Title:

The integration of performance analysis approaches within the practice of competitive sports teams

By

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A thesis submitted in partial fulfilment for the requirements for the degree of PhD at the University of Central Lancashire

October 2015

University of Central Lancashire

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Type of Award: PhD, Doctor of Philosophy

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Abstract

The current body of research has used positivistic approaches to establish performance related variables emerging from various levels of play associated with technical and tactical parameters within elite football. However there is a dearth of knowledge considering how information derived from performance analysis (PA) techniques has been implemented within elite football environments. As a result the purpose of this thesis was to explore the focus of analysis by coaches and analysts and subsequently how PA techniques and approaches were utilised within sporting environments to facilitate this. In order to address this area of research, five chapters were completed to build upon the existing literature and create new knowledge in the area. In doing this a combination of quantitative and qualitative approaches were developed in the studies identified below.

Chapter One: The initial literature review investigated how the evolving role of PA and the associated proliferation of positions and internships within high performance sport have driven consideration for change, or at least wider use of PA. In order to explore the evolution of PA from both an academic and practitioner perspective this study considered the wider conceptual use of PA. The key aim of the chapter was to provide a critical review of the use of PA and considerations for practice. This section acts as a grand literature review to set the context for a number of key themes explored in the subsequent chapters of the thesis.

Chapter Two included two parts, the primary aim was to investigate the PA tools and approaches employed by sports coaches and analysts and their perception of its value. Study One Part A focused on the coaches' approaches. **Method:** A stratified sample of forty-six coaches were selected to complete an online-survey relating to their engagement with match, notational and technique analysis. **Results:** Most coaches (68%) were provided with a DVD or edited clips after every game, whilst 16% would receive this service following most games. 64% of coaches used PA tools to provide video clips for other coaches and their support staff, 68% provide a video of the opposition, 64% collate quantitative game data and 55% use PA to create video based motivational DVD's. Just under half of the coaches (43%) would use some form of live coding and analysis during games, whilst 39% would also receive a written post report including game statistics. PA information informed the coaches' short term planning (93%), medium term planning (80%) and long term planning (70%). 91% of coaches identified that their coaching philosophy would impact on their selection of KPIs, whilst 43% also identified that their 'gut instinct' would often impact on their selection. **Discussion**: The key findings from this study provided specific insight relating to how coaches engage with PA approaches. In particular, these findings inform specifically on how PA impacts on their coaching practices within a number of different contexts. Study One Part B, identified the role which performance analysts play within football clubs and how these roles differ within professional and academy settings. Comparisons were drawn between the two levels because of the potentially varied approaches. This study also addressed the dearth of research regarding the role of match analysts, in relation to the provision of feedback via match and notational analysis techniques and systems. **Method**: An exploratory study was conducted using an online questionnaire formed using knowledge collected from current match analysts working in elite football,

academics working within the areas of PA (tutors who teach PA and interact with student and analyst employers within football clubs) and from the current literature. The questionnaire was completed by 48 match analyst practitioners working within elite football clubs. 32 of the analysts were predominantly working in a professional team setting, while 16 were predominantly working in an academy setting. **Results**: When comparisons were made between the two groups of analysts a number of key differences were identified in relation to the provision of pre-match feedback, post-match feedback and the value the analysts gave to certain PA approaches. **Discussion:** Further insight has been provided into the importance of the role that analysts play in enhancing the observation, analysis and feedback strategies employed by elite level football teams. The key findings established within Chapters One and Two provided a platform to establish themes which would be central in informing interview discussion points in the subsequent phase of data collection.

Chapter Three: Study Two quantified and described player perceptions of PA. Despite the wider spread employment of PA within the coaching process little, if any, consideration has been given to the context in which PA delivery takes place and subsequently impacts on the players receiving such information. The objective of the study was to identify player perceptions of PA use within football environments. **Method:** A mixed methodology was employed, 48 male footballers from three different English Championship Football Clubs completed an online questionnaire. Following this 22 players were selected using an opportunistic sample to complete a semi-structured interview. **Results**: Individual perceptions and practical realities surrounding the different consumers' interaction with PA were explored during interviews and the results were analysed and presented using hierarchical content analysis. **Discussion**: Through the systematic analysis three important features emerged, all of which were consistent across all clubs and standards of play: (1) the level of debate and player interaction differed greatly during video feedback sessions, (2) the use of video analysis is central to player self-reflection but the level of engagement with self-reflection varied across players, (3) The majority of players preferred some delay before receiving video feedback. These factors have provided further insight to the practical contexts in which PA is used and perceived by elite players.

Only limited consideration has been given to how coaches might view performance and how this is translated into analysis, match insight and subsequent behavioural change. To address these shortcomings Chapter four (Study Three Part A) attempted to provide an understanding of the individual perceptions of coaches and analysts, how they view performance, and thus work jointly to conduct subsequent analysis. Reflecting these factors Study Three Part A aimed to: (1) Establish what factors elite coaches and performance analysts value in terms of their assessment of performance; (2) To examine the congruency between the values and philosophies of coach and analyst with specific reference to how they view and assess performance. **Method**: A sample of 25 coaches and 23 analysts from 5 clubs across the top 3 tiers of English domestic football were interviewed to establish the use of PA within their club. **Results/Discussion:** The hierarchical content analysis established 71 higher order themes and 287 lower order data themes from the results. Key themes which emerged suggested that central to congruence were factors related to role clarity, effective communication and discussion via the means of post and pre-

match reviews. A central concept to congruence was the extent of the 'buy in' by each coach to the process and content associated with PA, and fundamental to this was the rapport and trust established within these relationship groups. A number of important concepts were also identified relating to what factors were valued in terms of their assessment of performance. In a number of instances dissonance was identified between a coach's conceptual description of their philosophical approaches and their practical utilisation of PA and their analysts.

Currently little is known about the specific and effective integration of analysis in an applied setting within high performance football clubs. As a result Study Three Part B was primarily concerned with the practical issues and solutions coaches and analysts face when implementing PA techniques within their everyday practice within football clubs. Specifically this thesis was concerned with exploring how elite coaches and analysts employ PA techniques in practice and how their PA strategies facilitate feedback, planning and preparation for performance. **Results/Discussion:** Hierarchical content analysis established 72 high order themes and 308 lower order themes. PA clearly had an impact within a number of applied practices within football clubs, these included: pre and post-match planning, transfer of PA information into deliberate practices and the setting and monitoring of individual and team training objectives. Evidence also established that performance analytics were employed in reviewing a range of sports science related information to answer key performance questions each club might have. PA was central in the use of feedback, de-briefing and pre-match opposition meetings. Despite this the extent to which coach and analyst had an understanding of pedagogical issues surrounding the delivery of such sessions varied greatly. A number of practices were used to encourage player self-analysis and independent learning. Self-reflection processes were also central to the implementation of PA. Based on the information collected in Study Three Part A and B, key themes and discussion points have been presented to provide additional analysis within Study Three Part C. Specific case studies and cross club comparisons further illustrate key themes emerging from the thesis findings.

In Chapter Five, as a result of the collective findings and analysis, an integrated model of the factors influencing PA within the elite football environment has been presented in the final section of the thesis. This model presented an overview of the factors impacting on the implementation of PA within the football environments investigated.

ACKNOWLEDGEMENTS

CONTENT PAGE

INDEX OF FIGURES

INDEX OF TABLES

LIST OF APPENDIX

Glossary of Terms

Performance analysis: The process of completing match analysis, notational analysis or game analysis. These terms are sometimes used interchangeably. to explain performance analysis (PA thereafter)

Performance analyst: The person who might film, analyse and report back on key performance indicators on behalf of a coach.

Match analysis: Requires the production and presentation of 'key' breakdown statistics (commonly referred to as Key Performance Indicators) which are commonly linked or supported with complementary video compilations of critical game actions and sequences of play (Carling *et al.*, 2014a)

Notational analysis: Attempts to quantify a multitude of game behaviours, generating number-based matrices of performance, often in an attempt to tease out causal relationships; for example the pattern of play.

Technical Scout / Opposition Analyst: Some clubs use these terms interchangeably, but both will assess the previous matches of upcoming opponents and prepare information which can be used to inform practice.

Key performance indicators: These are the variables a coach might value and / or which are associated with success or a specific successful outcome.

Performance Indicator: 'A performance indicator must represent some relevant and important aspect of play' (O'Donoghue, 2010:152).

Coding: This is the process where a performance analyst or coach might use PA software to highlight events which appear during the game. The process of coding key behaviours will allow the coach / analyst to quickly view all similar coded behaviours after coding has taken place. The codes can be presented as quantitative information, but also used to link to specific video segments.

Matrix: A matrix is the template used to provide an overview of numerical values representing performance indicators. Most PA software will have some sort of matrix function.

Ball in play: It is common practice for analysts to edit the video footage from the whole 90 minutes of game play to take out stoppages, thus cutting the total time down to approximately 45-60 minutes.

Technical analysis: This is often associated with the analysis of the execution of a discrete skill or technique by an individual player.

Tactical analysis: The analysis of patterns and styles of play, which are likely to be associated with the wider strategy and tactics of a team.

Trend analysis: The use of PA techniques to help establish if trends or patterns in game play are occurring, these are often established and represented using quantitative information.

Game footage: Video evidence, either the full game or clips taken from a football match.

Pre-match: This relates to the coach/analyst or support staff within the club using PA approaches to look forward to an upcoming game. Commonly this might include analysis of the opposition's strengths and weaknesses.

Post-Match: This relates to the coach/analyst or support staff within the club using PA approaches to look at previous performance, most commonly the last game the team played. PA approaches will commonly be used to establish the internal strengths and weaknesses of the team based on the specific plans, tactics and strategy taken into the game.

Unit presentation: The feedback of PA information by a coach / analyst delivered to small / functional groups, for example the attacking unit or the defensive unit.

Individual feedback: The feedback of PA information delivered to a single individual player via a coach / analyst.

'**Buy-in':** A conscious decision to adopt a specific method or value.

Congruence: The quality or state of agreeing / corresponding behaviour between two people (or a group of people). In the context of this study this often manifested itself as the consultation and cooperation between the coach and analyst.

Confounding variables: Performance variables are often treated as independent variables in isolation which are associated with match outcome, often analysis does not acknowledge the wider variables associated with it, thus not acknowledging potentially confounding variables and important context which might impact on the key primary variable (Mackenzie & Cushion 2012:2). Confounding variables are variables which might have a direct impact on the primary variable and / or provide additional context or critical information.

Contextual intelligence: Is the ability of the analysis which is reported to provide a deeper explanation / insight into the wider holistic aspects of performance which might be impacting on the primary variables under investigation.

Reflective practice: The process of looking at previous performance to evaluate its effectiveness when compared to performance expectations. In the context of this thesis video and PA information was often used to enhance these reflective processes.

Sports Science: The use of related scientific disciplines within a sports environment, these might include physiology, strength and conditioning, sports psychology, sports therapy and rehabilitation.

Biomechanics: A sub-discipline of sports science which is largely interested in the mechanics of human movement.

Prozone / AMISCO: Two of the industry leaders in providing PA data, Prozone and AMISCO merged in 2011. The Prozone / Amisco systems use automatic player tracking to allow the movement of players, officials and the ball to be tracked automatically. As a result it is possible to track all 22 players and every kick of the ball during the whole game, thus providing all technical, tactical and physical aspects of performance from each game. They also provide a number of other performance related services.

OPTA: OPTA are a sports data company, which collect and distribute data and information to many football clubs. Similar to Prozone and AMISCO they also provide information which might be used for scouting or recruitment of players.

Representation of common descriptors of each phase within the football clubs.

Level 1	Level 2	Level 3	Level 4
First Team:	U21, Pro Dev phase, Reserves	Academy / U18 Elite Dev phase	Foundation Age groups i.e. U16-U8
Full time senior professionals	Full time professionals	Full time / alongside education programme	Day release or sessional attendance
A player which plays at the highest possible level within the club	These players might be playing between the U21 and first team squads. Some teams might have a mixed squad of U21 and reserve players	These players aspire to gain full time professional contracts	Initial entry into most professional football clubs

*Please note the above terms have been provided to give some explanation of the levels / phases present in the football clubs investigated within this thesis. However it is important to note not all clubs have clearly defined age groups, level or phases. This is largely influenced by the clubs current EPPP categorisation or the categorisation they are working towards.
The Elite Player Performance Plan: EPPP.
This is the long-term strategy designed to enhance Premier League Youth Development. A key aspect of the remit is to increase the number and quality of 'Home Grown Players' gaining professional contract and playing first-team football at the highest level (Youth Development Rules 2012).

Talent Identification: The screening of individuals using selected tests of physical, physiological and skill attributes in order to identify those with potential

for success in a designated sport. Coaches and analysts might use PA techniques to enhance their in game observation and analysis of performance.

Scout: Scouts observe matches to collect information relating to potential player signings. The scout might collect information on a number of technical, tactical, physical and psychological features to establish if the player is a good fit for the club. All professional football clubs will have a network of scouts which attend football matches on their behalf.

Coaching team: At each level there will be a number of coaches with different roles, i.e. goal-keeping coach, assistant coach, first team coach etc., these make up the wider coaching team.

Abbreviations
PA: Performance analysis
UEFA: The Union of European Football Association

KPI's: Key performance indicators
PI's: Performance indicators

CHAPTER ONE

Introduction

1.1: Original contribution of research

Very few studies have considered Performance Analysis (hereafter PA) from an interpretive paradigm; the vast majority of research which has been employed within PA settings has originated from reductive positivistic approaches. As a result attempts to illustrate the implementation of PA have focused around quantitative data to best describe performance variables associated with success (Mackenzie & Cushion, 2012; Wright *et al.,* 2011). Very little research has considered how PA generated information is implemented within high performance coaching environments, especially within elite football. Limited research, (with the exception of Groom et al., 2011, Groom et al., 2012), has considered the implementation of PA from a pragmatic perspective and attempted to provide interpretive explanations of the complex interactions at work within full time elite professional football environments. By providing new insight into the constraints which impact on the ability of coaches and analysts to implement PA on a daily basis, this thesis has provided new understanding to this field of study. No other preceding research has considered the context and practicalities of the coach/analyst interaction and relationship, thus this is a truly unique aspect of this research (Huggan et al., 2015, has only started to provide empirical evidence from an analyst perspective of competitive football environments). To provide additional insight into the content surrounding PA implementation club specific case studies have been presented in the later part of the thesis. These case study approaches and cross club comparisons allow unique consideration to how PA is not only used across clubs but also the

consistency of that approach within clubs across the various phases of football (for example first team, U21's, U18's within the academy and age group settings). As a result of these collective findings, a new conceptual model to illustrate the use of PA has been presented within the concluding parts of the thesis.

To support the originality of this work please see a list below of current publications.

Wright, C., Atkins, S., Polman, R., Jones, B. Sargeson, L. (2011). Goal Scoring Opportunities in Professional Football. *International Journal of Performance Analysis in Sport.* 11: 438-449.

Wright, C; Atkins, S; Jones, B. (2012). An analysis of elite coaches' engagement with performance analysis services (match, notational analysis and technique analysis). *International Journal of Performance Analysis of Sport, 16: 436-451.*

Wright, C; Atkins, S; Jones, B, Todd, J. (2013).The role of an elite match analyst within football. *International Journal of Performance Analysis, 22: 240-261.*

Carling, C., Wright, C., Nelson, L., Bradley. P. (2014) Comment on 'Performance analysis in football: A critical review and implications for future research'. *Journal of Sports Sciences,* 32,1: 1-7

Wright, C., Collins, D., Carling, C. (2014). The wider context of performance analysis and its application in the football coaching process. *International Journal of Performance Analysis of Sport, 14, 3:, 709-733.*

1.2: Emergence of the research question from preliminary work

The initial question evolved while working with a professional Premier League football team to establish areas in which goals were scored from during live match play. It was identified that there was a wider range of variables potentially associated with the dynamic nature of goal scoring opportunities in addition to what had previously been explored within the current literature. It was observed that the majority of research surrounding the investigation of performance indicators was largely from a positivistic perspective and employed reductive techniques to present some indication of success i.e. attempts to goals ratios, means and percentages to present percentages of success rate, statistical difference or linear regressions (cf Carling *et al.,* 2014a; Mackenzie & Cushion,

2012). Much of the research tended to look at variables in isolation thus possibly not considering the wider context of confounding variables (cf Carling *et al.,* 2014a; Mackenzie & Cushion, 2012,). Logistic regression was employed to explore the interaction between goal scoring opportunities and wider contextual variables associated with goal scoring. The logistic regression indicated a number of significant relationships between predictor variables and goals scored: position of shot, type of shot, number of players directly between the shot and the goal, goalkeepers position. The presentation of odds ratios also provided useful insight into the likelihood of scoring, thus providing a legitimate explanation of the chance of scoring (cf Wright *et al.,* 2011). Despite describing 9 predictor variables (with each having between 3-9 sub categories) within the logistic regression, it still failed to explain high levels of variance in terms of PIs associated with goals scored and goal scoring opportunities (Nagelkerke R^2 = 21%), thus this might suggest other important variables associated with goal scoring opportunities were not accounted for within the analysis.

During the process of completing this initial goal scoring analysis project, it facilitated the opportunity for contemplation on two important concepts central to the wider PA literature: (1) the analysis of PA data / information and (2) the analysis and *use of* PA data / information. Despite PA only being a relatively new discipline in terms of academic evidence (Groom *et al.,* 2011), at the point of starting this study there was an absence of published work which had presented analysis of sports data utilising PA approaches from physiological, technical and tactical perspectives (Carling *et al.,* 2014a; Mackenzie & Cushion 2012). However there seems to be somewhat of a theory to practice gap in terms of exploring the use of PA data, approaches and perceived values (Mackenzie & Cushion, 2012). As a result of further contemplation on these issues during the

goal scoring project, a number of important research questions began to emerge. These included:

- How and why would PA related information be used by the coaching team involved with the project?

- What was the rationale of the focus of analysis on certain performance aspects over other aspects, thus what did the coaches value and why?

- How was PA implemented in practice and how was this influenced by the coach/club philosophy?

- How might PA approaches be used to evaluate specific strategies and tactics?

Having further discussed these aspects with the analysts and coaches involved in the goal scoring project this began to stimulate additional questions in terms of how and why PA data, information and approaches were utilised to provide PA information in the first instance. Having completed an extensive review of the literature it was apparent very little information was presented at the time (prior to the work of Groom et al., 2011, Nelson et al., 2011, Reeves & Roberts, 2013), on the use of PA approaches within competitive football environments. As a result the focus of PA research work tended to be on the information generated rather than why it was produced in the first place or how the information might be used to inform the coaching process.

At the time a considerable part of the author's role was as a lecturer and coach educator of PA, but also regularly engaging with professional coaches and analysts and supporting their use of PA within competitive sports environments. Via communication and engagement with practitioners, anecdotal evidence was apparent for the growth of PA and widespread application amongst high

performance sports teams and individuals. Despite this a substantial gap in the current body of applied and academic research to support the use of PA was observed (Carling *et al.,* 2014a; Groom *et al.,* 2011; Mackenzie & Cushion, 2012). In order to explore these issues it appeared that research approaches which allowed the interpretation of the 'action and activities' of the practitioners' everyday practice would be crucial (Stringer, 2007). It became further apparent that consideration needed to be given to the real world processes and functions of these different groups and less about a definitive representation of reality or realities the coaches, analysts and players face (Lincoln *et al.,* 2011; Sparkes, 1998). Subsequently the potential research questions seemed to align with pragmatic research which is less concerned with 'universal truths' but more concerned with the 'multiple truths' arising out of relationships, negotiation or dialogue between members (Lincoln *et al.,* 2011; Spark, 1998). This was key in order to not only explore the emerging questions identified above, as a result of the initial goal scoring project, but also ones which were starting to emerge within the literature (cf Groom *et al.,* 2011; Nelson *et al.,* 2011). In addressing these emerging research questions it was also important the researcher could provide specific illustrations and instances of the specific constraints, contexts and circumstances which surrounded the issues of the use of PA in practice in relation to the three groups: coaches, analysts and players. This was important in attempting to provide potential meaning for the end users.

1.3: Thesis aims

1. To provide a critical review of the use of PA and considerations for practice.

2. To investigate PA tools and approaches employed by sports coaches and analysts and their perception of its value.

3. To identify player perceptions of PA use within football environments.

4. To establish what factors coaches and performance analysts value in terms of their assessment of performance.

5. To examine the congruency between the values and philosophies of coach and analyst, with specific reference to how they view and assess performance.

6. To explore **how and why** coaches and analysts employ PA techniques in their everyday practice and how their PA strategies facilitate feedback, planning and preparation for performance.

1.4: Review of literature: Introduction the wider academic and applied context of PA analysis

Within the academic literature, PA research has largely focused around forms of notational analysis. Such work has attempted to quantify a multitude of game behaviours, generating number-based matrices of performance, often in an attempt to tease out causal relationships; for example, the pattern of play which most often precedes a goal (Bate, 1988; Hughes & Franks, 2005; Jones *et al.,* 2004a; Stanhope, 2001). More recently, however, the evolving role of PA and the associated proliferation of positions and internships within high performance sport have driven consideration for a change, or at least a broadening of emphasis (Edgar 2013a; Hatton, 2013; Jones, 2013; O'Donoghue, 2013). There is an emergence of sources which have started to elude to the wider context in which PA tools and analysts operate, alongside and (hopefully) in collaboration with the coaching process (Groom et al., 2011). As a result consideration as to how data might start to translate into behaviour change in coach, player and practice behaviours is increasingly appropriate. A number of recent presentations (Bourne, 2012; Carling, 2012; Kuper, 2012) have demonstrated how PA techniques can be used to address specific, performance-generated questions and then employed to drive and monitor genuine behaviour change. These presentations, many of which are now available online, have provided additional insight into the applications of PA within elite competitive sports environments. Unfortunately, however, while there is anecdotal evidence of these positive changes, the comparative absence of peer reviewed papers and more general employment of behaviour-focused PA suggest that this is an area which would benefit from further academic and practitioner inquiry.

