able to let you see or change the data we hold about you.

Where can you find out more about how your information is used?

You can find out more about how we use your information at https://www.ed.ac.uk/records-management/privacy-notice-research

- by asking one of the research team by sending an email to [redacted]

WHAT WILL HAPPEN WITH THE RESULTS OF THIS STUDY?

The results of this study may be summarised in published articles, reports and presentations. You will not be identifiable from any published results. Quotes or key findings will always be made anonymous in any formal outputs unless we have your prior and explicit written permission to attribute them to you by name. A summary of the findings from the study will be made available to participants who indicate they would like to receive this. This summary will be sent to participants by post / email.

WHO IS ORGANISING AND FUNDING THE RESEARCH?

This study has been organised by Paul Downes from Moray House, School of Education and Sport, University of Edinburgh.

WHO HAS REVIEWED THE STUDY?

The study proposal has been reviewed by Moray House Ethics Committee – University of Edinburgh.

WHO CAN I CONTACT?

If you have any further questions about the study, please contact the lead researcher, Paul Downes [redacted]) or my Director of Studies, Professor Dave Collins ([redacted]

If you would like to discuss this study with someone independent of the study please contact a University Officer for Ethics at ethics.hiss@ed.ac.uk or the Research Governance Team (cahss.res.ethics@ed.ac.)

Appendix 11

Cognitive Apprenticeship In S & C, V2, 08/04/2022

PARTICIPANT CONSENT FORM

Study Title: Application Of Cognitive Apprenticeship To Facilitate Strength And Conditioning Development

Researcher's name and contact details: Paul Downes. 0064274818511

Participant ID: _____

	Please tick box
1. I confirm that I have read and understood the Participant Information Sheet (Version 1 dated 08/04/2022) for the above study.	☐
2. I have been given the opportunity to consider the information provided, ask questions and have had these questions answered to my satisfaction.	☐
3. I understand that as my data will be coded and therefore be both pseudonymised and anonymised. I also understand that data will be stored for a minimum of 5 years and may be used in future ethically approved research.	☐
4. I am aware that participating in this study at the current time may carry risks in relation to potential exposure to coronavirus, and I understand the steps that have been taken in relation to minimise the risks of exposure and transmission. As this is an online study there is minimal exposure risk.	☐

5. I agree to my involvement being video recorded as part of my participation. ☐

6. I agree to my video recorded interview being transcribed by a third party contractor. ☐

7. I agree to take part in the above study.

Name of person giving consent	Date	Confirmation of Giving Consent
_____	_____	☐

Name of person taking consent	Date	Confirmation of Receiving Consent
_____	_____	☐

PARTICIPANT CONSENT FORM

Study Title: Application Of Cognitive Apprenticeship To Facilitate Strength And Conditioning Development

Researcher's name and contact details: Paul Downes. 0064274818511

Participant ID: _____

Please tick box

8. I confirm that I have read and understood the Participant Information Sheet (Version 1 dated 08/04/2022) for the ☐
9. I have been given the opportunity to consider the information provided, ask questions and have had these ☐
10. I understand that as my data will be coded and therefore be both pseudonymised and anonymised. I also ☐
11. I am aware that participating in this study at the current time may carry risks in relation to potential exposure to coronavirus, and I understand the steps that have been ☐

12. I agree to my involvement being video recorded as part of my participation. ☐
13. I agree to my video recorded interview being transcribed by a third party contractor. ☐
14. I agree to take part in the above study.

Name of person giving consent	Date	Confirmation of Giving Consent
_____	_____	☐

Name of person taking consent	Date	Confirmation of Receiving Consent
_____	_____	☐

Appendix 12

Modelling Points To Reinforce For Planning Questions For Client/Athlete....