Reflecting these contentions, in order to further explore these aspects and to develop evidence-based guidelines for optimum practice, a deeper understanding of PA and the analyst's role is still required. It would appear that there is limited consensus or evidence on what constitutes more or less effective use of PA in this and other emerging applications (Carling, 2014a) Consequently in order to further illuminate the broader potential for PA, this chapter aimed to provide a critical review of the use of PA and considerations for practice. In doing this five key themes were addressed by employing an exemplar review approach to elucidate the points made, working through the medium of football as the most common user of PA.

- To establish working definitions of PA and where it sits within the contemporary sports science and coaching process continuum.
- To consider how PA is currently used in relation to data generation.
- To explore how PA could be used to ensure transfer of information.
- To give consideration to the practical constraints potentially faced by coaches and analysts when implementing PA strategies in the future.

1.5: PA and where it sits within the contemporary sports science and coaching process continuum

The ethos of PA involves creating a valid record of performance by means of systematic observation that can be analysed in an attempt to promote change (Bishop, 2003). The early applications of PA in football have tended to focus around the use of match and motion analysis techniques used by sports scientists to provide an evaluation of performance (Carling *et al.,* 2005). More recently, PA has further evolved resulting in the creation of specialised performance analyst posts whose role has required them, in specific contexts, to become an integral part of the preparation and feedback of information to the coaching team and players (O'Donoghue, 2010). This has largely revolved around the facilitation

and dissemination of video compilations and game statistics. Despite the perceived importance of such roles within some football clubs it is not uncommon for performance analysts to have no or limited interaction with players, especially in football clubs on the Continent (Carling *et al.,* in press). Despite these most recent developments, the term performance analyst is a broad one and overlaps with facets of several other sport science disciplines. The most common are biomechanics and notational analysis, but applied sports physiology and psychology have also employed notational, match, or time motion analysis techniques to provide an evaluation and aid understanding of match and training performance, thus raising the question is notational analysis a legitimate 'stand-alone' sports science discipline or just another tool available to the contemporary sports scientist? One of the most eminent and current researchers in this field has suggested that PA is an area of sports science concerned with actual sports performance rather than self-reports by athletes or laboratory experiments (O'Donoghue. 2010). Unlike these other data sources, PA is often associated with live assessment of performance in an un-contrived state, thus affirming its role in an applied setting. The actual assessment of performance brings with it many strengths and challenges. The most obvious strength being the potential level of ecological validity, in that the conditions investigated reflect the real world setting (O'Donoghue, 2010). Challenges include lack of control over extraneous variables which one would hope to minimise in a laboratory setting. Some of these challenges will be discussed in the latter sections, within the context of data collection and variability of data.

In light of these descriptions of PA, especially in an applied context as outlined by O'Donoghue (2010), there clearly seems to be contention when considering

the earlier definition of PA. For example, the definitions proposed by Hughes and Bartlett (2002), who at the time suggested that the two disciplines of biomechanics and notational analysis should grow closer together. This was typified by Bartlett (2001) who identified that notation was central in identifying skills requiring attention by establishing simple positive to negative ratios. This information would then be used to direct more detailed technique analysis, thus optimising the investment of time into areas that most required additional biomechanical analysis (Bartlett, 2001). Thus an integration of notational analysis and biomechanics would seem appropriate. However at the time Bartlett (2001) also established a number of challenges requiring attention in the future thereby enabling 'a real fusion of the two disciplines' (Bartlett 2001:5). Although both biomechanics and notational analysis share some commonalities as described by both Bartlett (2001) and Glazier (2010), criticism has emerged from some quarters describing such a joining as a 'marriage of convenience' (Glazier, 2010:1). Contention appears to be caused by a perceived 'dumbing down' (Glazier, 2010:1) of biomechanical principles while physiologists and psychologists might also perceive themselves as performance analysts in their own right. The author of this thesis would strongly argue against what has been described as the 'dumbing down' and support the wider applications of notational analysis, match analysis and time motion analysis techniques by a range of different sports scientists and performance coaches in many applied settings. This in turn has brought new knowledge and challenges. When we consider such definitions we might find that practitioners within a football setting more closely align themselves as either match analysts or video analysts to describe their roles and the predominant techniques they utilise as opposed to a clear definition of where they might sit within the sports science discipline (Carling *et al.*, in press).

A lack of clarity regarding this role might be due the limited use in football of what we would describe as biomechanical techniques and processes outside the academic setting. As a result of this little evidence has been proposed for the use of biomechanical techniques in applied football environments (Carling, 2012).

Within a professional football setting, match analysis appears to be one of the most common terms with regards to the use of video technology to enhance feedback, as opposed to PA (Carling, 2012). This might be qualified in terms of the contemporary job role of match analysts which mainly requires them to produce and present 'key' breakdown statistics (commonly referred to as Key Performance Indicators) supported with complementary video compilations of critical game actions and sequences of play (Carling *et al.*, 2014a). If match analysts are required to engage with technical assessments of performance, these would most commonly be via live and off-line qualitative / semi quantitative analysis using coach focused tools such as Dartfish, Quintic and Coaches-eye. In this thesis the extent to which analysts themselves conduct biomechanical, physiological or psychological analysis would be somewhat limited, leaving this to sports scientist practitioners, researchers or private consultants (Carling *et al.*, in press). In fact, for clubs with larger numbers of support staff such as in the English Premier League, the performance analyst has moved away from the physical aspect of performance, leaving this work to the 'sport scientist' (Carling *et al.*, in press). As a result this study and the wider thesis will focus on the use of PA from a technical and tactical perspective and to a lesser extent the creation of physical data and how the performance analyst is central in these processes. Whilst sports scientists and strength and conditioning coaches might concern themselves with training workloads and match running data generated via GPS and video-based tracking technologies (e.g., Prozone) for example, the

performance analyst role will most likely be concerned with technical and tactical evaluations of performance. Clearly information collected and provided by the likes of PA providers such as ProZone and Sport-Universal (who have now merged) has provided additional understanding of in-game behaviour relating to injury occurrence (Carling *et al.*, 2010), the link between physical performance and a reduction in skill-related performance (Carling & Dupont, 2011); and has assisted in monitoring physical load during training and competition (Strudwick, 2013). Clearly, PA tools have evolved to investigate a number of sports science related issues. This rapid and dramatic evolution of PA tools might lead us to question, 'is PA being misused or used more effectively?' Notably, analysis software is based on what is available not what is best for the learners (Cassidy *et al.*, 2006). Furthermore, Performance Indicators (to be defined in the next section) are often measured as a result of availability rather than to develop a deeper understanding of performance (Mackenzie & Cushion, 2012). Hence it is important that this study begins to consider the effective, practical and conceptual use of PA in terms of its ability to generate valuable performance data, aid in providing effective feedback and delivery of data, and ensure effective transfer of information into deliberate practice / behavioural change. This is especially critical when we consider that PA tools seem to be used as a solution to multiple performance problems i.e. the 'ultimate Swiss army knife' as opposed to its initial purpose of enhancing systematic feedback and assisting with performer skills learning (Collins, 2012).

1.6: How is PA commonly used: quantitative approaches

A key rationale for how PA tools are used has emerged as a result of the research which has identified limitations within the coaching process. These have included memory retention of elite coaches (Franks, 1993; Franks & Miller 1986, Laird & Waters, 2008); the subjective nature of the coach's evaluation (Franks, 1993); and pressure under which coaches observe performance (Hughes & Franks 2008). Also an important yet often overlooked constraint is the limitation of the viewpoint of coaches, i.e. only being able to observe from pitch level while dealing with many forms of contextual interference. In an attempt to resolve these issues, the scope for how PA is currently used, from both an academic and practitioner perspective, has focused on the importance of providing an objective systematic quantitative record and subsequent evaluation of sporting performance (Carling *et al.*, 2005). Evidence has also started to suggest PA is implemented within coach decision making and planning processes (Carling *et al.,* 2014a; Groom *et al.*, 2011). However a more fundamental rationale for the use of PA has been described as its ability to contribute to gaining a competitive advantage (Kuper, 2012), while others have proposed that PA should directly contribute to increasing the likelihood of winning games (Wooster, 2013). Further consideration could be given to the many contextual and cultural dimensions which might impact on the coaching process (Cushion *et al.*, 2006). These aspects will be discussed later in the thesis.

As the systematic analysis of match performance has evolved, a substantial body of research has attempted to provide a better understanding of the importance of key quantitative performance-related parameters associated with success in football (Mackenzie & Cushion, 2012; Wright *et al.*, 2011). In order to establish the importance of specific performance variables, notational analysis studies

have previously been used to present data as ratios of goal attempts; successful, unsuccessful, percentage on target and completion rates for passing and crossing actions. To provide an indication of efficiency, analysts often present results which provide evidence for: how many times a team have the ball; how many times a team gets in the opponent's penalty area; how many chances are created and how many chances are taken. Much of the early data collections placed emphasis on frequency percentages and ratio type data, whilst also looking at playing style and passing sequences leading to goal scoring (Hughes & Franks, 2005; Reep & Benjamin, 1968). 'Straight-forward' analysis, including simple frequency counts and conversion rates which provide a 'snapshot' of overall performance is of the upmost importance to practicing match analysts in elite clubs (Carling *et al.*, 2014a). Again, however, what is still not well documented is to what extent such information is simply providing a description of what is happening, i.e. 'nice to collect or nice to know', rather than providing a distinct performance advantage (Bourne, 2012). In a similar fashion, Hayes (1997) originally provided an argument for establishing the impact of PA data "Show me the results of notational analysis, not the notational analysis results" (Hayes, 1997:4). Clearly PA has been used successfully in many contexts to address the initial limitations of the coaching process (the ability to observe effectively and recall key events) as identified by the early work of Franks & Miller (1986). As a result even a combination of the most basic objective information and descriptive feedback can prove useful in supporting the coaching process, depending on coach and athlete needs. In addressing Hayes' (1997) comments, evidence has also been provided to support the impact which PA can have on performance, across a range of sports (Brown & Hughes, 1995; Jenkins *et al.*, 2007; Martin *et al.*, 2004; Murray *et al.*, 1998) but none of which could be

considered full time elite environments. From the football setting, evidence has also been provided by Olsen and Larsen (1997) on how PA impacted directly on the Norwegian national team's playing style (Olsen & Larsen, 1997; Pollard, 2002; Weaver, 2007). More recently, much of the match analysis research conducted by Carling's research group has attempted to address key performance questions within the club in which the researcher works and as a result has had a direct impact on the club's approaches and practices (Carling, 2010; Carling & Bloomfield, 2010; Carling, 2011; Carling & Dupont, 2011; Carling *et al.,* 2014b). However little is still known as to what information derived from PA coaches do and do not value, how the information collected is used in practice to affect their decision making and subsequent planning of training, tactical strategies and approaches. To further investigate the integration of PA generated information, it is important that we still question whether data driven approaches have been able to effectively differentiate the 'interesting to know' from the 'unique performance' variables which might be associated with the successful outcome of a game. Identifying which factors individually and in combination might predict or be associated with success has become the 'Holy Grail' of PA work. As a result, PA has embraced the concept of Performance Indicators (PIs thereafter) and their potential associations with goal scoring.

At this point it is necessary to make a clear distinction between academic and field work which coaches and analysts might engage with. Much of the work commented on in this and the preceding chapters will be firmly situated in a research paradigm which would be described as a Positivism approach in that the academic work (from a research perspective) would often be interested in establishing a cause and effect type relationship. Whereas, the investigations

which coaches and analysts might employ are, within their own practice, largely at club level and much more interpretive in nature (Sparkes, 1992). In such situations analysts and coaches will attempt to provide further interpretation to the situational factors which they face in an attempt to establish how specific issues might be impacting on their own team's performance within their own organisational context (Cushion *et al.*, 2006; Cruickshank *et al.*, 2013). Clearly there is a lack of research which draws upon the application of PA in a truly applied context as this will largely sit with the clubs themselves, thus assumptions are often drawn from academic work and applied to a practical context. The subsequent sections will attempt to consider how match and notational analysis type work has been used in football using examples from both academics and practitioners, while attempting to provide additional insight into technical and tactical elements of the game. Due to the scope of this thesis physical and psychological parameters will not specifically feature.

1.7: How PA is used: creation of PIs and KPIs

PIs have been widely used within the academic literature (O'Donoghue, 2013) and coaching context (Hughes *et al.*, 2012). However the term is often misused or applied to explain simple action variables, which are simple descriptors of variables commonly observed in performance i.e. 'pass success' (O'Donoghue, 2013:1). The percentage of pass completion might be described as a performance indicator if it satisfies specific metric properties and is a valid measure of an important aspect of play (O'Donoghue, 2013). A useful definition is provided by O'Donoghue: 'A performance indicator must represent some relevant and important aspect of play' (O'Donoghue, 2010:152). PIs considered important will differ from one coach to the next (Hughes *et al.*, 2012) and as a

result might lack clear operational definitions as we might expect within an academic setting. Within the academic literature reviews (Hughes *et al.*, 2012; Mackenzie & Cushion, 2012) and a practical investigation (Carling et *al.,* 2014a) there seems to be an emergence of the term Key Performance Indicators (KPIs thereafter), in an attempt to distinguish themselves from basic PIs. KPIs appear to be PIs which are considered to be more closely aligned with success or factors associated with success for a specific team or individual. Some research has attempted to establish if PIs can be linked with success (winning games), or in the case of football, scoring or conceding goals. In addition, analysts and coaches in a club setting might use the term KPI to typify an aspect of their strategy or playing philosophy which they perceive as being central to their success (Carling, 2014a).

Largely, the findings from PA data are presented as percentage totals and attempt to success rate ratios. However there are a number of limitations in attempting to predict future success based on past performance. The retrospective nature of PA has often been seen as a common criticism of much notational analysis type work (Hayes, 1997), especially if such analysis fails to take into account for example current form, difficulty of the fixtures played and possible injuries to key players. Although ratios of goals to goal attempts do provide some 'normalisation' in terms of proportionality (Hughes & Franks 2005), they still do not provide a legitimate evaluation of the chance of scoring or success and thus, have limited predictive ability. This concept was initially highlighted by Hughes & Franks (2005) reanalysis of Reep & Benjamin's (1968) early work which promoted the use of 'route one' or direct style of football (Anderson & Sally, 2014:20). An important concept established by Hughes &

Franks (2005) was that the 'frequency of goals is not the same as the odds of a goal being scored' (Maderiros, 2014:3), thus contradicting the initial findings of Reep & Benjamin (1968) who reported that the majority of goals were scored following a short passing sequence of fewer than four passes. Hughes & Franks (2005) identified that because of the higher frequencies of possessions containing short rather than long passing sequences it would be appropriate to normalize the data in order to make meaningful comparisons on the influence of the length of passing sequences on goals. They developed a ratio of goals per 1000 possessions by dividing the number of goals scored in each possession by the frequency of that sequence length. This analysis suggested that longer passing sequences had a higher frequency of shots per 1000 possessions, which is in direct opposition to the earlier work by Reep and Benjamin (1968). Reep's attempts to establish 'one general rule' for success via reductive techniques for a 'winning formula' via a mechanised approach of minimal input for maximum return, resulted in misinterpretation of the significance of a direct style of play (Anderson & Sally, 2014: 21). Despite this, some important methodological considerations were established in Pollard & Reep's (1997) later work. In order to represent success as a unit of chance or probability, some attempts have been made using methods of non-linear relationship analysis such as Logistic and Probit regression (Ensum et al., 2004; Harrop & Nevill, 2014; Reep & Benjamin, 1968). These approaches could be incorporated in order to establish odds ratios and the probability of scoring (Pollard & Reep 1997). It was recognised if goals scored were to be used as categorically dependent variables, over 99% of team possessions would be classified as failed, thus limited information 'about likely effective strategies leading to a goal could be established' (Nevill *et al.,* 2002:843). As a result an alternative analysis was provided which only included

team possessions that resulted in a shot. The possibility of scoring was established by using the following predictor variables within the logistic regression, these included: (1) shot location (within or from outside a specific arc inside the penalty area), (2) distance (in yards from the goalpost and the position of the shot); (3) the angle of the shot (calculated by the arc in radians by the intersections of a line from the positions of the shot to the nearest goal post); (4) if there was one touch or more before having a shot; (5) if the shot originated from open play or a set play and (6) if the defender was more or less than one yard from the shot (Pollard & Reep 1997). The outcome variable 'weighted' shots to establish the probability of scoring a goal under various circumstances identified above (Pollard & Reep, 1997:545). By utilising logistic regressions these predictor variables were used to establish the probability of scoring. The key findings identify that 'every yard nearer the goal increases the probability of scoring and for players who 'managed to be over 1 yard from an opponent when shooting this more than doubles the probability of scoring' (Pollard & Reep 1997:546). Despite these refinements, such approaches have not been commonly used within notational analysis research until recently (Hughes 2004). One might question whether such statistical approaches have been able to attribute meaningful levels of variance (R^2 values) associated with success in football, even given the current plethora of in-performance variables which have been investigated up until this point (Carling *et al.*, 2014a). In order to help explain high levels of variance associated with success in football, research should explore other more holistic performance related issues for instance dissemination of the information and the effectiveness of which players take on board the PA information which is provided. Preceding research has indicated that the fluid and dynamic nature of football makes it problematic to formulate a

specific way football should be played via fixed patterns or systems of play. Despite this the German national side previously worked alongside Cologne University to develop an evidence-based approach for playing football which has been termed the 'German Play Book'. It has been said that this play book influences tactics based on specific opposition and situations which might appear during a game (Kuper, 2012; Fritiz, 2012, to be discussed later in this review of literature).

Critical evaluations of PA have also been used to consider the wider parameters of football and attempt to establish the probability of PIs predicting the likelihood of scoring (Ensum *et al.*, 2004; Wright *et al.*, 2011). Wright *et al's* (2011) findings provided insight to the probability of scoring depending on a number of contextually related factors including position of attempt, type of shot, initiation of attack and defender density to name a few (Wright *et al.*, 2011). This work has provided evidence for, along with a number of other variables, the importance of practicing set plays because of their potential productivity in scoring goals, despite their relatively low occurrence in comparison to open play opportunities. At the same time, however, their lack of contribution to goals scored within the logistic regression led the investigation to question how much time should be spent practicing set play routines at the expense of deliberate practice relating to open play tactics and strategies. Noteworthy anecdotal evidence has highlighted how Manchester City FC significantly improved their productivity at scoring and not conceding from set plays (during the 2011/12 Premier League season). It was noticed by the Manchester City analysts that the team had not scored any goals from set plays after a period of 22 games. Thus, having completed an extensive project reviewing 400 goals scored from set plays (Madeiros, 2014),

and analysing a range of games across Europe, some specific coaching insights and practices were internally formulated (Fleig, 2011). Manchester City won the Carling Premier League in 2011/2012 season having scored the highest number of goals in the league from set plays; 19 goals (Premier League, 2011/2012). While the example of Manchester City's practical application of PA is noteworthy, no information was provided on the amount of failed attempts thus a fuller understanding of the effectiveness of their new approach to set plays (e.g., success to failure rate) cannot be established. Moreover, it would also have been interesting to gain some insight into how this information was actually translated into specific training activities.

On a related issue little, if any, consideration within the current literature has been given to whether attempts directly on goal, via free-kicks, are the best use of such a strategic position. Unless teams have a recognised free kick taker of the calibre of players with a high conversion rate, such as David Beckham or Cristiano Ronaldo, it might be much more productive for a team to try and capitalise on their position by fashioning an attempt on goal indirectly, as an extension of open play (Kuper, 2012). Because of the potential opportunity to exploit space in the penalty area and the restriction placed on the opposition (minimum of 10 yards) for the ball, the likelihood of scoring might be enhanced.

1.8: How PA is used: The ability of PIs to reflect the dynamic nature of football

Early research relating to hidden patterns focused on the detection of T-patterns, which were associated with the detection of repeated temporal and sequential structures in real-time football behaviours (Borrie *et al.*, 2002). Much of the work up until this point has also had a theoretical application. Although it is difficult to establish to what extent such research design is implemented, or might have an impact in an applied context, there is some evidence that such PA approaches have been implemented to allow teams to anticipate common tendencies or patterns that an opposition might exhibit. Evidence of the use of PA in such a way has been highlighted by the German International football team, initially under the guidance of Jürgen Klinsmann. It has been suggested that evidence-based, notational analysis was implemented in developing a code book / tactical agenda for specific situational contexts (Kuper, 2012). A team of analysts at Cologne University would conduct evidence-based analysis on the opposition to identify how they might exploit common behaviours, thus producing detailed reports on all opposition (Fritz, 2012).