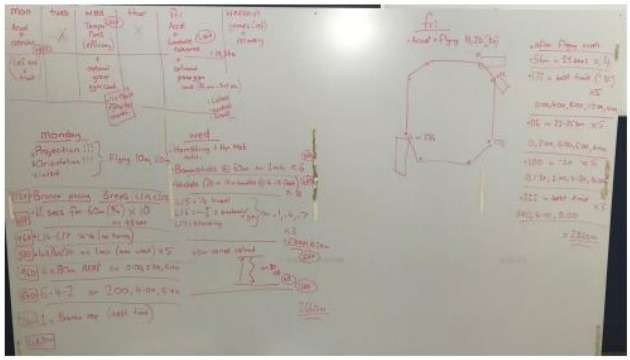
- What do you see as the focus of the plan?
- When do you need to be ready by?
- What does ready look like to you?

- How do you like to be coached?
- What training do you feel works best for you?
- What time of day do you feel highest/lowest energy? What does this look like?

- Previous Injuries? What/ When? So What?
- Where would you like to train? What Days? Why?

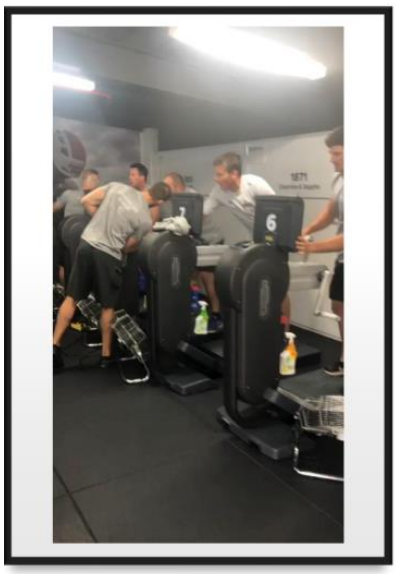
- What other plans do you have? Key dates?

- RECAP – what have you understood so far?

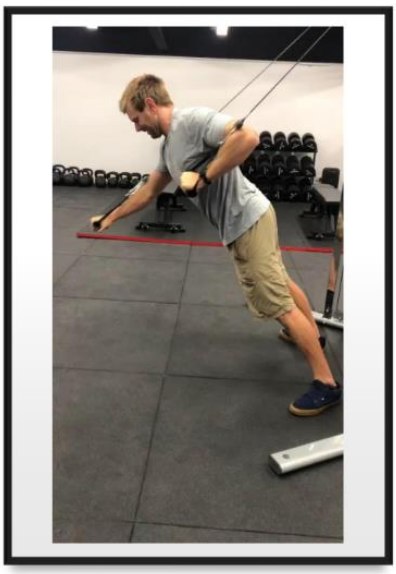


Appendix 13

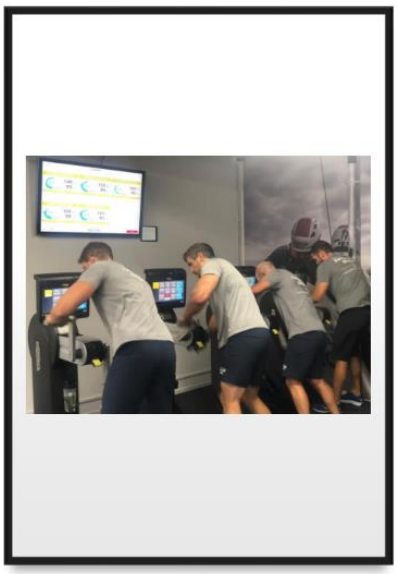
Appendix 14



Race Simulation – using historical race data and grinding based on position on the boat – maneuver/straight line, etc



Cable Machine Forward Grind Simulation – Focus on core stability and reducing energy leakage



Heart Rate Zone Training – working at 80%HRmax

Appendix 15

Effective behaviours and characteristics of S&C coaches include transactional behaviours such as instruction and organisational and planning skills (Szedlak et al., 2015).

Appendix 16

Appendix 17

Appendix 18

Appendix 19

Appendix 20