The ability of sports analysis to evaluate the role of dynamic and evolving systems in football has been highlighted by the importance of transitions in play (this is further highlighted in the following, study two). "Everybody says that set plays win most games, but I think it is more about transitions" – Jose Mourinho, (Chelsea Football Club first team manager cited in Roxburgh, 2005). As highlighted by Mourinho, the ability to quickly transition from offense to defense is critical for football teams to succeed. The importance of transitions in play or counter attacks is relatively new when compared to other well established performance variables as described previously (Hughes *et al.*, 2000). Yiannakos & Armatas (2006) amongst others have attempted to consider the role of counter-

attacking by integrating methods of assessment within their matrix which include opposition analysis and interactions. Despite methodological challenges, PA research has most recently identified the importance of the assessment of opponent interactions while evaluating the effectiveness of offensive playing tactics (Tenga *et al.*, 2010). Most recently PA research has also started to present the opposition defending data as well as the attacking team's information (Carling *et al.,* 2014b). One would suggest that this is critical in improving the validity of team PA. However, such consideration of player and opposition analysis often requires elaborate research designs which are perhaps more akin to academic than practitioner focused research. When investigating scoring opportunities against a balanced/imbalanced defence Tenga (2009) developed the criteria initially established by Olsen (1981) relating to penetration and preventing penetration during: goal scoring, winning the ball and preventing goal scoring situations (Tenga, 2009). Tenga (2009) identified that it was sometimes difficult to establish 'with certainty whether a team is in attack or defence' during specific situations i.e. when the ball is in the air or during duels, thus it was important to establish the level of possessions; 'total ball possessions and 'no ball possession' (Tenga, 2009:34). A further important consideration when exploring imbalanced/ balanced defences is the subjective nature of such approaches (Tenga, 2010). What might be considered an unbalanced formation might be as a result of an unconventional tactic or team set up. For example, some teams may play a more risky game defensively and have a goalkeeper, whose starting position is very high, almost acting as sweeper, thus raising doubts on whether the defence is actually unbalanced, specifically the present German national side and their goalkeeper Manuel Neuer. Germany would deliberately employ a high pressing tactical approach which would then require the goalkeeper to play an

advance starting position. This was a calculated risk which had been supported by their analytical approach to their preparation (Delfosse, 2014). Despite this, when starting to quantify football by using a more dynamic type approach as in the case and to the credit of Tenga (2009), it might be possible to begin to establish momentum throughout a game and even track a team's progression from a position of ascendency to descendency (O'Donoghue, 2009). In football, the key problem remains that it is not uncommon for a team to be outplayed where the opposition generally dominates every aspect of the game for 90 minutes and yet still win as a result of a 'lucky' goal. Thus, such work relating to momentum can be problematic when dealing with such a low scoring and fluid sport such as football (Anderson & Sally, 2014). Similarly, it is important to point out that social and psychological aspects of play which cannot be objectively notated are likely to greatly affect a team's flow and momentum.

Despite these challenges, recent research by Lago-Peñas (2010) has used performance related variables (goals scored; type of offense; type of defence and venues) to discriminate between winning, drawing and losing in Spanish football, if only in a basic manner. Lago-Peñas (2010) managed to successfully discriminate on the basis of 10 out of the 16 performance related variables assessed, thus establishing a significant difference on these grounds. Despite this, it is still difficult to establish the meaningfulness and magnitude of the differences. If for example we considered an event with a relatively high frequency of occurrence i.e. crosses received while defending; winning teams had to defend 29.4 ±10.1 crosses, draws had 29.8 ±10.6 crosses and losses had 27.4 ±9.4 crosses, a difference between winning and losing teams of 2 crosses per game. By considering this and the other significant differences observed in the Table 1.1 below, it would be relevant to question if the differences are

meaningful enough to warrant prescription of specific training preparation or additional technical, tactical direction and instruction from coaches. By observing the fairly narrow perspective of the variables identified in the below Table 1.1, there is a possibility that the focus of analysis has largely been on factors which can be more easily measured and as a consequence the status of these variables has also been elevated. For example more emphasis is placed on variables which are more accessible, while potentially more critical factors and insightful information which not readily quantifiable are often ignored. A key challenge faced by sports science in general is that 'what can be measured' and 'what's important' can easily become confused (Kiely 2011:142).

Table 1.1: The difference between winning, drawing and losing teams in game statistics from the Spanish soccer league 2008-2009: Adapted from Lago-Peñas et al 2010:290.

	Winner			Drawer			Loser			P^1
Variable	M	SD	Median	M	SD	Median	M	SD	Median	Value
Variables related to goals scored										
Total shots	14.4	5.1	14.0	13.6	5.2	13.0	11.9	4.8	12.0	.000
Shots on goal	6.6	2.8	6.0	5.1	2.7	5.0	4.2	2.4	4.0	.000
Effectiveness	46.2	15.7	44.4	37.5	15.4	38.3	37.6	31.3	35.3	.000
Variables related to offense										
Assists	8.6	3.7	8.0	8.4	3.7	8.0	7.3	3.6	7.0	.000
Crosses	27.4	9.4	26.0	29.8	10.6	29.0	29.4	10.1	28.0	.004
Offsides committed	2.9	1.9	3.0	2.6	2.0	2.0	2.4	1.9	2.0	.001
Fouls received	16.7	4.2	17.0	16.7	5.3	17.0	16.8	4.7	17.0	.874
Corners	5.2	2.9	5.0	5.5	2.8	5.0	5.3	2.9	5.0	.387
Ball posession	50.6	8.4	50.0	50.0	8.2	50.0	49.2	7.9	50.0	.339
Variables related to defence										
Crosses against	29.4	10.1	28.0	29.8	10.6	29.0	27.4	9.4	26.0	.004
Offsides received	2.4	1.9	2.0	2.6	2.0	2.0	2.9	1.9	3.0	.001
Fouls committed	16.8	4.6	17.0	16.7	5.3	17.0	16.7	4.2	17.0	.822
Corners against	5.3	2.9	5.0	5.5	2.8	5.0	5.2	2.9	5.0	.387
Yellow cards	2.8	1.6	3.0	2.9	8.2	3.0	3.1	1.7	3.0	.291
Red cards	.19	.58	.0	.20	10.6	.0	.35	.68	.0	.000
Contextual variable										
Venue	.39	.49	.0	.50	1.98	.5	.61	.49	1.0	.000

[1]Kruskal Wallis H.

Interestingly Lago-Peñas (2010) fails to consider the interplay between physical, technical and tactical aspects of performance. Current research (Carling,, 2014) has also highlighted that a more sensitive measure of success might be

the end of season league ranking rather than grouping on the basis of wins, losses or draws. Consideration should be given to what extent statistical means accumulated across a season are sensitive enough to nuances in performance variations which might influence winning or losing individual games. Within both top English and Italian leagues (Di Salvo *et al.,* 2010; Rampinini *et al.,* 2009) the middle and bottom ranked teams covered significantly greater distance in high speed movements compared to the top five ranked teams (both $p < 0.05$). It has been proposed that the greater high speed activity observed in the lower ranked teams could be seen as a direct consequence of the lower ranked teams' tactical and technical inability to regain and perhaps maintain ball possession (Carling, 2014; Di Salvo et al., 2013). A clear advantage of both Di Salvo *et al.'s* (2013) and Rampinini *et al's* (2007) work was the observed interplay between physical and tactical parameters. This is further emphasised when considering the findings from Di Salvo *et al.* (2013) which highlighted that technical and tactical effectiveness probably have a greater impact on the results and teams' final league rankings. The frequency of ball possession, short and long passes, completed short and long passes, shots and shots on target were all higher in the higher ranked teams (Di Salvo *et al.,* 2013). Carling (2014) further supported this by highlighting during the 2010/2011 season (French top-flight Ligue 1) the champion winning team was ranked in the top three clubs for goals scored, ball possession, completed passes and crosses, shot and shots on target. While, conversely the same team was ranked ninth out of 20 clubs for total distance run and eighth for high-speed activity (>21 km/h). Within this research the authors acknowledged the importance of further research to corroborate these findings across multiple national championships internationally to establish if similar trends are observed. Research shows that

technical and tactical superiority is a more robust indicator in identifying the success of higher ranked teams (the top 5 five league positions in Premier League and Italian Serie A and the French top flight Ligue 1). All teams covered less distances and completed less high speed movement activity. This has been attributed to technical and tactical superiority, with the lower ranked teams having to exert more physical effort in an attempt to regain possession as a result of their inability to maintain possession. Although physical information has not been directly linked to goal scoring at a match by match level, evidence has suggested that these higher ranked teams benefit from a higher frequency of: ball possessions, short and long passes, completed short and long passes, shots and shots on target (Carling, 2014). This supports the notion that work rate is not a good indicator of success in football.

Importantly Di Salvo *et al.* (2010) and Rampinini *et al.* (2009) highlighted important differences being observed across certain playing positions. This also raises an important question as to whether in an applied context what is the most appropriate; either position specific analysis or individual analysis according to what the coach expects from the player. Currently what is not explored within the literature is what factors influence player selection, for instance do mangers pick players to fit into their pre-determined system or do they pick a system to complement their players? It would be interesting to explore if coaches have a specific philosophy on player selection and implementation of specific strategies or tactics.

Although the applications in the preceding sections have identified attempts to use PA in a more dynamic and holistic way, some of the methods of quantifying performance variables still propose a dogmatic, solvable linear algorithmic

approach to performance. But because of the non-linear nature of football, it has been proposed that new approaches which consider the sport as a more fluid and dynamic entity should continue to be explored. Possibly the quest for the 'Holy Grail' of predicting success needs to be considered from a different perspective, rather than from the simple data matrices which have been employed up until this point. It might be worth considering that we are seeking for 'multiple truths' as opposed to 'one general rule of a winning formula' (Madeiros, 2014:8). Considering the retrospective nature of PA data it is possible that the focus should be less on the predictability of PA approach and more on its capacity to include wider context related variables. This approach should increase the opportunities to discover factors which could increase the likelihood of success.   Clearly, irrespective of the analytic techniques implemented, we would propose that the most important aspects to practitioners and coaches are still how data is interpreted and actually used in training interventions (Davis, 2011). It is highly unlikely that football coaches will ever attempt to understand complex statistical approaches but more coaches would be likely to comment on possession or set play statistics eg: 'we created and took more of our chances; this season we have less possession but are creating more chances and winning more set plays from a more direct approach' etc. (Carling *et al.*, in press). In order to enhance the interpretation and use of the data it might also be worth contemplating how the quality, rather than the quantity of the data may be improved by a deeper understanding of appropriate context specific information. This study is not trying to suggest that there is a problem with contemporary PA but simply to make the case that future research would be beneficial especially if it was able to further establish the extent to which such PA information impacts on practices and systems within football clubs' everyday practice. In other words does it affect

short term /long term planning in terms of specific practice, and also the development and/or recruitment of players to fulfil the specific needs of a club?

1.9: The importance of contextual information in enhancing the meaningfulness of the data

This section explores how PA data might be used to establish trends, thus allowing coaching and support staff to generate and address effective performance-related questions. As highlighted in the previous section, academic research is evolving to address some of the challenges which exist in terms of the ability of the discipline to move from a very restrictive linear analysis of performance to one which can provide further insights into the non-linear, dynamic and evolving nature of football. In order to move towards approaches which provide insightful understanding to football, it might be worth exploring the importance of the wider contextual information in which data are currently set. The evolution in the amount and type of quantitative data available surrounding PA analysis over the last 20 years has been dramatic (Anderson, 2013). This has been created from a number of different perspectives, most commonly from academic publications in sports science, coaching science related journals and practitioner focused journals such as Insight (The Football Associations Coaching Journal). In the last three to five years PA has been presented and discussed in the commercial and blogger spheres and, it is now possible to provide information on almost all aspects of match play available as a result of modern data analysis providers (Anderson, 2013), there is now clearly 'nowhere to hide' on the pitch (Carling *et al.*, 2005). For example, OPTA Sport (Sports Data Company), in collaboration with Manchester City Football Club, recently released a dataset containing match performance related information on all English Premier League football matches from the 2011/12 season (see http://www.mcfc.co.uk/the-

club/mcfc-analytics). Furthermore, blogger mediums have provided new insight into sports performance, using a combination of match data via open sources such as the English Premier League Index (http://www.eplindex.com). These have resulted in critical but usually subjective fan analysis which is (apparently) well supported and grounded in objective notational analysis data. Accordingly, what many of the insightful bloggers have been able to do (e.g. The Liverpool Supporting Atmospheric Scientist) is provide important context around this key objective data. Clearly, more and more data are available from a range of different sources. What is often additionally required however is contextual intelligence in order to provide more quality insights. Contextual intelligence might be brought about by ensuring analysis is able to report on and provide a deeper insight into the wider holistic aspects of performance, which might be impacting on the primary variables being explored.

In order to further investigate the role of important contextual information, it might be worth exploring the example of the importance and potential misinterpretation of possession within professional football. In the case of Premier League football and international tournaments, possession of the ball per game does not appear to be a PI closely associated with scoring goals (Bate, 1988; Hughes & Franks, 2005; Jones *et al.*, 2004a; Stanhope, 2001). This might lead to the question of whether possession in its own right can be described as a KPI at all, As a result, one might explore other outcome variables providing a more longitudinal look at performance and their association with possession. For example, league standing might be worth exploring, as opposed to just goals scored. In this regard, one could speculate that the recent domination of Spain at international level and Barcelona at club level, have largely been attributed to their ability to

retain possession for prolonged periods of time, with Barcelona averaging 73.4% in La Liga and 74.3% in the Champions league in 2010/11 (Prozone, 2011). This might suggest that keeping the ball for sustained periods of time in the modern game will lead to success. Moreover, more recent analysis of international football found that successful teams utilised longer periods of possession compared to unsuccessful teams (Successful team: team which progressed to the knockout stages) (Garganta, 2009; Lago-Peñas *et al.*, 2010; Prozone, 2011). In contrast, however, the evidence might suggest that, although teams who finish in the top six (during 2010/11 Premier League seasons) had longer periods of possession compared with unsuccessful teams, retaining possession may not be a decisive variable to distinguish who finished with the most or least points within the Premier League (Hughes & Franks, 2005; Prozone, 2011).

Accordingly, in order for the value of possession, as in the case of many other performance variables, to be genuinely meaningful to the coaching process, a further understanding of the wider aspects of possession seems essential. For example, in order to further consider if possession plays a role in predicting a successful outcome for a team, further consideration to the quality of possession in the opposition half or final third might be needed. This might lead us to reframe the initial question to: 'does more decisive possession lead to a goal scoring opportunity rather than the amount of possession (Lago-Peñas *et al.*, 2010; Jones *et al.*, 2004a)?' In the case of Barcelona, analysis of possession might not reflect their ability to retain and win back possession. The ability of teams such as Barcelona or even Spain to make a deliberate effort to chase down the ball or challenge for the ball in a specific time frame from losing possession might be a more important or pertinent context-related variable, which might assist in

explaining their dominance of possession. This point might lead us to question whether the way in which possession is measured and assessed is too crude. Thus these aspects identified above may be too subtle to quantify. A deeper understanding is required in order to allow a more precise and sophisticated analysis. Additional consideration should potentially be given to specific passing networks occurring between specific players which are more productive than others (Gurpinar-Morgan, 2012). Other important wider contextual factors might include: the opposition's system of play; home advantage; current score line; significant officiating decisions (Carling *et al.*, 2013). Again, these contextual factors might play an important role in the collection, analysis and interpretation of a number of performance variables. Other context specific variables relating to possession might include the quality of ball control to make time and space, i.e. does it result in a forwards or backwards movement, does it allow the player the ability to progress the ball forward, thus maintaining momentum? In the case of Carling's (2010) study, which investigated player separation in relation to their team mates and the nearest opposition, it would have been interesting to know if this was influenced by the quality or tactics of opposition (is there a link between team quality and their ability to disrupt play). Are teams which deliberately try to close down space or pressurise the opposition successful in disrupting the quality of the opposition's possession? Are some teams 'better' at this than others? All these potential qualitative factors could be systematically assessed if clear operational definitions are created prior to inter / intra observer reliability being established. For effective implementation, all operational definitions would have to be established and agreed upon by the coaching and support team involved in the analysis process, however this is not always common practice in some football clubs. This process might be a problem when using match analysis

providers whose own definition sets might not align with the club's definitions. Wider contextual information refers to the importance of evaluating the wider antecedents (causes) and outcomes (results) associated with a specific behaviour. Currently most work has only identified associations between antecedents and outcomes and limited research has been able to establish a causal relationship. Wider contextual factors might directly impact on antecedents, behaviours and outcomes as some important associations have been identified with regard to situational variables which influence performance. These situational variables included: Game location (home and away advantage), quality of opposition, game period and type of competition (Gómez et al., 2013). Although the scope of this study does not enable discussion of each of these, case by case, evidence has suggested all these situational variables have an impact within football to some extent (for a detailed review of these factors, the reader is referred to the work of Gómez et al., 2013). Situational variables might be even more pertinent when we consider the low scoring nature in football and the lack of control over the 'ebb and flow' of the game as we would see in other sports, where the coaches are able to use time outs at strategic times to impact on the momentum of the game. As a result the nature of football makes it extremely difficult to transfer strategic information to players during the game (Gómez et al., 2013). It is also important to give consideration of the extent to which situational factors might interact, and thus impact on PIs and the outcome of the game. A number of 'higher-order interactions' (Gómez et al., 2013:264) have been identified in football. Lago (2009) established interactions between possession, match location and match status, with home teams having more possession when drawing (score line tied) than away teams (Gómez et al., 2013). Taylor et al., (2008) reported that the frequency of common action variables

(pass, shot, tackle, clearance, crosses, dribbles, loss of control and aerial challenges) were also impacted upon by match location and match status. Finally, Lago *et al.*, (2010) established the effect of match location, quality of opposition and match status on running activity. These findings highlighted that home teams tended to cover greater distance than visiting teams at low intensity. Lago *et al.,* (2010) suggested the most plausible explanation for this as being: crowd effect, travel effect, familiarity, referee bias, territory, specific tactics and psychological factors. These key examples provided the importance of considering the interactional effect of situational variables on performance. Evidence has suggested teams might follow very different strategies if they are playing at home compared to away (Gómez *et al.*, 2013), so it is important that this and other situational variables are considered in terms of how they might impact on the result and thus the possible interpretation of PA data.

1.10: The role of 'None Stat All Stars' and less measured variables

To extend the points made in the previous section, the author further hypothesise that wider contextual information is key when considering the role of a group of individual players who play a pivotal role in the success and even failure of a team, but whose contribution might not be fully appreciated within current game analysis: 'None Stat All Stars' (Wooster, 2013). The concept of measuring the intangibles is not new when attempting to provide a wider and more holistic view of analysis but often such intangibles might still not have been well represented in current statistical matrixes. Often, analysis in its wider application of sports science can place too much value on the aspects which we can most readily quantify, thus ignoring the ones which we cannot and/or which are difficult to ascertain (Kiely, 2011). Potentially, aspects of performance which are the most

difficult to quantify could be the most important or insightful (Kiely, 2011, Wooster, 2013; Madeiros, 2014). PA could provide information relating to the consistency of specific teams and individuals, for example whether higher ranked teams more consistent in certain areas of performance, although this can be difficult to measure due to changes in playing and coaching staff. Experienced analysts might track such information over a number of seasons but also make comparisons at critical parts of the season (Hatton, 2013; Lawless, 2013). Similarly, the focus of PA has often not given consideration to defending and its significance within the current literature. Potentially, there are a number of practical issues associated with quantifying off-ball parameters but the importance of the 'last ditch tackle' or that 'crucial block' might be critical in interpreting not only defensive effectiveness, but also in explaining a lack of attacking effectiveness. In match analysis systems, 'duel' or 50/50 confrontation might be coded as a tackle (Gerisch & Reichelt, 1993). The ability of a defender to dominate such situations might also be under represented, due to a lack of sensitivity in the analysis tool. Commonly, attacking duels are not differentiated from defending duels in the stats. Additionally, this might highlight the need for individualised player ratings according to player roles. For example, Bolton Wanders Football Club (when in the Premier League under the management of Sam Allardyce) one could speculate that they had a specific set of criteria, based more on direct play and pressing in the final third of the pitch. In contrast, teams such as Manchester United might look more at their ability to rapidly counter attack and create scoring chances.

Although consideration of many of these factors would provide further insight into game analysis, there is always a 'cost to effectiveness' equation to be considered

in terms of the time requirement of conducting such analysis, especially when accounting for contextual factors. As a result of this 'cost to effectiveness' context-rich analysis would have to be central to assisting the effectiveness of a coach's coaching philosophy, and aspects of strategy which coaches or organisations might associate with success. Notably, however, evidence suggests that many coaches still base their team performance evaluation on 'hunch' or 'gut instinct' (Anderson & Sally 2014; Kuper & Szymanski, 2012), thus reinforcing their decision making process through being driven by tacit rather than declarative knowledge (Nash & Collins, 2006; Edgar, 2013b). The ability of PA to resolve specific performance questions which directly inform the coaching process might be dependent on the coaches ability to clearly articulate and operationalize what they associate with success in football. This clearly might be a concept which some coaches will struggle with (Anderson 2013). If coaches are unable to do this, one might start to question if any such analysis can come to fruition and thus translate into an adequate form for informing their coaching practice. An important concept, not explored in the current literature is the extent to which practitioners will utilise a balance of video to illustrate important PIs during the game and statistical information. It is anticipated that most analysts using statistical data will associate this to specific video instances, thereby providing important contextual information relating to antecedence, behaviour and consequence. An important question might be, do statistics initially lead the coach to seek insight from the video or alternatively, would video be observed first then followed by statistics to support the coaches' initial observations? Also a club's most recent results might influence the club's specific approach. For instance if the team is playing well and winning games habitual analysis of KPIs

might simply be maintained. In contrast, if current form and results are poor then certain PIs and video evidence might be looked at more closely.

At this point another important question might be to consider where the stimulus for analysis should lie; does the responsibility lie with the coach or the analyst team? Would we expect the coach to be proactive in setting specific performance related questions or is it the role of the analyst to proactively provide insight which the coach has not previously considered, was aware of or raise performance questions which the coach has not even contemplated? As the responsibility of analysts has evolved as a result of developing effective working relationships with the coaching team and managers, it is not uncommon in some clubs for coaches to leave PI choice up to the analysts, thus the latter also take the initiative to analyse and present information on aspects of play which they feel are appropriate (Carling *et al.*, in press).

1.11: The growing constraints which PA faces

At this point it would be speculative to draw upon how PA might be effectively delivered and used when we consider the current lack of empirical evidence (Mackenzie & Cushion, 2012). In order to further understand its purpose and impact, attempts should be made to unpick the pedagogical bases for its use by coaches and the possible constraints which influence its implementation; this will be a key feature of the subsequent sections of the thesis. The current section will go on to consider some of the most obvious constraints which relate to the application in PA approaches.
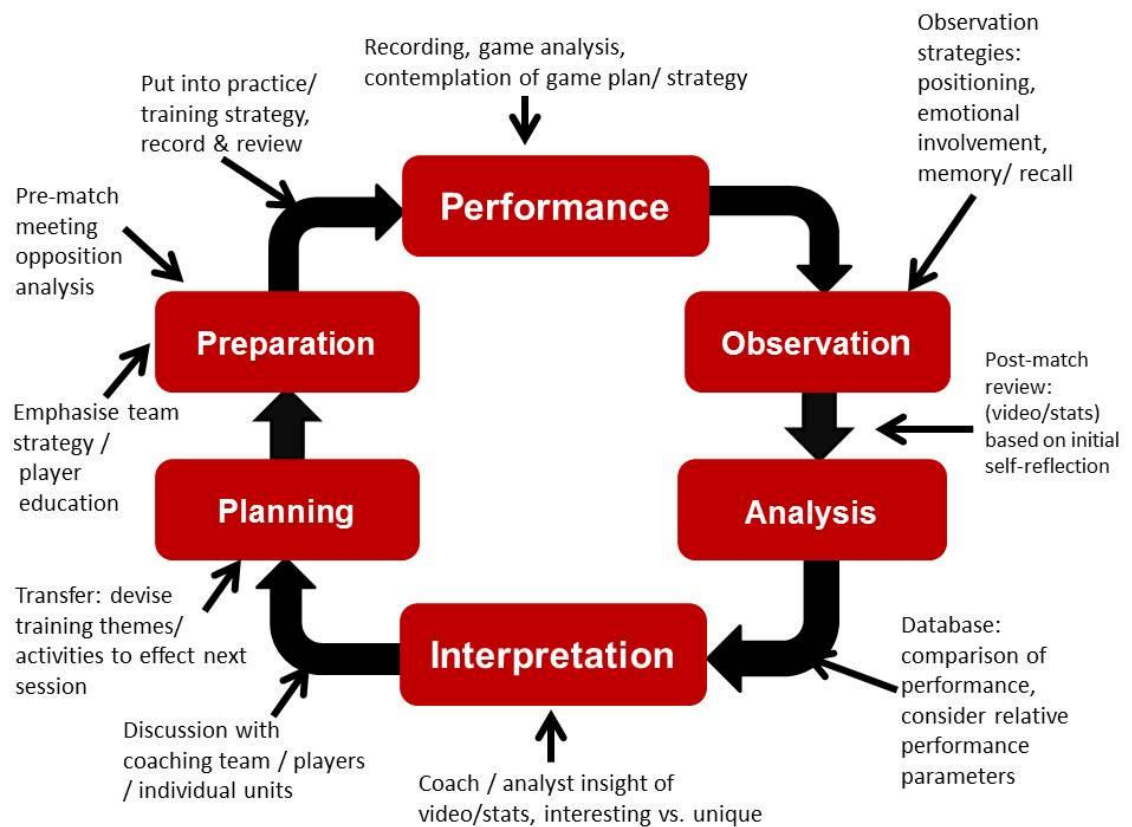
Figure 1.1: Pre and post-match analysis within the weekly coaching cycle Adapted from Carling 2005, and Duckett 2012.

There are a number of texts which provide theoretical models that relate to the conceptual use of PA tools and approaches (Carling *et al.*, 2005; Hughes & Franks, 2008): refer to Figure 1.1. These have been central in providing initial insight to undergraduate students and aspiring analysts in an attempt to understand the process of the coaching cycle and how the performance analyst might support such a process. However despite their practical use, such flow charts and schemas of the coaching cycle have been highlighted as presenting an idealistic and simplistic view of performance in terms of observation, planning, training and practice (Groom *et al.*, 2011). Also they potentially fail to take into account the complex and problematic nature of developing performance in a changing, fluid and highly competitive environment (Cushion *et al.*, 2006; Lyle, 2002). What has become apparent most recently is evidence for increased use

of PA in assisting the coaching process, with not only a growth in positions available (paid and unpaid) but also a change in the diversity and variety of the types of roles which analysts might be required to fulfil while using video editing technology in and around professional football teams (Carroll, 2013; Hatton, 2013). A number of additional roles around the provision of PA support have seemed to evolve over the last few years. The creation of the EPPP has seen the mandatory requirement of Category One Academies to have two analysts within their football programmes (Youth Development Rules, 2012). Other PA roles have appeared to be more commonly advertised on performance analyst recruitment sites. More often the role of a technical scout is emerging where analysts will review prospective players and assist in the deployment of the traditional scouting system i.e. sending a scout to watch a prospective player live (Prestidge, 2014). The role of an 'opposition analyst', might specifically scout the opposition and provide video and statistical reports on how to approach that specific opposition, and is now seen as a specific role separate from the more traditional performance analyst (Prestidge, 20014; Hatton, 2013; Edgar, 2013a). Some analyst roles take a more longitude look at performance 'match analytics', to identify trends which might give them an advantage, thus integrating all aspects of sports science support via the medium of PA tools such as Prozone data, GPS and recovery information (Prestidge, 2004).

In the English Premier League it is not uncommon for contemporary analysts to report a working week of 60 hours, as they frequently travel with the 1st team which can be extremely time-consuming and tiring. These factors place additional pressures on their ability to turn the game analysis around quickly and effectively (Carling *et al.*, in press). Despite the huge workloads many of these roles are still considered poorly paid. Some clubs now have the means and

willingness to employ analysts working at distance to conduct more long-term statistical based analysis. A more proactive approach to game analysis might enhance a club's ability to address questions from an evidence-based approach, thus taking a more long term look at performance (trends over a continual 4 week cycle). Some clubs appear to be fairly well supported in terms of performance analyst support, with analysts fulfilling specific roles relating to recruitment analysts, opposition analysts, academy analysts and first team analysts (Carling *et al.*, In press; Hatton 2013, Wright *et al.*, 2013), but the effectiveness of these roles will possibly be influenced by their integration within the wider organisation. A lack of integration with the coaching team and wider organisation can result in localised analytics (Bourne, 2012; Davenport & Harris, 2007; Madeiros, 2014), where even the most insightful analysis and interpretation of data will not see the 'light of day' if it is not received or used by anyone outside the analyst team. This might be a potential constraint or barrier to PA which warrants further consideration. One of the potential restrictions which might affect the interaction of PA is the extent to which the wider organisation values PA, and as a consequence, the financial constraints in place which prevent sufficient levels of support (Carling *et al.*, 2014; Madeiros, 2014).   In a high performance environment we might expect a performance manager to give clear guidance pertaining to agreement, alignment, accountability and adjustment for effectively implementing PA in supporting wider analysis activities (Wiltshire, 2013). However evidence has suggested less formal methods of mentoring and support are accepted within football (Grecic & Collins, 2013; Partington & Cushion, 2013), and also that role clarity is often a challenge within the coaching process resulting in a number of levels of ambiguity and uncertainty (Jones & Wallace, 2005). This in turn highlights the importance that further consideration is given to the specific

and effective integration of analysis within a specific organisation and their coaching process.

The openness of football clubs to share and publish work relating to their integration with PA has often been limited. Possibly, analysts working within clubs have seen the information they produce as being predominantly relevant to their own specific applied context, thus limiting their motivation to publish such findings (Drust, 2010). This might be akin to the secretive Research and Development projects as we might see in traditional industries where research findings are considered too important to be published due to the advantage or 'unique selling point' they might provide for their company. Despite this, case studies and action research type inquiry might be essential in providing important insight in the exemplar use of PA in an applied context (Mackenzie & Cushion, 2012; Nelson *et al.,* 2011). A move to a more interpretive naturalistic even qualitative type approach would most likely provide a better understanding of the effective use of PA (Mackenzie & Cushion 2012). This might provide useful insight into how different teams, organisations, managers and coaching teams might adapt their approach to meet their own and the external needs which they face. Such a fluid and flexible approach to analysis might not be reflected in the conceptual models previously identified, which fail to represent the fluid and changing nature of the coaching environment (refer to Figure 1.1). Groom *et al's.* (2011) grounded approach highlights the delivery of video-based PA as being subject to a number of complex social interactions between coach, analyst and players. In order to provide illustrations of the exemplar use of PA it would be imperative to firstly better understand 'the complexities of the dynamic, psychological and social activities' which surround the use of PA (Groom *et al.,* 2011:30). Groom *et al.* (2011) provided a strong rationale for further consideration

41

as to how the social environment, coaching / delivery philosophy and recipients' qualities might frame the delivery process. Any proposed intervention of video analysis requires careful consideration of presentation format, session design, delivery approach and targeted outcome (Groom *et al.,* 2011). These important considerations will form the basis of key questions to be explored in the latter stages of the thesis.

One of the common criticisms, which could be considered to limit the impact that PA can have within domestic football, is a club's inability to look past a short-term approach. As a result, some clubs' approaches to analysis seem to focus on a game to game approach (Caring *et al.*, 2014a). This short-term approach is synonymous with the result based business elite football coaches find themselves in. Unless coaches are 100% sure that PA will have a positive impact, and preferably an immediate impact, they might be reluctant to invest the time with the information generated from PA techniques (Wooster, 2013). This is understandable when one considers the 1.7 years average life span of a football manager across all 4 professional levels in England (Bridgewater, 2012). At all levels of the domestic game, promotion and relegation places are at stake. These issues are magnified when we consider the heavy fixture schedule of certain clubs and bunching of fixtures across the season. As a result, PA focus in a team could be more heavily weighted towards an assessment of the opposition (pre-match focus) thus investigating how the opposition's weakness might be exploited and strength minimised, as opposed to looking at an assessment of the team's own performance (post-match focus). Again a deeper understanding of why such approaches might be adhered to would require detailed exploration of the coach's coaching philosophy and how this has shaped the implementation of their strategy and tactics.

Clearly, some coaches invest significantly more time in order to gain a comprehensive understanding of performance problems using match performance data, reports and videos (Carling et al., 2014a). In other contexts, some experienced and very successful football coaches might rely more on their personal judgment and intuition (Edgar, 2013b; Madeiros, 2014). During periods of pressure, the filtering of critical features is essential for timely and effective decision making. Fundamental to this approach is the ability of the coach to establish an effective 'theory of the game', i.e. know what is needed to win games, or have a strategy they associate with winning games. Also crucial, however, is the coach's ability to articulate this to their support team. This might be an alien concept to many coaches (Anderson, 2013), as such conceptual thinking is not central to formal coach education systems. Effective and responsive communication might also be essential when there is every possibility that performance parameters might change and be modified as more reactive type problems present themselves (Carling *et al.*, 2014a). Up to this point what has not been fully explored is how coaches make their decisions in relation to assessing performance, what performance parameters are used to assess against and how this influences their interpretation of the game. One would suggest a deeper understanding of these factors would be central to establishing how PIs are created and implemented.

What is not well understood is how the relationship and dynamic process in place between the coach and analyst allows effective analysis to be produced and thus provide insight into performance within the subsequent training week. Although we would hypothesise that the relationship and communications process are central to the effective use of PA, little evidence up to this point has been provided to support this standpoint. Shared mental models have been identified as being

central to the coach and athlete relationship (Mascarenhas & Smith, 2011), in that they promote a shared understanding of specific situations where attention should be focused and can be useful in clarifying information and required behaviours. It would be interesting to establish if a shared mental model exists between the head coach and the wider coaching and support team in relation to their shared values, beliefs and coaching philosophy. A shared mental model is central in identification of critical performance features and filtering out non-essential aspects to ensure that individuals are not overloaded with enormous amounts of information (Mascarenhas & Smith, 2011). Preceding research has identified the central importance of 'trust' and 'respect' when considering the varied interactions between the coach and key stakeholders (e.g. athletes, assistant coaches, parents, administrators) in their respective coaching contexts (Cushion & Jones, 2006; Jones *et al.*, 2004b; Potrac *et al.*, 2002; Potrac & Jones, 2009; Wiltshire, 2013). Groom *et al.*, (2011) and Nelson et al., (2011), further identify the importance of respect between coach and player in order to ensure interpretation of the coach's decisions and behaviours when reviewing video-based feedback. Further understanding in such areas is also further warranted. Evidence has suggested that a high performance environment should promote an athlete focused environment (Wiltshire, 2013) where approaches are employed to promote players' own learning and development (Collins, 2011; Ford *et al.*, 2010; Hodges & Franks, 2008). Although we might envisage that PA could play a central role in a players own self-analysis and development, very little is currently known as to what extent coaching approaches would facilitate effective PA feedback.

Clearly, careful consideration should be given as to how and when information might be best delivered to the players to enhance its impact, 'ultimately, a good performance management and analysis tool is not just a control mechanism but a learning system that effectively communicates and informs' (Wiltshire, 2013:180). Although feedback plays a critical role in facilitating learning (Vickers, 2011), both coach and analyst alike must be aware of its limitations and the problematic nature of effective feedback. Research surrounding feedback has suggested that performers can become too reliant on feedback and thus it suppresses the performer's ability to identify faults (error detection) and correct faults (error correction) themselves (Hodges & Franks, 2008). Anecdotal evidence has suggested that performance analysts themselves play a very varied role in terms of the feedback and debriefing of information to the manager, wider coaching team and players. What is not currently explored in the literature is to what extent coaches, and analysts understand the complexities in which they might have to consider when and where feedback is or is not implemented. This is an issue which again might be considered as being central to the effective delivery of video and PA analysis processes, but again the literature has only just started to unpick some of the pedagogical issues which might need to be considered when implementing PA approaches (Groom *et al.*, 2011).

1.12: Conclusion

In a relatively short period of time there has been a dramatic growth in the range and depth of academic research and evidence of how this works and is applied within the field by practitioners. As a result huge amounts of data are often generated by contemporary PA techniques and systems. Strong evidence has been provided for PA's ability to provide objective information to enable useful insight and understanding of technical and tactical PIs central to football performance. Similar evidence has emerged that such information has an important role to play in enhancing the coaching process. On the basis of such useful and valid evidence the author is not trying to make out there is a problem with how PA is currently used from an academic and applied perspective, but what has been highlighted in this study is the importance of continual development to provide and apply contextual intelligence to the quantitative data which is generated, to further enhance its meaning and impact. This is critical to ensure that the insight which data can provide allows for differentiation between general and unique performance parameters. The addition of more qualitative type enquiries and case studies of real performance problems which football clubs face might provide some insight into the potential pedagogical underpinning and subsequent effective implementation of PA. Despite the plethora of PA research, little is known relating to how information is effectively transferred to all parties involved with the PA process. Even less evidence is openly documented regarding how data are transferred to impact on planning specific training sessions and interventions. As a discipline, to further establish the impact or effect PA might have on the coaching process and ultimately performance we call for a better comprehension on a number of the factors identified above.

1.13: Bridging Section: Chapter One and Chapter Two

In attempts to establish important performance variables associated with success within football, most of the PA research has provided a rather narrow view of performance (Caring *et al.*, 2014a). Much of the early research has taken individual performance variables in isolation and attempted to establish their link to success i.e. goals scored and games won or lost. As a result potentially important confounding variables are often not considered (Mackenzie & Cushion, 2012), thus context surrounding performance is not fully provided. The very nature of PA approaches are problematic, as their primary aim is to attempt to quantify observed human behaviours as measurable occurrences, from which causality can be derived to predict future performance (Smith, 1989; Mackenzie & Cushion, 2012). This has resulted in the vast majority of PA related research employing positivistic and even nomothetic methods and assumptions (Carling *et al,* 2014a; Mackenzie & Cushion 2012), and subsequently missing the opportunities to explore the meaning and reason for such human behaviours. Within published work there is sparse use of individual case studies of a specific club which provide more interpretative insight into the meaning of the data for that specific club. A further consideration might also be the unique characteristics of players in the teams which might also influence their specific style of play, tactics and strategies employed. Also the rationale for how and why such information is analysed and used to inform the clubs' practices and approaches is largely not reported on. With the exception of a handful of papers (Groom *et al.,* 2011; Groom *et al.,* 2012; Nelson *et al.,* 2011) the vast majority of publish PA research has focused on generation of PA data rather than generation and use of such PA data / information. As a result a decision was made that the focus of the thesis would shift from one which focused on the context of playing behaviour, to

one which was more concerned with exploring the specific use of PA approaches, the coach/analyst relationship and how this facilitated their implementation of PA. Before employing interpretative techniques to explore how and why coaches and analysts engaged with PA due to the limited evidence base available it was necessary to conduct some additional primary research to provide initial insight into the approaches employed by coaches and analysts and their perceived value of PA.

In order to maximise response rates and achieve a wide perspective for the use of PA, it was felt necessary in the first instance to employ survey techniques across a number of coach and analyst groups to establish a broad consensus for the use of PA approaches and techniques.

CHAPTER TWO

2.0: Study One: PA approaches employed within competitive sports environments.

The key aim of this chapter was to explore PA tools and approaches employed by sports coaches and analysts and their perception of its value. In order to do this the chapter was split into two parts; Study One Part A which focused on approaches employed by coaches, while Study One Part B: focused on the approaches employed by analyst from football. In both case responses were collected via online survey tools.

2.1: **Study Two Part A: Introduction: Coach surveys relating to use of PA**

Over the past decade there has been a noticeable growth in the use of PA (or more specifically the use of notational analysis / match analysis) within professional football clubs (Carling, 2009). Blaze *et al*. (2004) reported that of ten English Premier League managers who responded to a questionnaire, nine used hand or computerised notational analysis. Further evidence for this has been seen in the growing number of full time performance analysts employed by professional clubs. PA has become increasingly accessible, particularly with regard to the use of modern software such as Sports Code, Dartfish and Kandle Snapper. Such software does not require a coach and analysts to have a degree in computer programming or statistics to be a competent user (James, 2009). More recently there have been a number of PA companies such as Prozone, OPTA and Focus, which provide a service where games are fully coded and analysed on behalf of a club, following each match. The relative accessibility of

these services has allowed PA to become more widely available for professional and semi-professional sports organisations.

The current national coaching structures as outlined by the UK Coaching Certificate at levels three and four have identified the importance of PA skills (Hockey Coaching UK 2008; Jones, 2011; Rugby Football League 2011). These coaching awards both have compulsory elements relating to technique, match and notational analysis. Similarly PA is a compulsory element of both the UEFA B and A Licenses within football (Lancashire Football Association, 2014). The importance of notational and match analysis within these educational programmes could largely be attributed to its ability to enhance feedback during the coaching process. PA is widely accepted as enhancing a coach's ability to identify, diagnose and assist in the correction of technical and tactical problems (Hodges & Franks, 2008; Lyle, 2002). Although the provision of post-match video feedback is widely accepted within some sports (football, rugby league and rugby union), little is known as to how elite coaches modify subsequent practice with this information (James, 2009). This could be largely due to the secretive nature of competitive elite sport and the possible fear of losing a 'competitive edge'. Ignoring the specific detail of what key technical and tactical information is prioritised, there is little known as to whether feedback is provided in a systematic manner (Stratton *et al.*, 2004). For example, there is very little known as to the length of time needed to receive feedback, the time-scale for delivering feedback to key stakeholders and the simple process of feedback to groups.   Much anecdotal evidence has suggested that PA has been used as a reactive tool following a poor performance or loss of form (Court, 2004). Although some academics do work and consult with professional sports clubs, in many situations

they are often working with a club 'looking from the outside in'. As a result a large proportion of the work relating to PA of football is completed by academics with an interest in football who are not necessarily directly involved in the coaching process (James, 2009). Despite this there has been a substantial amount of research within this area which has focused on the results generated via match and notational analysis studies, but still little attention has been given to the impact notational analysis has had on improving performance (Hayes, 1997). A few initial attempts have been made to assess the impact of using match and notational analysis techniques (Brown & Hughes, 1995, Jenkins *et al.*, 2007, Martin *et al.*, 2004, Murray *et al.*, 1998). However as O'Donoghue (2010:14) identified 'much more research is needed in this area'.

Two small-scale reviews had attempted to explore the use of video analysis in semi-professional and professional game settings. The first study employed a semi-structured interview to explore two professional Advanced Licensed Youth coaches' perceptions of video analysis (Groom & Cushion, 2004). The research addressed seven key areas: coaching philosophy, data analysis, coach perceptions, usefulness, learning, technical information, reflection, timing and mental aspects. This paper provided some useful but brief conclusions relating to the benefits of video feedback for players and coaches. The second paper attempted to build a theoretical framework to understand the delivery of video-based PA by 14 English youth football coaches (Groom *et al.*, 2011). Groom *et al.* (2011) provided an insight into the complexity of social and psychological parameters associated with the delivery of video analysis. Although it is valid to further investigate the pedagogical basis for the use of PA, it is evident that there is still little knowledge of specifically 'if and what' PA (or more specifically: match,

notational and technique analysis) is being integrated within the coaching process. In such a context it might also be important to consider the use of PA by coaches from a social constructive approach. Previous research has not explored how coaches learn and how this might impact on how they view performance. Does their formal and informal learning influence which performance variables a coach perceives as important and subsequently influences their application of PA? The approaches employed by a coach could potentially be influenced by their values and beliefs which will be formed by their previous experiences, their coaching peers and their formal learning.

Although some research has provided a useful insight into the role of PA in enhancing sports performance, in many cases the findings have had limited practical value to coaches (James, 2006). As a result there is still very little academic and practitioner research which has identified how coaches interact with PA. It is clear that a 'gap' has existed between research and coaching practice (Goldsmith, 2000), especially within this field of study. The primary aim of this study was to investigate PA tools and approaches employed by competitive sports coaches.

2.2: Methods: coach survey

A stratified sample of elite professional and semi-professional coaches (n= 65) was selected to complete an online-survey relating to their engagement with match, notational and technique analysis. The coaches were selected on the basis of either being currently enrolled on the UKCC level 4 coaching qualifications (this is the formal coach education programme for elite master coaches within the UK) or having some affiliation with the school of Sports

Tourism and the Outdoors at UCLAN via professional engagement. Forty-six coaches responded (response rate of 70.7%) and completed the online survey.

2.3: Participants' characteristics

Of the forty-six responders 93% of the coaches were males while 7% were females. 9% of the coaches were level 2; 31% level 3 (including UEFA B); 54% level 4 (including UEFA A) and 5% were level 5. The majority of coaches which took part in the study would be considered experienced coaches in that only 14% of coaches had less than 5 years formal coaching experience. 21% had up to 6-10 years experience; 34% had 11-15 years and 32% had over 15 years formal coaching experience. 50% of the coaches involved with the survey were full time coaches and 38% were part time (9% of the part time coaches identified they had other roles within the same organisation to supplement their part time coaching roles). Of the sports represented 46% were rugby league, 21% hockey, 18% football, 9% basketball, and 7% rugby union.

2.4: Procedure

The key themes of the questions were based on current literature relating to the provision of PA and UKCC learning objectives for the analysis of performance module undertaken by aspiring level 4 coaches (Hockey Coaching UK, 2008; Rugby Football League, 2011; Jones, 2011). The key themes for the questions were as follows: **Demographic information:** Participants were asked their: age range, gender, level of coaching experience, and standard of performers they coach. **Analysis process:** The time taken to perform and interpret analysis; how and what information was produced?   **Feedback:** By what means is feedback provided and when is feedback provided? **Implications for coaching practice**:

How the information provided impacts on the coaches' planning and interaction with players. **Key performance parameters:** What factors influence the selection of key performance indicators? **The value of performance analysis:** To what extent do the coaches and their organisations value PA?

A total of 34 closed pre coded questions were used, allowing coaches to select the most appropriate response. The questions allowed coaches to select multiple responses from each question. Having devised a bank of questions relating to the themes identified previously, the questionnaire was piloted on a group of 10 professional / semi-professional coaches and 5 academics in the field of sports coaching / coaching science. From these questions the most appropriate questions were selected and the questionnaire was amended according to the key points raised by the participants of the pilot study. An online survey was created using Survey Monkey (www.surveymonkey.com), all of the coaches involved with the study were contacted via email and requested to complete the online questionnaire. All responses were logged using the Survey Monkey tool. Before completing the online survey a glossary of terms were provided for the coach to make reference to while answering the questions.

2.5: Results

The majority of responders coached across a number of different levels, ranging from professional performers (25%), semi-professional performers (14%), international (23%) and national (9%) performers. The survey was also made up of (21%) coaches who coached at Academy, Regional and University level. The below table identifies the access to PA tools available to the elite coaches surveyed.

Table 2.1: The provisions of PA

Questions	Response	%
Q9: Do you have access to or are you provided with a video / DVD / edited clips following each match?	Rarely 2 or 3 times a year	7%
	Occasionally (1-2 times a month	9%
	Often (following most games)	16%
	All the time (after every game)	68%
Q10: On average, how long is it before you receive the above video/DVD?	The same day as the match	56%
	The following day	16%
	Two days following the match	9%
	Three days following the match	5%
	Four days following the match	2%
	Five or more days	9%
Q11. Do you have access to a performance analyst who provides match analysis on your behalf?	Yes	32%
	No	68%
Q13. Do you complete your own analysis of games/matches?	Yes	91%
	No	9%
Q14. If yes to the above, how much time on average following a game do you spend on this?	Don't complete analysis	7%
	Up to 1 hour	2%
	Up to two hours	14%
	Up to three hours	18%
	Up to Four hours	23%
	Up to five hours	21%
	Up to six hours	0%
	Up to seven hours	9%
	Seven or more hours	7%
Q15: Do you complete your own technique analysis?	Yes	72%
	No	27%

When considering the responses relating to the provisions of PA (Table 2.1), 68% of coaches would be provided with a DVD or edited clips after almost every game. The majority of these coaches (72%) would receive this information soon after the game; either the same day (56% of coaches) or the following day (16% of coaches). Only 32% of coaches had access to a performance analyst who would provide them with PA related information following each match. As a result 91% of coaches would complete their own formal analysis of each match and, as Q14 suggests, the time spent by a coach analysing each match can vary considerably.

Table 2.2 identifies that 17% of coaches who are provided with information from their own performance analyst spend up to 1 hour reviewing the information, while 25 % spend up to 2 hours and 15 % spend up to three hours on average following each match reviewing the information. Table 2.2 highlights that 86% of these

coaches use video / clips to feedback to the whole team; 82% use clips to feedback to individual players; 77% of coaches view edited clips from the game, 73% view edited clips of specific players and 73% use video clips to feedback to small groups of players. Of all coaches 43% would use some form of live coding and analysis during games, while 39% would also receive a written match report including game stats.

Table 2.2: When and the type of information provided

Question	Response	%
Q15: If you have been provided with match analysis (videos, clips, match reports, shooting percentages etc.) from a performance analyst following a match, roughly each week, how long do you spend reviewing this information?	Does not apply	27%
	Up to 1 hour	17%
	Up to two hours	25%
	Up to three hours	15%
	Up to Four hours	5%
	Up to five hours	2%
	Up to six hours	0%
	Six + hours	10%
Q16: What elements of performance analysis do you use / have access to? (Tick as many as appropriate)	View video of full game	86%
	Use video / clips to feedback to the whole team	86%
	Use video / clips to feedback to players individually	82%
	View edited clips from game	77%
	View edited clips of specific players	73%
	Use video / clips to feedback to small groups of players	73%
	View edited clips of key action points i.e. set plays, free kicks, short corner.	71%
	Use video clips to feedback to other coaches and support staff.	64%
	Videos of opposition	68%
	Quantitative game data i.e. match statistics	64%
	Motivational DVDS	55%
	Use full video to feedback to other coaches and support staff.	43%
	Written match reports, including game stats	39%
	Live coding / analysis during the match	43%
	Scouting reports on the opposition	41%
	Technical analysis of sporting actions	32%
	Videos of prospective players	32%
	Full time feedback shortly after full time (2-3 hours afterwards)	27%
	Half time feedback	25%
	Show full game to players and identify positive / negative aspects of play.	25%
	Full time feedback available immediately in dressing rooms after full time	14%

Table 2.3: How PA informs coaching practice.

Questions	Response	%
Q17: Does any of the above information you receive relating to performance analysis inform your: (Tick as many as appropriate)	Short term planning?	93%
	Medium term planning?	80%
	Long term planning?	70%
	Players you recruit?	36%
	Change your strategy for the following game?	77%
Q18: To what extent does the above information (Q16) collected via means of performance analysis inform your coaching sessions?	Rarely (2 or 3 times a year)	2%
	Occasionally (5-6 times a year)	11%
	Often (4 or 5 times a month)	37%
	All the time (every week)	48%
Q19: How often do you film training?	Daily	21%
	Weekly	21%
	Monthly	27%
	Yearly	7%
	Never	25%
Q20: What are the benefits of filming training?	To assess effort	57%
	To assess tactical/ special awareness	75%
	To assess technical capability	75%
	To assess movement related activity	61%
	To assess current form	21%
	To assess your own coaching approaches / delivery	7%
Q21: How useful is performance analysis in developing / introducing changes in your style / tactics / game plan?	Essential	43%
	Very	43%
	Fairly	9%
	Not very	5%
	Not at all	0%
Q22: What factors impact on your ability to feedback to your players / coaching staff?	Time taken to complete analysis	73%
	Lack of time available	75%
	Time lost from training/practice due to feedback	43%
	Availability of Lap-tops, PCs, Project screen, Palm-top etc. to feedback.	21%
	Players receptiveness to feedback	21%
	Availability of appropriate room / space to feedback to the full group.	16%
	Other coaches / support staff's receptiveness to feedback.	14%
	Usability of the information generated.	6%
	Reliability of the information generated.	5%
	Concern of providing an overload of info.	2%
	Equipment failure.	2%

Table 2.3 highlights that the information received via PA informs short term planning (93%), medium term planning (80%) and long term planning (70%). A large proportion of coaches (77%) identified that PA was used to change their strategy for the following game. Of the coaches surveyed 48% identified that PA information informs their practice sessions regularly (every week). While 37% of coaches identified that it informs their practice sessions often (4 or 5 times a

month), and directly impact on their planning process. Most coaches (86%) identified that PA was essential or very useful in developing and introducing changes in their style / tactics / game plan. Question 19 highlights that on a varying basis most coaches at some time will film their training sessions. The coaches identified that they would film training to assess: effort 57%, tactical awareness 75%, technical capability 75% and movement related activity 61%. A small proportion of coaches would film their sessions to assess their own coaching approaches and delivery (7%). The biggest concerns for the coaches when considering which factors would impact on their ability to feedback the information were: time taken to complete analysis 73%, a lack of time available 75%, loss of training / practice time due to feedback 43% and the availability of appropriate technology 21%.

Table 2.4: Coaches' use of performance indicators

Question	Response	%
Q23: Do you use key performance indicators to code key behaviours from a match?	Yes	86%
	No	14%
Q24: If yes, do your key performance indicators:	Remain consistent from game to game?	29%
	Change from game to game?	12%
	Some key indicators remain constant while some are more flexible and will change from game to game	54%
	Does not apply	5%
Q25: What factors influence your selection of key performance indicators?	Other coaches	34%
	NGB awards	14%
	Your coaching philosophy	91%
	Coaching literature	27%
	Gut Instinct	43%
	Training emphasis that week	5%
	Club priorities	18%
	Player feedback / discussion	5%
	Discussion / feedback from players	5%
	Academic literature	2%
Q26: How confident are you that these key performance indicators are attributed to success?	Extremely	23%
	Very	47%
	Fairly	25%
	Not very	2%
	Not at all	0%
	Does not apply	2%

Of all coaches surveyed 86% used some form of key performance indicators (KPI) to assess / code each game. Only 29% of coaches identified that these key performance indicators would remain constant from game to game, 54% identified that some KPIs would remain constant while some are more flexible and will change from game to game. The vast majority of coaches (91%) identified that their coaching philosophy would impact on their selection of KPIs, 43% also identified that their gut instinct would impact on their selection. Only 23% of coaches were extremely confident that these KPIs were attributed to successful performance; 43% were very sure and 27% were fairly sure.

Table 2.5 (below) highlights that the most widely used PA tools are SportsCode (59%), Opta Stats (32%) and Dartfish (23%). Most coaches identified that they do not use an external provider to supply PA services (84%). This might be as a

result of a lack of response amongst football coaches working in first team football settings, where we would expect them to utilise analysis providers such as Prozone.

Table 2.5: PA tools utilised

Question	Response	%
Q 27: What performance analysis tool do you have access to?	SportsCode	59%
	Opta Stats	32%
	Dartfish	23%
	Apps for i-phone/ i-pads / android phones	23%
	ProZone	9%
	Kandle snapper	7%
	Focus X2	2%
	Quintic	9%
	Kandle swinger	2%
	Sports Performer	9%
	Studiocode, iCoda	2%
	Not sure, I leave this to the match analyst	2%
Q28: How important is it that you have a good working relationship with your performance analyst (if you have access to one)?	Don't have one	56%
	Extremely important	16%
	Very important	19%
	Important	9%
	Not very important	0%
	Not important at all	0%
Q29: Do you use an external agency/ provider for performance analysis services?	Yes	16%
	No	84%
Q30. If you use an external agency/provider for performance analysis services, what services do they provide?	Does not apply	77%
	Video of the opposition	13%
	Recruitment videos	10%
	Scouting reports	5%
	Match/game stats	18%
	Bespoke projects	3%
Q31: Please tick the following statements which best describe how up to date you are with performance analysis technologies.	You keep up to date with the latest technologies and latest developments in performance analysis technologies and techniques	43%
	You keep up to date with developments in the technologies/techniques you are currently using	52%
	You keep up to date with the technologies/techniques on an annual basis	34%
	You keep up to date with the technologies and techniques every few years	0%
	You liaise with your performance analyst to keep informed with only the key relevant developments in performance analysis and techniques	16%
	You don't keep up to date with developments within performance analysis as you leave this to your performance analyst	2%
	You don't keep up to date with developments within performance analysis	5%

Table 2.6: The value of PA to the coach and organisation

Question	Response	%
Q32. Based on your organisation's commitment of money and resources, in your opinion to what extent does your organisation value the role of performance: match / notational analysis?	Essential	23%
	Very important	9%
	Important	27%
	Not very important	23%
	Not important at all	9%
	Not relevant	9%
Q33. Based on your organisation's commitment of money and resources, in your opinion to what extent does your organisation value the role of performance: technique analysis?	Essential	17%
	Very important	15%
	Important	32%
	Not very important	12%
	Not important at all	15%
	Not relevant	9%
Q34. As a coach to what extent do you value the use of performance analysis and the services a performance analyst can provide?	Essential	46%
	Very important	34%
	Important	11%
	Not very important	0%
	Not important at all	5%
	Not relevant	9%

Of the coaches, 36% felt that their organisation valued the role of match, notational and technique analysis as important / very important while 23% identified their commitment as essential. Of the coaches, 46% felt that PA and the services a performance analyst can provide were essential, while 34% valued it as being very important

2.6: Discussion

The aims of the present study were to investigate how and to what extent PA methods and tools were integrated within elite coaches' current practices. It was anticipated that the study would not only highlight what specific tools were being used but more importantly, to what extent coaches valued PA and performance analysts.

The ability to observe and assess performance can be considered one of the primary roles of the sports coach (Kidman & Hanrahan, 2011). Despite this strong evidence has been provided for the coach's inability to recall a high proportion of key events during a game, due to the limitations of human observation within the coaching process (Franks & Miller, 1986; Franks 1993; Laird & Waters, 2008). The subsequent dissemination of such research via the means of academic practitioners and coach educators could be attributed to the use of video analysis to enhance the coaches' observational strategies. This is supported by the results from this project which outlines that the vast majority of the elite coaches surveyed receive a video, DVD or edited clips of the game to review either the same day or the following day of the game. At many levels of play it is a requirement of the home team to provide the opposition with a video of the game within a specific deadline (O'Donoghue, 2006). Considering the availability of information post-match, an important question to be addressed in subsequent chapters would be, what do coaches do with this information and how does this fit into their subsequent planning, training and feedback process for the following week? Only a small minority of coaches receive this video on an occasional basis, if at all, and the obvious interpretation of this would be that they

do not have access to PA facilities. However based on other responses to subsequent questions, a more likely alternative could be that the coaches do not value or 'buy-in' to the role of PA in enhancing their coaching practice, specifically their ability to observe, recall and evaluate key events.

Nearly a quarter of all coaches use video, DVD or edited clips occasionally or rarely, which might suggest that they only incorporate the use of PA on an ad-hoc basis in preparation or following 'important or big' matches. This might also suggest that, for these coaches, PA does not play a systematic role within their coaching practice. While investigating sub-groups of coaches it was clear, on the whole, that both rugby league and hockey coaches are clearly aware of their potential limitations as a coach. All the rugby league and hockey coaches surveyed completed some form of their own analysis following each game, whereas as only 75% of football coaches do this. This report identified that over half of all coaches will use some formal game and match statistics, while 43% will generate match reports on the basis of information collected via PA. This would provide strong evidence that a large portion of coaches are not only using a systematic approach to enhance their observation process but also they rely on a number of other systems and techniques to recall and analyse key events during each game. This is also supported by the finding that the majority of coaches will spend between 1-3 hours reviewing PA data (clips, video, match reports, match statistics) following each game. This provides further evidence for the frequent use of systematic analysis within the coaching process. Further consideration might be given as to what extent coaches value this investment of time within the analysis and planning process.

Key findings from the survey highlighted that a substantial focus is placed on the use of video and clips to enhance stimulated recall with players. It was clear that the vast majority of coaches would use video clips to feedback to the whole team (86%), with players individually (82%) and with small functional groups (73%). Unlike rugby league and football, all hockey coaches would consistently use individual and small group feedback. Lyle (2002) has highlighted the importance of video in assisting the decision making process of complex situations in a number of teaching, coaching and mentoring settings. Based on the findings from this section alone it is not possible to identify if coaches use PA with players to improve a player's decision making process. The predominant use of video clips being presented to teams, players and coaches might suggest clips of important incidents are key in reflecting on significant decision making opportunities (refer to Table 2.2). Video evidence, as in these clips, has been highlighted as being important in stimulating dialogue between coach and players in relation to the decision making process (Groom et al., 2011). It is thought that the decision making process is enhanced by facilitating a common understanding of specific required behaviour, thus potentially removing misunderstanding and enhancing the clarity of the expectations of the coach (Groom *et al.,* 2011). These findings might also provide evidence that some coaches are embracing a more athlete centred / individualistic approach to their coaching, as the findings for this study suggest a high proportion will feedback on a small group and functional unit basis as well as feeding back to the whole team. These findings also provide evidence that coaches are using their analysis of information, to try

and differentiate the specific feedback they are providing to individual players and groups.

Research relating to the use of feedback by sports coaches has focused on its role relating to error correction, detection and other types of feedback, specifically concurrent, terminal and augmented feedback (Hodges & Franks, 2008; Swinnen, 1996; Swinnen *et al.*, 1990; Vander Lindon *et al.*, 1993;). An important consideration for a coach's perspective would be the precise timing of such feedback, but limited attention has been given to this within the current literature. At this point it is only possible to speculate on the level of concurrent, terminal and augmented feedback facilitated via video but it is clear that a quarter of coaches had access to PA data at half time, thus allowing feedback to players on the previous half of play if required. While just over a quarter of coaches had information available to feedback 2-3 hours following full time, the advantage of live coding which minimises analysis time, thus allowing the analysts to feedback to coaches or players much sooner. This would allow terminal feedback relatively close to the event taking place if the coach deemed this approach beneficial. Despite this only 30% of rugby league coaches used live coding while 67% of hockey coaches and 62% of football coaches would use this function. This can also dramatically speed up the analysis process as the game can be captured while play is happening (O'Donoghue, 2006). This is practically useful during tournaments, when the turnaround time of the analysis is required much sooner by a coach (O'Donoghue, 2006). An important issue highlighted was that, when asked what factors impact on the coaches' ability to feedback to players and coaching staff, time was a common constraint. A combination of these issues will

often result in coaches / support staff providing players with videos, edited clips and match reports to review in their own time. The obvious limitations to this is to what extent a performer's attention is being directed to the key performance elements, as valued by the coach and performance analyst team, to ensure the key message is not being lost.

The importance of the use of motivational DVDs and clips was also supported within this study as over half of the coaches use motivational clips and create motivational DVDs for their players. Reviewing videotapes of successful performances can have a number of positive effects on motivation and enthusiasm (Dorwick, 1991). Specifically, video tapes and clips can help increase: self-confidence; team confidence in forthcoming matches; enhance team spirit and develop a player's understanding of their own and their team's performance (O'Donoghue, 2006; Jenkins *et al.*, 2007). Interestingly when exploring issues around how and when information was fed back it seemed apparent that the players and coaching staff were receptive to the use of PA. This would suggest all support staff and players in these settings are fully accustomed to the use of video and PA within their sports context. Despite this there is evidence that suggests that player perception of PA is less positive and they can still be sceptical of PA, sometimes referring to it as a 'big brother' type exercise (Carling *et al.*, 2005:78). However no concerns on this matter were raised by the coaches within this study and only a minority of coaches identified that usability and reliability of the information provided was a concern.

The vast majority of coaches indicated that the information they receive relating to PA informs all levels of their coaching practice. In total, 93% identified that it informs their short term planning, 80% their medium term planning and 70% their long term planning. 80% of coaches identified that they use PA to change strategy for the following game. The slightly lower percentage indicating that it would inform their long term planning might be as a result of long term planning being less flexible and adaptive, as we might expect. These findings might also be as a result of the short-term constraints placed on many coaches working on a year to year and even, in some contexts, a month by month contract. Similarly many of the coaches involved with the study will have much more of a long term / development view in relation to their performance, as their role within academies and junior national and international squad settings might dictate they are more likely to have a developmental perspective. Again, nearly half of all coaches identified that PA would inform their training all the time (regularly throughout the week) while 39% highlighted that it would have an impact four or five times a month. This again supports the use of PA as an integrated element within coaching.

When reviewing the responses of the coaches relating to aspects of performance analysed during training, the vast majority of coaches responded that tactical awareness would be analysed. This has a common link with the importance of teaching games for understanding in that coaches would be attempting to engage and develop players at a cognitive level and not just on a technical and physical level (Light & Roberts, 2010). Despite the importance of teaching games for

understanding as promoted by national governing bodies via their coach development pathways, there still seemed a large focus on physical and technical aspects as the vast majority of coaches considered filming training as a benefit to assess players' technical capability, while over half thought filming training was useful in terms of assessing the effort of the performers. Over half of all hockey coaches identified that they filmed training on a daily basis whereas filming training is not as regular an occurrence for football and rugby league. A quarter of rugby league and football coaches would film training on a weekly basis. Clearly the key focus of filming training for the hockey coaches was to consider the technical aspects of performance, while the key focus from football and rugby league was to assess tactical features. The technical nature of hockey, justifies this emphasis but it is difficult to draw any key patterns for the use of PA within training, however it does clearly highlight that PA has the potential for being used to observe training as well as game performance. The rationale for this and the practices for filming training should be explored in subsequent sections, potentially it could be used to observe, analyse and feedback to players on the technical and tactical parameters observed during training. It might be useful for coaches to reflect on the effectiveness of the sessions employed and the extent to which the session's aims and objectives were achieved by the players.

To be confident of developing comprehensive intervention plans and strategies, coaches will look to highlight critical incidents within previous performances (McGarry, 2009). The vast majority of coaches surveyed identified that they used key performance indicators to code key behaviours from a match. Almost all

coaches identified that their coaching philosophy would influence their selection of key performance indicators while just under half identified that 'gut instinct' would influence their selection. Similar patterns were consistent across individual sports i.e. rugby league, hockey and football. The vast range in experience might be a contributing factor to the coaches' reliance on their 'gut feeling'. Potentially coaches with longer coaching careers might have more previous experience to draw-upon when analysing performance. This would suggest that the vast majority of coaches are able to objectively articulate their perceived coaching philosophy into action variables and behaviours which they can use to analyse performance. By articulating their coaching philosophies into strategies and game plans coaches can not only evaluate the progress from game to game but also over the period of a season. Despite this, still almost half of the coaches will depend on their 'gut Instinct'. Although this might lead us to question the ability of such analysis of performance to predict core features of future games due to their lack of reliability and trustworthiness, this does highlight that subjective analysis still plays an important part of a coaches analysis of performance. This was also supported in the findings in that just over half of coaches identified that there was some element of flexibility in their selection of KPIs, as they identified that some KPIs would remain constant while some would be more flexible and will change from game to game. Again this supports the notion that coaching is an 'art rather than a science', and in order to understand and represent the dynamic nature of the events during live match play there has to be some element of flexibility in the methods and tools of assessment used within these settings. Well over half of coaches identified that they felt extremely / very confident that

the KPIs they used to analyse performance could be attributed to success. As a specific group, rugby league coaches were a little more confident (80% were either extremely or very confident) while hockey (66%) and football (50%) coaches were a little closer to the overall coaches' average. The coaches' perceived confidence could be due to the use of archive data bases or longitudinal data analysis which they might have acquired over their many years of experience. The level of experience, expertise and systematic objective analysis employed might be an important consideration especially in light of the Dunning-Kruger effect (Hattie & Yates, 2014). This level of expertise might be especially pertinent if inexperienced coaches are making decisions based on their subjective opinions, as it has been suggested that incompetent people do not recognize how incompetent they are (Hattie & Yates, 2014). Some evidence has also been proposed that experts with the lowest rates of forecasting accuracy were simultaneously the ones with the greatest confidence in their predictive ability (Kiely, 2011; Tetlock, 2005).

Even despite the growth in PC based systems, match and notational analysis systems (Focus x2, Dartfish, Kandle snapper); it seems that Mac based systems are still used widely by many coaches across a range of sports (60% of coaches used sports code / game breaker). Although sports code and game breaker were predominantly used, it was apparent that most coaches would supplement their use with a range of other systems and tools, depending on their specific sport context. The vast majority do not use an external service to provide PA information which highlights the importance of a coach's involvement with the

collection and analysis of information (with the exception of football). This possibly also highlights a lack of financial support for PA in most sports other than football, as most sports potentially don't have the financial resources to pay external PA providers. In many cases the coach would also be responsible for completing game analysis thus a substantial part of their role would be fulfilling duties we would associate with a performance analyst, highlighting the multifaceted role of a high performance coach. But this tended to be in rugby league, field hockey and basketball, and not observed in football.

2.7: Conclusions

The findings from this study have provided an insight into the practical use of PA by elite coaching, relating to when and how coaches provide feedback via the medium of PA. However this study also started to explore how coaches and their organisations value the use of PA and how it impacts on their weekly coaching practice. An important emergent theme was how coaches selected key performance indicators and how sure they are that these factors can predict success. In order to explore the key findings from this study it would be appropriate to further investigate the individual responses of a coach in more detail in an attempt to discover how their values and beliefs impact on their individual use of PA and their engagement with PA services. The themes emerging in the survey were further developed in the thesis to inform more interpretive qualitative methods, with these key themes directly influencing the formulation of questions which would be posed to the coaches and analysts interviewed as part of the final sections of the thesis. In order to achieve this,

one to one interviews would have to be conducted to establish how previous coaching experiences, relationships with peer coaches and wider social interactions influence their use of and engagement with PA services and equipment. In order to better understand this phenomenon it would be appropriate to further investigate this area of study from a social construct approach.

The advantage of using a cross section of coaches from a range of different sports was that it provided some diverse findings for the use of PA from a wider perspective of sports environments. Although there was potentially some commonalities between sports the starkest differences appeared to be that in football environments they tended to employ an analyst. As a result the coaches would rely on the analyst to conduct the analysis of performance on behalf of the coach. While in other sports, specify rugby league and hockey, the coach would invest significant time conducting their own analysis of performance. In the initial preliminary goal scoring work (cf Wright et al., 2011) it became apparent a number of challenges of working together impacted on the PA approaches employed. As a result of the communication the author established with football coaches and analysts following the preliminarily goal scoring analysis there appeared sufficient interest to focus solely on the use of PA within football. By focusing solely on football there was the potential to explore how PA is employed from both the coach and analyst perspectives. A sole focus on football also standardised the sample to professional full time environments which was a key challenge due to the different level of professionals observed within other sports

previously explored within the coaching survey. As a result is was decided the

subsequent sections should focus on the use of PA within football.

2.8: Study One Part B: PA approaches employed by analysts working in competitive sports environments.

Part A and B share the same key objective to further explore PA tools and approaches employed within competitive sports environments. However there was a slight change in focus to the role analysts play in relation to PA tools and approaches employed and their perceptions of PA value. Due to the preliminary nature of the work online survey approaches were employed to get a broad insight into this area of study.

2.9: Introduction: Analysts' survey relating to their use of PA

The ability to observe and assess performance can be considered one of the primary roles of the sports coach. In recognition of this, research has highlighted the potential limitations to the coach's ability to observe, recall, feedback and analyse key events (Franks & Miller, 1986, Franks, 1993; Laird & Waters, 2008). A number of the aspects relating to contextual interference during a game have been suggested to contribute to this limitation in the coach's ability to observe, analyse and recall key events during live performance (Carling *et al.,* 2005). The subsequent dissemination of such research, via the academic practitioners and coach educators, could be attributed to the use of video analysis to enhance the coaches' observation and analysis strategies (Wright *et al.,* 2012). As a result the merits of match and notational analysis have evolved potentially as a legitimate sub element of sports science support, available to high performance

coaches (O'Donoghue, 2010)*.* This in turn has seen the growth in full and part time performance analysts' roles, especially within English professional football.

There is much research relating to game statistics and reliability of match and notational analysis studies (Hughes & Franks, 2004; O'Donoghue, 2010), yet the use and value of this information, within the coaching practice, still remains unclear (Groom *et al.*, 2011). Given the applied context of PA it is important that further consideration should be given to its pedagogical underpinning within coaching practice (Groom *et al.*, 2011). The obvious start point would be to explore what precisely is the role of the analyst in providing information which might enhance the quality of a coach's observation, recall, analysis and feedback. Despite a plethora of research surrounding match and notational analysis game data, there is still very little academic and practitioner research which has identified how coaches interact and utilise their performance analysts. There is a dearth of information identifying the role that a performance analyst plays in enhancing the coaching process. It is clear a 'gap' has existed between research and coaching practice (Goldsmith, 2000), especially within this field of study.

Before one can start to consider the impact that PA generated information might have on performance (cf. Hayes, 1997; Brown & Hughes, 1995; Jenkins *et al.*, 2007; Murray *et al.*, 1998; Martin *et al.*, 2004), it would be appropriate to further evaluate the role of performance analysts within the coaching process. Although this work is somewhat dated little, if any, research since has attempted to consider and report the impact of PA. Further exploring how PA information and

approaches are employed in practice might provide additional insight for future research which does attempt to illustrate the impact of PA within competitive sports environments, specifically football.

The aim of this study was to investigate PA tools and approaches employed by analysts and their perception of its value. Consideration was also given to what level of interaction they might have when providing this information to players and coaching staff. This will bring into consideration the coach's and analyst's relationship, the analyst's knowledge of the game and the coach's / manager's trust in the analyst to provide the correct feedback. These factors will assist in starting to explore how values, beliefs and philosophy within the club might impact on how the coach or analyst uses information or feeds back to an individual or the team. Consideration will also be given to the different roles an analyst might play in a first team context when compared to an academy setting.

2.10: Method: Analysts survey

A stratified sample of performance analysts, working within English professional football was selected to complete an online-questionnaire relating to their involvement within PA. The analysts were selected on the basis of their level of experience, the level at which they work at, or through professional affiliation with the University.

2.11: Procedure

Key themes were based on the current research on PA but because of the limited academic literature relating to the role of a performance analyst significant pilot

testing was completed in the construction and selection of the most pertinent aspects. A total of 32 closed questions were created for the questionnaire. Closed questions were chosen as it was important for the analysts to answer using a pre-determined set of responses facilitating the comparison across clubs and contexts within the clubs (Gratton & Jones, 2010). Only closed, simple and multiple response questions were used as it was anticipated that the findings from this study would directly inform future interviews with analysts within the later part of this thesis (i.e. chapter four). The surveys were not completed within the presence of a researcher thus attempts were made to make the survey as standardised and user friendly as possible, thus increasing the potential response rate. Some of the questions used Likert scales. This allowed the measuring of concepts, attitudes or opinions relating to their engagement with PA. Gratton and Jones (2010) suggested that a respondent may be unhappy about being forced into an extreme choice for a specific question whereas the use of Likert scale type questions allows the responder to give a clearer, more specific, answer. Where appropriate in the questionnaire, filter questions were utilised that enabled the responder to not answer meaningless questions that may have no relevance to them or be inapplicable.

In order to optimise the appropriateness, validity and clarity of the questions created substantial piloting of the questions was conducted (Gratton & Jones, 2010). The group of 6 individuals that took part in the pilot consisted of match / performance analysts and academic practitioners within the field of football PA. These individuals did not take any part in the actual survey itself. With limited

academic literature relating to the role of a performance analyst, this group were fundamental in the review of the appropriateness of the questions selected. Data derived from the questionnaire was collated and coded as frequency counts. Likert scale items were coded as 5 – 1 with 5 being the highest score or most important and 1 being least important. The questionnaire was created and collected using the online survey tool Survey Monkey and the results were exported to SPSS for analysis. In order to ensure that the analysts understood the questions a glossary of terms was provided within the questionnaire for the analysts to make reference to while answering the questions. Before completing the questionnaire a glossary of terms were provided for the analysts to familiarise themselves with. This was to ensure clarity when using key technical terms relating to the varied practice across the analysts' clubs

2.12: Participant's information

The participants comprised of two key groups: 66.7% (32) of respondants worked predominantly with a professional club, while 33.3% (16) predominantly worked within an academy setting. From the 48 respondants, 66.7% of the analysts currently had a full time contract within the organisation that they work for; 12.5% currently have a full time paid internship; 8.3% currently have a part time contract; 6.3% currently have a part time internship; 4.2% currently volunteer and the final 2.1% currently volunteer but get paid expenses by the organisation. In relation to their experience, 29.2% identified that they had 5 or more years as an analyst; 22.9% stating 4-5 years' experience within the role; 10.4% having 3-4 years' experience; 14.6% having 2-3 years' experience; 16.7% having 1 – 2 years'

experience and only 6.3% having less than one year's experience within the role as a match / performance analyst. The majority (85.4%) of the respondants stated that they had undertaken or were currently studying either a sports science or sports coaching degree, with a further 31.3% of the respondants having undertaken a masters after their degree. Knowledge of the game from a coaching perspective is highlighted to be important as 58.3% of the respondants have undertaken FA Level 1 coaching badges, 56.3% have undertaken FA level 2 coaching badges and a further 18.8% have undertaken their UEFA B coaching badge with only 6.3% having completed their UEFA A coaching badge. From the respondents obtained, two distinct groups appeared. The first group of analysts predominantly perceived the majority of their work / role to be with supporting professional players and the associated coaching staff. These players were defined as first team senior professionals, some of whom were currently playing for either the first team and/or the reserves team. The second group was academy analysts, who perceived the majority of their work / role as spent interacting with players and coaching staff within a full time academy setting, predominantly working with under 18s and 16s squads. However their role sometimes required them to support analysis across different age groups or squads, depending on the specific club resources and staffing

2.13: Results

Understanding the role that an analyst has within an analysis department can vary and the multiple roles that an analyst has can be seen below in Table 2.7. The majority of the analysts that responded are involved with post-match analysis (81.3%), post-match feedback (70.8%), pre-match analysis (79.2%) and also complete live analysis (79.2%).

Table 2.7: The roles of the analyst within a PA department.

Q6. What is your role within your analysis department.

Answer Options	Total Response%
Post-match analysis	81%
Post-match feedback team and individuals	70%
Pre-match analysis	79%
Live analysis	79%
Scouting analysis	54%
Talent identification	38%
Motivational DVDs	58%
Trend & data analysis	58%

Table 2.8: PA tools utilised.

Q10. What performance analysis tool do you have available to analyse performance

Answer Options	Total Response%
Dartfish	10%
Focus x 2	13%
Sportscode/Gamebreaker	88%
Apps for iphone/ipad	38%
Sony Vegas	31%
Final Cut	40%
Prozone Match Insight	35%
Opta	25%
Amisco	27%

Further analysis relating to the tools utilised also indicated that 87% of the analysts do use an external company to provide team or individual analysis of

their games. Of the external companies used (Prozone) was the most popular company used to provide additional analysis with 35%. This was followed by Amisco with 27% and then Opta with 25% (Figure 2.8). In this case clubs appeared to use multiple companies for different services (data collected prior to the merger of Prozone and Amisco, thus it is unlikely that clubs will use both Prozone and Amisco products).

Table 2.9: The Analysis Process.

Q11. How long on average would it take to complete your post-match analysis?

Answer Options	Total Response%	Academy % (total)	Professional % (total)
0-1hour	2.1%	6.2% (1)	0% (0)
1-2 hours	12.5%	31.2% (5)	3.1% (1)
2-3 hours	27.1%	31.2% (5)	28.1% (9)
3-4 hours	10.4%	6.2% (1)	12.5% (4)
4-5 hours	12.5%	12.5% (2)	12.5% (4)
6 hours or more	22.9%	6.2% (1)	28.1% (9)
Not applicable	12.5%	6.2% (1)	15.6% (5)

Table 2.9 identifies that the majority of analysts (both academy and professional) would take 2-3 hours to complete the post-match analysis. Of all analysts surveyed 77.1% responded to having discussed with the coach when determining which KPIs to analyse performance against; 16.7% of KPIs were determined by the coach or manager alone. From the identified KPIs the majority of the analysts (72.9%) stated that they provide additional analysis than just sticking to the agreed KPIs. Within the coding of games 65% of analysts use a standardised template to complete their analysis either for pre or post-match analysis with only 19% identifying that their coding template differs depending on the opposition that they are playing.

Table 2.10. Analysis preparation before providing feedback (Q21. How effective would you rate reviewing your analysis with coaching / management staff before feedback with players begins?)

Q21. How effective would you rate reviewing your analysis with coaching / management staff before feedback with players begins	
Answer Options	Total Response%
Very effective	33%
Effective	46%
Sometimes effective	15%
Rarely effective	0%
Not effective	0%
Does not apply	6%

The majority of analysts that responded in the survey stated that yes (89.9%) they did review their analysis with coaching and management staff before conducting feedback to players. As a result of this consultation with the coaches, 56.3% of analysts said that their feedback of the analysis would be modified. The majority of the respondents said that yes (72.9%) they provided some sort of instant feedback during performance while the remaining (27.1%) didn't provide any instant feedback during performance. It was also observed that 79% of analysts conducted live analysis, thus suggesting some clubs have the ability to feedback live or immediately after the game but choose not to.

Table 2.11 identifies the pre-match feedback process that the respondents predominantly use within their club setting. A number of responses exhibited

noticeable differences between the two groups of analysts. These were: group presentation; unit presentations and statistical documents. The subsequent question (Table 2.12) also identifies a number of differences in relation to the analysts' preferred use of unit presentation and statistical documents. When asked to rate the effectiveness of reviewing their analysis with the coach prior to feeding back to the player, 33% suggest that this opportunity was very effective, while 46% described this opportunity as effective.

Table 2.11: The pre-match feedback process: Total % of analysts (Academy total / Professional total)

Q17. What best describes the predominant approach to pre-match feedback? Please Note, answer this question based on the predominant approaches used within your club.

Answer Options	Majority of the time	Most of the time	Sometimes	Rarely	Never
Group presentations	74.5% (9/26)	12.8% (3/3)	10.6% (3/1)	2.1% (0/1)	2.1% (1/0)
Unit Presentations	11.1% (0/5)	15.6% (0/8)	60% (13/13)	11.1% (1/3)	2.2% (1/0)
Individual Presentations	14.9% (2/5)	17% (1/7)	42.6% (8/12)	23.4% (4/7)	2.1% (1/0)
Statistical documents	46.7% (1/19)	13.3% (3/3)	20% (5/4)	15.6% (2/3)	4.4% (2/0)
Game footage	87.2% (13/28)	4.3% (0/2)	6.4% (2/1)	0% (0/0)	2.1% (1/0)
Scouting reports	54.2% (2/24)	14.6% (0/7)	10.4% (5/0)	8.3% (4/0)	12.5% (5/1)

Table 2.12: Preferred pre-match feedback: Total % of analysts (Academy total / Professional total).

Q18. In which setting do you consider pre-match feedback to be the most effective? Please Note,
is the question must be answered based on your own preferred approach.

Answer Options	Very effective	Effective	Sometimes effective	Rarely effective	Not effective
Group presentations	42.6% 4/16	40.4% 9/11	17% 3/4	0% 0/0	0% 0/0
Unit Presentations	37% 3/14	45.7% 6/15	17.4% 7/1	0% 0/0	0% 0/0
Individual Presentations	46.8% 8/14	34% 3/13	19.1% 5/4	0% 0/0	0% 0/0
Statistical documents	17.4% 1/7	23.9% 2/9	45.7% 9/12	13% 4/2	0% 0/0
Game footage	70.2% 9/25	25.5% 6/5	4.3% 1/1	0% 0/0	0% 0/0
Scouting reports	34.8% 0/15	32.6% 8/7	26.1% 5/7	6.5% 3/0	0% 0/0
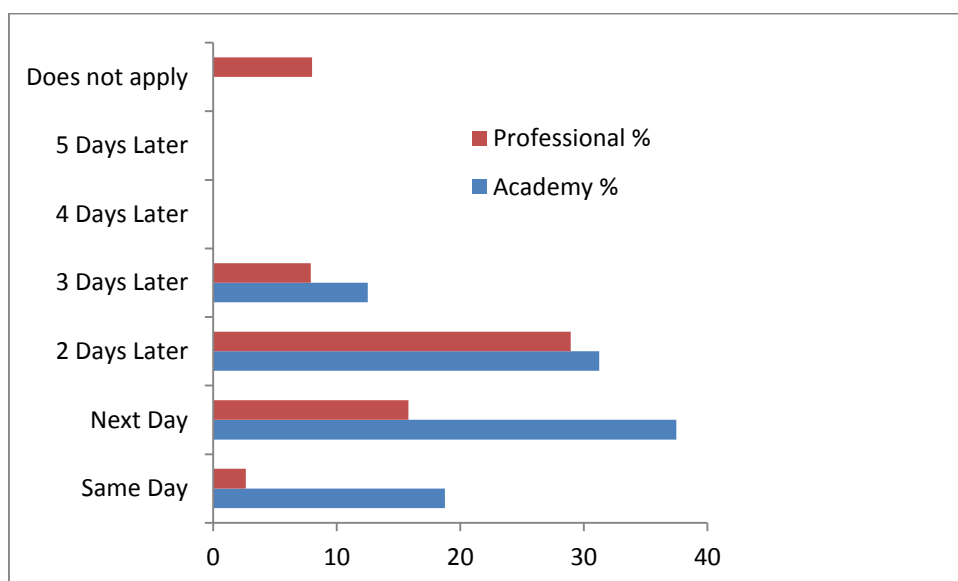
Figure 2.1: The post-match feedback process (Q22. How long after performance would you provide post-match feedback to coaching staff?)

Figure 2.1 identifies the post-match feedback process, from the respondents,

31% of academy analysts would provide feedback the same day while this Figure

was 24% for analysts working with professional players. Of the academy analysts

37% would provide feedback the following day while 44% of professional analysts would provide feedback at this point. A further 31% (of academy analysts) and 13% (of professional analysts) which took part in this survey identified that they would provide post-match feedback 2 days after the performance. For example if the game is played on a Saturday, feedback would take place on the Monday. Of respondents 8% (professional analysts) stated that this question does not apply to them, this could be because they only provide or complete the analysis as soon as possible but the management and coaching staff review this in their own time. It is not uncommon for the team and coaching staff to have one or two days rest following a fixture, thus feedback would be provided on their return. The analyst specific role might not require them to have any involvement with the delivery of, or the creation of post-match feedback, i.e. possibly only focus on opposition analysis and scouting reports. Similarly they might conduct analysis for a more senior analyst who has the responsibility of providing feedback to the coaching team.

From the 48 respondents 72.9% of them did not lead the feedback to players, although 12.5% of the respondents did state that they do deliver either pre or post-match feedback to the players. What has not been explored in the literature is the role of analyst within the feedback process and feedback sessions, for instance they may act as a facilitator to operate the technology and pull up required information or they may play a more active role in posing questions or providing instructions relating to technical and tactical aspects of performance. This is an important concept which might relate to the interaction between the coach and analyst and should be explored in subsequent chapters of the thesis.

From the analysts who selected that they did not lead the feedback sessions, the manager (62.5%) was the most commonly selected person to take the session (other than the assistant manager 31.3%; 1st team coach 18.9%; youth team manager 20.8%; youth team assistant manager 12.5%; youth team coach 16.7%). This was a multiple answer question so more than one person may have been leading the session while other backroom staff also supported the delivery of the analysis to the players. Of all the analysts that responded 60.4% said that they did have an input during the session and 29.2% of the respondents said that during the session they did not have any input into the feedback to the players.
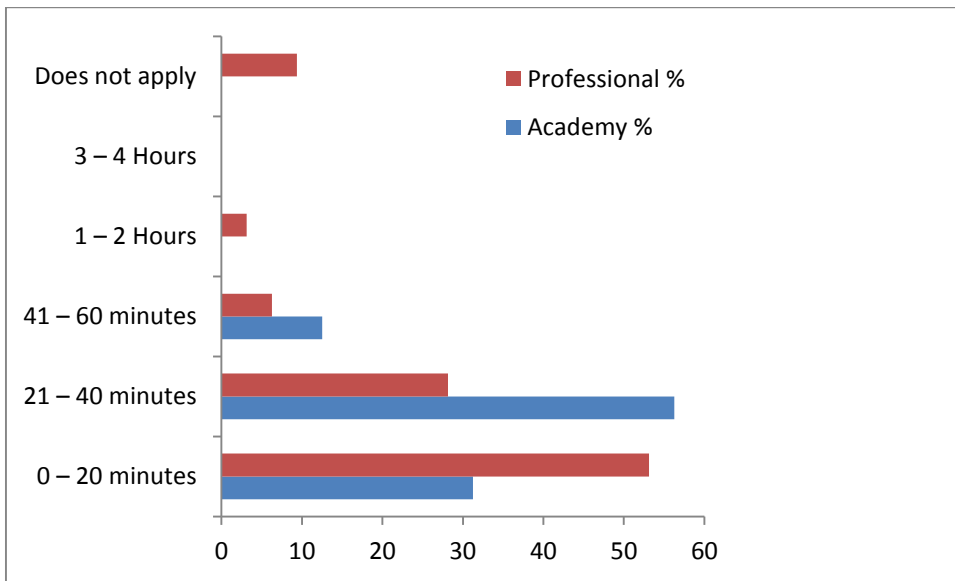
Figure 2.2: Post-match feedback (Q28 How long would an average post-match feedback session last?)
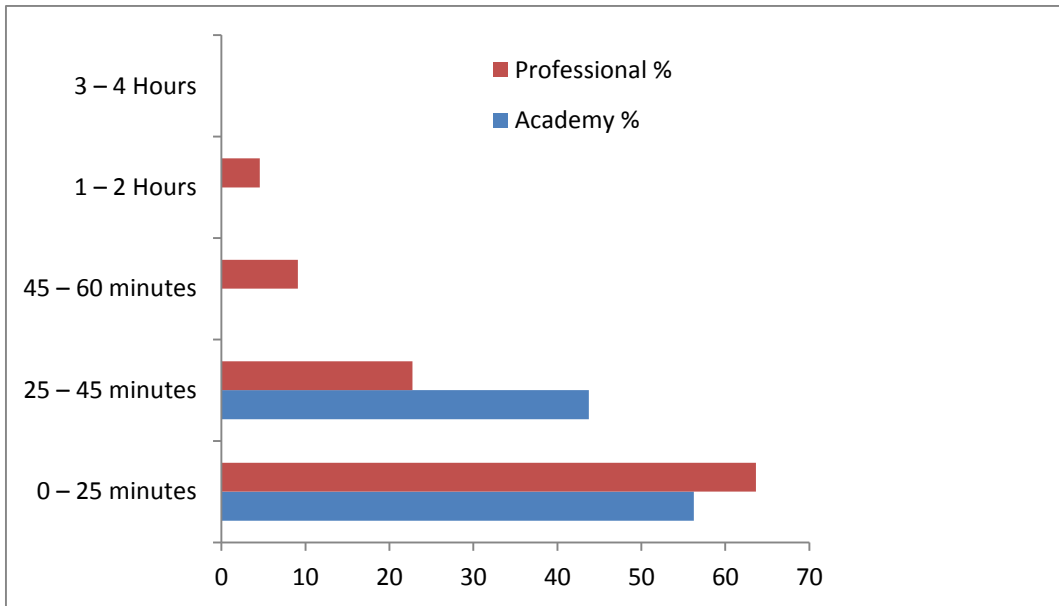
Figure 2.3: Post-match feedback (Q29 How long do you feel is an appropriate length of time for a feedback session?)

Over half of the analysts working in a professional context would take between 0-20 minutes to feedback (53%), while 31% of academy analysts would take the same duration for post-match feedback. A further 28% of analysts working in a professional context would take between 21-40 minutes, while over half of the academy analysts (56%) tend to use 21-40 minutes to feedback. When asked their preferred time frame to feedback the majority of both groups of analysts opted for 0-25 minutes (56% of academy analysts / 64% of professional analysts), while 44% of academy analyst and 23% of professional analysts preferred 26-45 minutes.

Table 2.13: The predominant approach to post-match feedback within your club: Total % of analysts (Academy total / Professional total)

Q30. What best describes the predominant approach to post-match feedback? (rate each: majority of the time, most of time, sometimes, rarely, never) Please Note, answer this question based on the predominant approaches used within your club.

Answer Options	Majority of the time	Most of the time	Sometimes	Rarely	Never
Group presentations	52.2% 8/17	26.1% 4/7	19.6% 4/5	2.2% 0/1	0% 0/0
Unit Presentations	4.5% 0/2	13.6% 1/5	56.8% 11/13	25% 4/7	0% 0/0
Individual Presentations	19.6% 4/5	30.4% 4/9	39.1% 6/13	10.9% 2/3	0% 0/0
Statistical documents	52.3% 3/19	6.8% 1/2	18.2% 5/3	22.7% 7/4	0% 0/0
Game footage	71.7% 11/22	17.4% 4/4	8.7% 1/3	2.2% 0/1	0% 0/0
Scouting reports(Of opposition/ prospective players)	18.2% 0/7	13.6% 2/5	15.9% 3/4	31.8% 7/7	20.5% 4/5

Table 2.13 identifies the predominant approach to post-match feedback being used within their current clubs or organisations. Clearly game footage plays a seminal role in that 71.7% of analysts will use game footage the majority of the time. Group presentations were the most popular form of presentation used (52.2%) over individual and unit presentations. Within their clubs and organisations, statistical documents were used the majority of the time (52.3%) by the analysts for the use of post-match feedback.

Based on the analysts' experience and exposure to PA the two groups differed greatly on 4 key responses as to the value of: post-match feedback; opposition analysis; instant feedback after the game and the importance of feedback in improving performance

Table 2.14: Approach to post-match feedback considered to be most effective: Total % of analysts (Academy total / Professional total)

Q31. In which setting do you consider post-match feedback to be the most effective? Please Note, these questions must be answered based on your own preferred approach.

Answer Options	Very effective	Effective	Sometimes effective	Rarely effective	Not effective
Group presentations	40% 6/12	35.6% 6/10	24.4% 4/7	0% 0/0	0% 0/0
Unit Presentations	41.9% 3/15	34.9% 3/12	20.9% 9/0	2.3% 1/0	0% 0/0
Individual Presentations	64.4% 9/20	26.7% 4/8	8.9% 3/1	0% 0/0	0% 0/0
Statistical documents	25.6% 1/10	32.6% 3/10	30.2% 8/16	11.6% 4/1	0% 0/0
Game footage	66.7% 10/20	24.4% 5/6	6.7% 1/2	2.2% 0/1	0
Scouting reports (Of opposition / prospective players)	9.8% 0/4	22% 4/5	39% 7/8	19.5% 4/4	9.8 1/3

Table 2.15: How analysis is viewed based on your own experiences or exposure to PA

Q32. Rate the following (very effective, effective, sometimes effective, rarely effective, not effective) Please Note, these questions must be answered based on your own experiences / exposure to performance analysis.

Answer Options	Very important	Important	Sometimes important	Rarely important	Not important
How important do you believe post-match feedback is?	80.9% 12/26	19.1% 4/5	0% 0/0	0% 0/0	0% 0/0
How important do you believe individual post-match feedback is?	72.3% 10/24	23.4% 5/6	4.3% 1/1	0% 0/0	0% 0/0
How important do you believe team post-match feedback is?	70.2% 8/25	21.3% 6/4	8.5% 2/2	0	0
How important do you believe pre-match / opposition analysis is?	53.2% 2/23	29.8% 7/7	10.6% 4/1	6.4% 3/0	0
How important do you believe it is to providing live analysis to coaching and management?	34.8% 2/13	45.7% 11/11	15.2% 1/6	4.3% 2/0	0

2.14: Discussion

The aims to investigate PA tools and approach employed by analyst and their perception of its value. Due to the imbalance between academic literature and practitioner based instruction it is anticipated that the information uncovered would help bridge the gap within the literature relating to the role that a match analyst actually plays within the coaching process. When comparisons were made between performance analysts who work predominantly in professional first team club settings and those who predominantly worked in academy settings a number of key differences were identified in relation to the provision of pre-match feedback, post-match feedback and the value of certain PA approaches.

Match analysis has been recognised as being of central importance within the coaching process, forming the basis of weekly training programmes (Thelwell, 2005), despite there being limited evidence to prove the association between match analysis support and success. The ability for a club to have accurate objective analysis systems available to them allows them to systematically ensure that player performance can not only be monitored but effectively evaluated to improve team and player performance development (Hughes & Bartlett, 2002). PA is also integral in the enhancement of the quality, specificity and accuracy of coaches' plans and interventions, thus maximising the opportunities for deliberate practice and potentially modifying behaviours (Court, 2004, Garganta, 2009; Groom *et al.*, 2011). Despite the potential benefits of PA, little evidence-based research has supported PA application in such a way within competitive football environments. This study did identify that 70.2% of the analysts use an external company to code games. This information is then analysed by the analysts within the club in most cases. The inherent benefit of

using external companies are that many incorporate multi- player tracking systems ensuring that every game behaviour of every player on the pitch is logged, thus ensuring assessment of virtually all technical, tactical and physical parameters (Carling *et al.*, 2009). This potentially provides an additional level of objective information which the analysts in the club might not have the time or means to collect themselves. Such information can prove essential in identifying wider performance problems or questions. Prozone was the most commonly used company to provide analysis, but the level of which all the information can be articulated and readily used might largely depend on the ability of the analyst to filter out irrelevant information (Hughes, 2004). Although, if an entire league of teams were using the same company, there is an inherent advantage in that clubs could then benchmark themselves against each other as every game is analysed using the same objective method (Carling *et al.*, 2005). It is highly likely that a large proportion of analysts who use an external company will still complete their own analysis to complement any information provided by external providers. An experienced analyst with a high level of understanding of the game will be able to produce their own accurate analysis of performance for the coaching / management team, having established their own inter and intra reliability (James *et al.*, 2007). Such specific selections of unique performance parameters might ensure that important aspects of qualitative contextual information relating to the team's KPIs, which are most highly valued by the club, are not lost within the data collection (Mackenzie & Cushion, 2012; Wright *et al.,* 2011). When an analyst's own inquiry might only be driven by KPIs derived from the coaching philosophy, weekly specific game plan, tactics and strategies, important wider holistic aspects of performance might not be included due to the specific focus of each analysts individual pre-selected coding window. From the study it was clear that the most common

analysis tools were Sportscode / Gamebreaker with 87.5% using these tools, which are Mac based analysis software packages.

The ability to communicate effectively between the coaching staff and the analysts is vital while identifying what approach to take while producing analysis of performance. The results from the study provide strong evidence for this as 89.4% of the analysts believe that the relationship between coach / manager and analyst is very important (Bourne, 2012; Court, 2004; Cushion, 2007). Although this might appear a little obvious it is important to consider why such relationships are significant and in what context might working relationships not be effective. These are key concepts which will be explored in the subsequent sections of this thesis. Some evidence for the importance of the coach-analyst relationship was shared by both groups of performance analysts, either working predominantly in academy or in professional settings. This is further supported from the study as 77.1% of the analysts stated that the KPI's used to analyse performance were negotiated by both the coach and analyst, thus highlighting the importance of the relationship in effectively designing and implementing KPIs that reflect their coaching philosophy, strategy and tactics. At this point it would be important to consider if the level of congruency between the coach and analyst impacts on the usability of the information which is produced, and as a result does this influence the extent that this information can be utilised within the coaching process? Also importance has to be placed upon the ability of the coach and analyst to quantify critical PI's which in turn result in the ability to provide meaningful information which can enhance their player development (Bourne, 2012; Groom *et al.*, 2011). This is further acknowledged by

O'Donoghue (2006) who believed that analysis provides information about performance that will assist coaches' and players' decision making.

The results from the study highlights the use of analysts reviewing their analysis with the coaching team before providing or conducting any feedback to the players as 89.9% already do this as part of their own analysis cycle. This might suggest that this allows for the most relevant footage or data from the game to be used within the feedback process, ensuring that the information is understood by the coaching staff and management allowing for them to be more knowledgeable when delivering feedback on performance, thus enhancing the quality and conciseness of their feedback.

The review process where coach and analyst review the statistics, game footage and clips might also be very useful in generating intervention plans and ideas. The initial review between coach and analyst was critical in creating meaningful discussion around the findings and videos, as 56.3% suggest that this discussion would further influence what was a priority to feedback to the player. At this point careful consideration might also be given to how the feedback process might be delivered to best aid with individual players' or teams' receptiveness to the information (Court, 2004; Groom & Cushion, 2004; Wright *et al.*, 2012). Furthermore, the study identified that the effectiveness of reviewing analysis before conducting feedback by the analysts is considered very effective: 33.3%, effective: 45.8% and sometimes effective: 14.6%. Based on the analysts that took part in this study, it appears that reviewing the analysis with the coach is a key role which the analyst plays. This might be associated with the coach's own awareness of their emotions and involvement

during the game, thus being aware that they are likely to miss too many key events of the performance (Frank & Miller, 1986; Franks, 1993; Laird and Waters, 2008).

There is a varying approach to pre-match feedback when comparing the roles between the analysts predominantly working in either academy or professional settings as a number of statistical differences were identified between the two groups (refer to Tables 4.8 and 4.9). Clearly more analysts in the professional settings tended to use group presentation, unit presentation, statistical document and scouting reports more frequently as part of their pre-match analysis (Court, 2004; Groom & Cushion, 2004). This could be due to the pre-match analysis and feedback holding more importance in assisting in the preparation for specific opposition. Possibly professional organisations have the capability to widely obtain information about their future opposition, thus placing more emphasis on its importance.

Within an academy setting the coach and analyst focus is more likely to be developmental, thus concerned with using analysis to enhance their own players and team personal /internal development (Court, 2004). A key difference was also identified on the value placed upon the importance of feedback on improving performance and the importance of feedback directly after performance by the analysts (Table 4.12). This could possibly be related to the outcome /result based approach that professional organisations face and the need to find any possible margins for improvement which might translate to on field performance. The urgency of such feedback of analysis might also relate to the high level of match congestion at certain parts of the season.

Regarding the need and use of feedback there is an abundance of current literature supporting its use and relevance to player development relating to skill learning (Collins 2012; Hodges & Franks, 2008). One of the key aims of this study was to address how the analyst might facilitate such feedback. It is evident from this study that the analyst may compile the analysis for the coaching or management staff but the majority of them (72.9%) do not actually lead the feedback session. Only 12.5% of the analysts that responded lead the delivery of the feedback to players. This could possibly be as a result of a number of factors which needed exploring such as: the level of experience and seniority of the analyst; the trust of the coach with the analyst and how highly the coach values the use of PA. At this point it is difficult to established whether it is appropriate for the analyst to lead feedback sessions, but this will also be explored within the subsequent chapters. It is important to understand that having the shared knowledge and understanding of the philosophy and coaching plans of the coach or manager would be critical in ensuring effective feedback (Groom & Cushion, 2004; Kuper, 2012; Wright *et al.,* 2012). If these aspects are not clearly articulated or shared by the analyst their ability to lead such feedback would be compromised, thus possibly explaining why coaches might not be willing to give autonomy to the analysts. Although the analyst may not lead the session, 60.4% did suggest that they did have an input into the session. This further supports the role the analyst plays in enhancing the feedback process.

This study has also started to identify how analysts working in specific contexts might value certain methods of post-match feedback. Analysts working with professional clubs were more likely to use and value the importance of statistical documents to feedback as opposed to academy analysts (Table 2.13 & 2.14). This might be

associated with tracking and monitoring performance variables over the course of a season and benchmarking across players and teams (Carling *et al.*, 2005). Such approaches are often linked to the availabilities of information provided by external analysis providers i.e. Prozone and Opta etc. The other aspects which were clearly different were that professional analysts valued the importance of pre-match / opposition analysis more than academy analysts (Table 2.15). These aspects again might suggest that professional teams have much more of an external focus in preparing for specific oppositions, while at an academy level greater focus is placed on their own individual and team's development. This could also be explained by a lack of available information about the opposition at academy level and or the inconsistency of the players which academy teams field.

2.15 Conclusion

The focus of this chapter was to investigate tools and approaches employed by analysts. The findings have provided an insight into the role that an analyst plays specifically within the pre-match and post-match feedback process. This study addresses the current gap in the research and opens up further debate on the need for more practitioner based research to allow analysts to explore the role they play within competitive football environments.

The use of PA and performance analysts have become key within competitive football environments. This is further evident by its proposed integration into the EPPP system. Its growing importance has also been seen with its integration within the current FA coach education courses, and in the increasing number of paid positions and internships currently available to support competitive football teams. Multiple universities are also currently offering courses relating to PA designed for

aspiring analysts and coaches who wish to fill these prospective roles. Despite this increasing demand for PA there is still little evidence-based research which has explored how and why PA is employed and how the role of an analyst is required to interact with coaches in order to provide an insightful assessment of performance. Although the information collected within this chapter from coach and analyst responses only provides a basic insight into approaches employed, this information was important in helping further understand the evolving role PA plays within the performance cycle. It is also important that this theory 'to' practice gap is explored as preceding research has highlighted the complex relationship between players and coaches within football environments (Cushion & Jones, 2006; Groom et al 2011; Jones, *et al.,* 2003; Potrac, *et al.,* 2002). Groom *et al,* (2011), further highlighted the importance of understanding the coaching philosophy, athlete's preferences, and the learning environment as being key to the delivery of PA. This thesis however proposes that the analyst plays a key part in these processes as described above. Potentially the complexity of having an additional person within the coach / player dyad provides an additional level of complexity which has not previously been explored within literature investigating the football performance cycle. Further evidence-based practice approaches have been widely used in the areas of sports psychology and are seen as being key in further developing professional knowledge and practice (Groom *et al.,* 2011). Subsequently calls have been made for more evidence-based practice research within the realm of PA to inform coaching and analysis practice (Groom *et al.,* 2011). As a result a more evidence-based approach employing interpretive techniques is key in exploring the role the analyst plays within football environments.

The responses highlighted from this help provide specific insight into the current use of PA within elite football clubs. The importance of the role analysts play in the feedback process has been clearly established as has the differentiated approach between analysts working in different contexts. In order to explore the concepts surrounding the interactions between the analyst and coaching staff and its impact on the coaching process, action based research or case studies would assist in further understanding this phenomenon.

2.16: Limitations: use of survey data collection

The key aim of this chapter was to investigate PA tools and approaches employed by sports coaches and analysts. The use of survey data collection aligned with this key aim as it provided a broad spectrum of questions relating to how and what approaches were implemented across a wider sample of practitioners (in total 46 coaches and 48 analysts) in relation to their application of PA. As a result the surveys employed were largely exploratory with few theoretical assumptions (O'Donoghue, 2010). The rationale for this was that it was preliminary work which would inform subsequent chapters using more interpretive techniques later in the thesis. Although the surveys employed did provide useful insight into these processes, the information drawn from these research findings were limited, in that no explanation could be drawn into why such approaches or processes were employed as questions were largely fixed, closed questions and did not allow the author to explore why participants responded in such a way. It was decided not to use open responses in an attempt to increase the accessibility and response rate amongst participants. This was also because all questionnaires were self-completed remotely by the participants (not in the presence of a researcher). It was anticipated if the questions took too long the participants might

be less willing to complete the survey, thus not completing the questions fully. However it was always the intention of the researcher to further develop the research method to employ more qualitative approaches in the subsequent sections, thus providing further interpretation and meaning as to why certain approaches and processes were employed, including the context and constraints within their practices. Despite this and conceding these key limitations, a number of weaknesses of the approach were apparent and needed further consideration. Although a targeted sample was used (for the coach survey), there was a poor response rate from the football coaches/ managers. As a result the findings were biased to the use of PA across rugby league (46%) and hockey (21%) which had the highest response rate. Due to the relatively low response rates across football (18%), basketball (9%) and rugby union (7%), in the result sections it was not appropriate to split results to show the response per sport. Although this would have been of interest, the researcher thought any analysis per sport would be highly problematic because of the relatively low number of participants. Only a few examples of specific differences were identified within the discussions to provide further breakdown of the key questions where the sports seemed to differentiate in relation the use of PA. Again at this point in the research journey just an overview of the use on PA across the sports surveyed was deemed necessary, thus finding 'per sport' was not deemed as important as general insight into the application of PA within competitive sport.

Although the questionnaires were accompanied by instruction, definitions and a detailed rationale, all questions were self-completed, not in the presence of a researcher, creating a number of weaknesses. Key challenges included the accuracy and honesty of the answers provided and the willingness of the participants to provide

answers that presented themselves in an unfavourable manner. The vast majority of participants were targeted as being engaged with UKCC level 4 programmes or working in conjunction with the School of Sports Tourism and the Outdoors, thus were made aware of the motivation of the project and its aims to enhance the understanding of their practices. As a result the researcher communicated with the participants, identifying to them that there was no alternative motive to expose them or their potential ineffective practices and that they were under no obligation to take part if they felt they could not answer the questions honestly. However the honesty and integrity of the participant responses could not be controlled above these measures employed. A fundamental weakness was that certain answer options may be interpreted differently. In an attempt to address this and make the questions as un-ambiguous as possible extensive piloting of the surveys were conducted on multiple groups. A number of challenges were faced in terms of the multiple choice and multiple response questions. Some questions were set up to allow participants to tick multiple responses as it was obvious that a multitude of responses was possible and the author did not want to unduly restrict the participant's response, thus providing freedom of choice if more than one option was deemed appropriate. As a result some questions did not appear to add up to 100%. Although multiple choice questions were used which limited the participants to one response parameters, participants were not required to answer all the questions and could skip (opt out of answering a question) if they felt it was appropriate. As a result one or two questions seemed to contradict each other and despite being very similar questions slightly different response rates were reported, which possibly questions the reliability of some of the responses obtained.

Analyst surveys were created to give a perspective on which approaches were valued and their perceived effectiveness over other approaches (using a Likert scale ranging from very effective to mostly effective). Although some differentiation can be identified in terms of the level of favourableness of their attitude placed on different approaches, one of the significant limitations of Likert scales is that 'they do not provide a basis for saying how much more favourable one is than another' (Burns & Dobson 2012:376). There is no basis for the belief that the five positions indicated on the scale are equally spaced. The interval between 'strongly agree' and 'agree' may not be equal to the interval between 'agree' and 'undecided' (Kotharia, 2006:183). Also, in reflection the results could be biased towards more positive responses. As it has been suggested surveys employing Likert scales have a tendency to encourage respondents to answer according to what they think they should feel rather than how they do feel (Kotharia, 2006:183). Although this was not initially identified in the extensive piloting of the survey, these responses might be limited as a result of this. Possibly the questions might have been less ambiguous and more reliable if the responses were limited to the frequency of the use the approach, rather than the value associated with it. Again this was a key limitation but the author wanted to attempt to try and explore the coach and analyst perceptions of the value of PA approaches. Although the use of Likert scales did ensure the participants' responses were not limited to the extremes of 'yes' and 'no' responses, the fixed options required them to make an absolute judgment on their individual situation. Such approaches might force participants to choose 'absolute answers', which don't reflect the complexity of practice and approaches they employ in their everyday environments. As a result the findings were likely to be focused on finding universal rather than the multiple truths which help explain the complexity in which coaches and analysts operate.

2.17: Bridging Section: Chapter Two into Chapter Three and Four

Within the literature little is known about what performance aspects coaches value and how PA generated information is used to modify subsequent practice. There is currently a lack of published literature surrounding PA application in an applied context. There is still very little academic and practitioner research which has identified how coaches interact with PA and how PA impacts on a number of their daily and weekly activities. Mackenzie & Cushion (2012) identified that current research undertaken is arguably of little help to practitioners and as a result there exists a gap between 'theory-practice' in relation to how PA is currently employed. As a result it was felt that additional primary research was needed to establish an understanding of some of these aspects before directly discussing them with elite coaches, analysts and players. Although the findings from chapter two were limited to a simple indication of common approaches and the perceived importance of the use of PA amongst coaches and analysts, they did provided important direction to explore why PA was used in the subsequent chapters.

Some of the important key themes that emerged from the coach and analyst survey included:

- The specific focus of analysis, and how this related to the implementation of a specific coaching philosophy, strategy and tactics.

- The coaches and analysts approach was influenced by either a developmental or winning focus.

- The extent of the coaches and analysts 'buy-in' in relation to their perceived importance of the role which PA can play.

- Coach analysis was largely influenced by their 'gut instinct' and their subjective analysis.

- PA impacted on their match reports and planning process.

- PA information impacted on their post-match discussion on the game.

- The use of PA to facilitate individual and small group feedback approaches.

- The timing of feedback within the training week.

- The difference in focus / approach per level i.e. in a professional and academy football environment.

- Analyst level of interaction and engagement with the coaching team.

- Analyst level of involvement during the feedback sessions.

Only recently in the work of Groom *et al.* (2011), which utilised a grounded approach, have attempts been made to explore the complexities surrounding the coach's use of PA. The process surrounding PA and feedback has been largely simplified (Mackenzie & Cushion, 2012) with no consideration given to complex interchanging environments and 'social inter-dependencies' having an effect on the interaction and interplay between the coaches and analysts (Cushion et al, 2010). Similarly little is known about how these key social and cultural factors might shape the relationship formed between the coach and analyst dyad.

Although the findings from the surveys were extremely useful in making some reference to many of the important aspects regarding coach and analyst engagement with PA, the findings from the surveys largely only provided insight into what PA approaches were implemented. This resulted in largely a superficial description of its use. In order to illicit a deeper understanding into 'how' and 'why' specific PA approaches and techniques were employed it was important that qualitative approaches were further explored. In order to further develop the key findings from this study it was decided it would be appropriate to further investigate coaches',

analysts' and players' individual responses in more detail in an attempt to discover how and why their values and beliefs impact on their individual use and their engagement with PA. As a result it was decided that to better understand this phenomenon it would be appropriate to further investigate this area of study from an interpretative research approach. This is an important shift from traditional PA research method approaches. A move towards more 'naturalistic and qualitative methods' has been supported as being critical in order to develop new knowledge in this area (Mackenzie & Cushion, 2012:18).

At this point a decision was made to solely focus on football for a number of reasons. Firstly, football seemed to exclusively rely on analysts to complete the analysis themselves and very few coaches would invest sufficient time to analyse each game themselves as the coaches tended to rely largely on the skills of a performance analyst. It was evident that coaches from other fields would engage in analysis of video and performance information themselves, rather than relying on a performance analyst to produce this for them. Also following the surveys a lot of positive comments emerged from analysts about the effectiveness of the use of PA within their environments or the constraining factors which they faced in their daily practices. Making the findings available to the analysts who took part in the survey generated additional interest from these groups, thus a database of analysts within the clubs which were willing to further discuss their role and the use of PA was established. Due to the relationship the author had developed with these analysts over a prolonged period of time they seemed willing to talk openly around their use of PA. As a result it was felt that focus in the first instance should be on a group of coaches and analysts from one sport, which tended to rely heavily on PA, thus selecting football.

The previous considerations identified above informed the subsequent studies and the line of questioning explored within chapters three and four.

- As a result of the responsiveness of the analysts and their openness, they seemed to admit they had a story to tell in relation to the use and misuse of PA, thus it was felt that the subsequent sections should focus on football alone. However it was also important to reflect how the work of the analyst played a key role in supporting the coach in achieving their performance related goals.

- Due to the largely inductive nature of the research topic it was appropriate the focus of the interview should remain as open as possible to allow the coaches and analysts to reflect on their current practice and wider factors impacting on their daily use of PA.

- An important aspect was of the effectiveness of the relationships which in turn influenced the impact of PA.

CHAPTER THREE

3.0: Study Two: Player engagement with PA

The key aim of this study was to identify player perceptions of PA use within football environments. An initial questionnaire was employed to obtain some general insight from a wider sample of players; this was then followed up by more interpretive approaches where interviews were used to establish a deeper understanding for player perceptions within their specific environments. Implications for coach-analyst interactions and the techniques employed within the coaches and analysts every day practice will be explored in the subsequent chapter, chapter 4.

3.1: Introduction:

A plethora of research has identified the contexts associated with coach led feedback, including augmented feedback, and the associated benefits of terminal over concurrent feedback. A comprehensive review of this and the nature of feedback are provided by Hodges & Franks, (2008). Consideration has also been given to the importance of developing an athlete's own ability to generate self-correction via error detection and error correction (Hodges & Franks, 2008). Despite this, however, there seems to be a gap between the research surrounding motor learning and feedback approaches and how this might translate to the delivery of PA. In fact, O'Donoghue (2010) suggests that the purpose of PA in a coaching context is to provide augmented feedback to help the player learn about their performance and identify areas requiring attention. The concept of augmented feedback is broad, however; therefore one would suggest that the application of PA, within the feedback process specifically, hinges upon the coach's ability to deliver information correctly and efficiently whilst taking into account a number of contexts, interpersonal and social factors (Potrac *et al.*, 2002).

An important question, key to the present study, is the extent to which coaches are engaging players during video sessions and the impact these have on a player's learning and subsequent performance. Traditionally, some sports coaches have made the assumptions that winning is based on the foundations of technical and tactical superiority (Denison, 2010; Grecic & Collins, 2013). Such a mechanistic approach has been further perpetuated by the role of sports science in supplementing the coaching process (Gilbert & Trudel, 2004; Reilly & Williams, 2005) and thus, being adopted by some of the world's most influential coaches (Curzon-Hobson *et al*., 2003; Denison, 2007; Williams & Hodges, 2005). Clearly, PA has played a role in propagating such an epistemological approach. However, recent evidence from player development has highlighted a more athlete centred, holistic approach as being conducive with fostering elite players (Grecic & Collins, 2013; Abraham & Collins, 2011; Allen & Hodge, 2006; Jones & Wallace, 2005; Ollis & Sproule, 2007; Potrac, *et al*., 2000). As a result, many coaches have been encouraged to embrace approaches which facilitate players' self-analysis, self-reflection and which develop players' own decision making capabilities (Grecic & Collins, 2013). The use of effective questioning, discussions and problem based learning approaches have been central to the effective practice of teaching games for understanding and constraints led coaching (Light & Roberts, 2010; Evans & Light, 2008). Notably, however, such approaches are in direct contradiction to a more traditional instructor based, learn-do philosophy, often associated with elite football coaches approaches (Partington & Cushion 2013; Williams & Hodges, 2005; Harvey *et al*., 2010). Subsequently a key concept which was considered in this investigation is to what extent such changes in approach are reflected in a coach's use of PA during feedback and debriefing sessions, if at all. For example, will players be exposed to the traditional 'sit there and

receive direct instructions', or will they be engaged with questions, discussion and encouraged to develop their own decision making capabilities. Emerging research in this area has focused on the importance of player learning approaches and preferences (Reeves & Roberts, 2013; Groom & Cushion, 2005). The author would propose that it is important that this concept is further explored in detail, specifically the extent to which coaches manage or attempt to engage players during video feedback sessions. Are such sessions perceived by players as a one way method to deliver technical instruction and information as highlighted by Potrac *et al.* (2002) or a two way dialogue regarding performance? One would suggest this is more complex than simply understanding the preferred learning styles of the players and therefore warrants further investigation, as recent evidence has begun to question the legitimacy of learning styles (cf Pashler *et al.,* 2008; Rasmussen, 2015). Preceding research within educational settings has identified a multitude of factors which might impact on the likelihood of an individual engaging within the learning experience, for example: ability, background knowledge and interest (cf Dweck, 2009; Riener & Willingham, 2010). As such, further focus should be placed on how learning preferences might foster learning and if this translates to video feedback sessions. Although research has provided consistent evidence that both children and adults have preferences about how they like information to be presented to them, there is little evidence which suggests that specific delivery in the preferred modality enhances student learning (cf Pashler *et al.,* 2008; Rasmussen, 2015). As a result it has been proposed that the focus should be placed on the learning strategies which have consistently been shown to work for the learners rather than specific learning styles (Pashler *et al.,* 2008; Rasmussen, 2015). Subsequently this investigation will be interested in how learning strategies emerge within video based learning situations.

Research suggests that, when video feedback is used with questioning from coaches, an improvement in the quality of tactical knowledge can occur as a result of adaptations in the athlete's long term memory (Garcia-Gonzales *et al.*, 2013). If this information is transferred to the player's decision making capacity, it has been proposed, this will lead to a higher percentage of successful decisions made during game play (Garcia-Gonzales *et al.*, 2013). This further supports the presence of PA within coaching practice for improving athlete performance via self-reflection. One would speculate that this is as a result of stimulated recall and an enhanced perceived reference of correctness (Mackenzie & Kerr, 2012; Hodges & Franks, 2008) but the mechanisms for such improvement have not been adequately explored within the identified research.

A second key concept central to this investigation is the use of PA to supplement reflective practice. Reflective practice has become a central concept within the coaching literature and coach education over the last two decades (Cassidy, *et al.*, 2006; Cassidy, Jones & Potrac, 2004). As PA technologies become more widely spread, user friendly and easily accessible (Wright *et al.*, 2012), it has also been proposed that PA might play a central role in enhancing the clarity and criticality of reflective practice if employed effectively. PA approaches have become important aspects of the academy player's own self-analysis and reflective logs as outlined by Elite Player Performance Plan (EPPP - Youth Development Rules 2012), and are becoming widely employed in football academies. Such processes might encourage more independent learners when supplemented with a coach's input. However the extent to which such opportunities are facilitated via the means of PA within professional football settings is still unexplored.

It has been well documented that the coaching process has often been oversimplified but recent empirical work has attempted to highlight the process as something which is not merely delivered but is a dynamic social activity (Jones, 2000; Jones *et al.*, 2002). It is argued that insufficient attention has been paid to the fundamental social dimensions of coaching and that too many studies have adopted a quantitative survey approach whereas a more interpretative investigation of context, values and behaviours are likely to give more of an insight into 'real world' coaching (Lyle, 1999). Previously, research within the realm of PA has largely used the positivistic paradigm, a core concept of which is reductionism. Reductionism attempts to understand the functioning of the whole through analysis of its individual parts (Brustad, 1997) but, unfortunately, this method views human behaviour as measurable, predictable and controllable (Smith, 1989), something which is not reflective of a process as dynamic as the coaching process. Therefore, an alternative research approach is required. Glazer (2010) puts forward the notion that, rather than utilising a reductionist, inter-individual approach, a more holistic, intra-individual, process-orientated approach is required. Mackenzie & Cushion (2012) agree with this point and state that a more action-based, case-study type approach is required to investigate questions specific to performance. Nelson *et al.* (2011) echo this point suggesting that more naturalistic and qualitative methods such as case studies, interviews and mixed method approaches may be beneficial in developing new knowledge and understanding. Consequently, this investigation utilised a hierarchical content analysis to explore player responses to generate new theories on the practicalities of PA. As a result these methodological considerations were at the forefront while planning and executing the remaining studies as part of this thesis.

Reflecting these considerations, this study considered whether players feel they are given the opportunity to engage with PA driven feedback sessions and the benefits of doing so. The overall aim of this investigation was to explore players' preferred engagement with the PA approach.

3.2: Pragmatic research philosophy and interpretive approaches

As discussed previously in this thesis very few studies have considered PA from an interpretive paradigm. The vast majority of research which has been employed within PA settings has originated from reductive positivistic approaches (Mackenzie & Cushion, 2012; Carling *et al.,* 2014a). It was anticipated that employing more qualitative interpretive approaches would allow a closer relationship between the researcher and the topic (Denzin & Lincoln, 2008). Utilising interpretive approaches would ensure the researcher 'gets inside the way others see the world or constructs meaning in their worlds' (Pope 2006:22), which was key as little consideration has been given from the coach, analyst and player perspective for the use of PA. An interpretation of the applied use of PA would be of primary concern to practitioners who have little evidence base for which to draw upon the use of PA data/ information and approaches, as the majority of PA research is solely concerned with the analysis of PA data and information (Carling *et al.,* 2013a; Mackenzie & Cushion, 2012). The aims of the research method were clearly guided by the applied problems the research had encountered and as a result it was anticipated that the subsequent generation of applied research should 'make a difference to the individuals or groups that it examines' (Corbin & Strass, 2008; Giacobbi et al., 2005). A central concept to the thesis aims related to how and why PA approaches were employed in the everyday practice within competitive football clubs. Pragmatic research philosophy has highlighted the importance of providing an interpretation of the actions and

activities associated with practitioner's everyday practices (Stringer, 2007), thus the research questions appear to have aligned with a pragmatic research philosophy. Pragmatic research philosophy has also identified the importance of real world processes and functions and is less concerned with a definitive representation of reality and realities (Cruickshank *et al.,* 2014).   As a result it is less concerned with establishing 'universal truths', but the multiple truths arising out of the relationships, negotiation and dialogue between members (Giacobbi *et al.,* 2005:27). Information presented via the pragmatic approach should encourage practitioners to critically reflect and reappraise their common sense knowledge, hence it is not just about replacing common sense knowledge with more sophisticated scientific theories (Schwardt, 1996). Central to this approach is the ability of the interpretation to provide explicit insight into the demand of the circumstances, constraints and context being explored in order to provide meaning to the end users. As a result the findings are provisional to the specific context in which they are developed (Corbin & Strauss, 2008; Cruickshank et *al.,* 2014), but if sufficient contextually rich accounts are provided practitioners will be able to make their own decision on the relevance and transferability of the information provided .

3.3: Method: mixed method: Participants

Altogether, 48 male footballers from three different English Championship Football Clubs completed an online questionnaire. All players were full time Academy (Under 18's, n=31) or Senior (development/1st team, n=17) players. Out of these 48 players, 22 were selected using opportunistic sampling to complete a semi-structured interview.

3.4: Design

All 48 players were initially asked to fill in online questionaires at www.surveymonkey.com (key steps where followed as described in the development and execution of the coach and analyst surveys in Study One parts A and B) and 22 players were subsequently selected take part in a semi-structured interview which consisted of 14 open-ended questions. During this process the lead author acted as an 'active listener' in an attempt to assist the players in describing their own experiences and preferences in their own words (Smith & Sparkes, 2005). It was hoped that the players would give open, honest and more in depth answers due to the author's previous rapport with the players, as the analyst from each club also assisted in the data collection process (Athens, 1984). The interviews were recorded using a recording device in order to be later transcribed and each interview lasted between 22 and 35 minutes. The research design was considered appropriate as Francis & Jones (2014) recently suggested that a quantitative questionnaire using a Likert scale to evaluate player perceptions should be used alongside semi-structured interviews to gain an insight into personal views and opinions of PA.

3.5: Data analysis and trustworthiness

Once the players had completed the questionnaire, responses were immediately available at www.surveymonkey.com and were later exported for analysis in Microsoft Excel. Analysis was carried out on the interview transcripts using hierarchal content analysis, in accordance with Harwood, Drew & Knight (2010), Pain & Harwood (2004), Sparkes & Smith (2014). The researcher immersed himself in the raw data to become familiar with all aspects of the audio interviews, transcripts and memos. Significant statements relating to player engagement with PA were identified; notes were transformed into concise phrases to produce a set of concepts representative of player

responses. Immersion was achieved by re-reading the transcripts, listening to the interview audio files multiple times and discussing key concepts from the interviews with the supervision team. Raw data themes were used to establish code in QSR Nvivo (Qualitative Solution Research 2002, Version 10, www.qsrinternational.com) and all interview transcriptions were coded following an inductive approach in Nvivo using these established codes. Connections between themes were identified to cluster raw data themes into meaningful categories which fitted together. Nvivo was then used to code and establish higher order themes which represented themes contained within each category. At this point, clusters of data were crossed checked with the initial transcribed material to ensure these remained consistent with the actual wording of the participants. An investigator who was not present during the data collection, but experienced in qualitative research, reviewed the analysis to complete inter-reliability checks. At this point the appropriateness of higher and lower order codes was critically reviewed by the research team. Following the coding of all data, the raw data themes were incorporated into higher and lower-order themes that described the participants' views (MacNamara *et al.*, 2010; Pain & Harwood, 2004).

Several steps were taken to establish trustworthiness, as outlined by Lincoln *et al.* (2011). To maximise the levels of open-ended responses probes were used only to provide additional clarification of points made by a player and to identify examples from the participant's practice when required. In an attempt to explore personal bias which might impact on the collection and interpretation, the lead interviewer bracketed their own views as much as possible (Sparkes & Smith, 2014). As part of the piloting interview the lead researcher held interviews with a member of the research team to discuss potential bias which the lead researcher might have in terms of the PA in elite football, thus attempting to minimise such bias during subsequent interviews. Two

researchers carried out reliability and consensus validation checks, which involved the coding of 4 interview transcripts from player interviews (Lincoln *et al.,* 2011; Martindale & Nash, 2012). Inter-related agreement amongst researchers was found to be 84% for the higher order categories and 81% for the lower order categories. These results can be considered relatively high in relation to previous findings (>80%, in Keegan *et al.*, 2009; Keegan *et al.*, 2014). To establish this inter-related agreement, the author and one member from the supervision team coded the interview transcripts within Nvivo to establish agreement of the coded higher order themes. Having completed this process the instances of agreement were calculated to provide a level of agreement as a percentage (this was calculated by identifying the differential between the numbers of agreed higher order themes coded compared to the total number of higher order themes). This process was then repeated with the high order construct tables to check that the lower order themes were aligned appropriately to the higher order themes. If the second researcher was not in agreement with the primary researcher this was indicated on the table as a mismatch (in that the lower order theme did not align with the higher order theme) and the number of times non-agreement occurred was presented as a percentage of the total number of lower order themes. The results of the reliability and validity checks were discussed by the researchers who acted to finalise details and confirm the level of agreement and consistency of the merging themes and categories. Finally, member checks were conducted whereby a summary of the results coupled with the conceptual framework was sent to a selection of the players so they could verify accuracy and provide feedback on their interpretation. Guba & Lincoln (1989:239), identified member checking as being one of the 'most critical techniques for establishing credibility'. As well as acting as a verification process this also provided additional dialogue between the participants and

author to ensure the findings were representative of their everyday actions and activities surrounding the use of PA. Some qualitative researchers have raised limitations when employing member checking in that feedback from participants should not be guaranteed as an unquestionable source of authority (Sparkes & Smith, 2014). These considerations were noted but in this instance member checking was deemed appropriate in enhancing the meaning of the findings for the end user, thus being consistent with a pragmatic research philosophy. Responses from the players confirmed the accuracy of the results and appropriateness of the framework. In total, raw data themes emerged from the data, 26 higher order themes and 103 lower order themes. The steps identified above were also constantly adhered to and employed in the remaining data collection within this chapter.

3.6: Results: player survey data
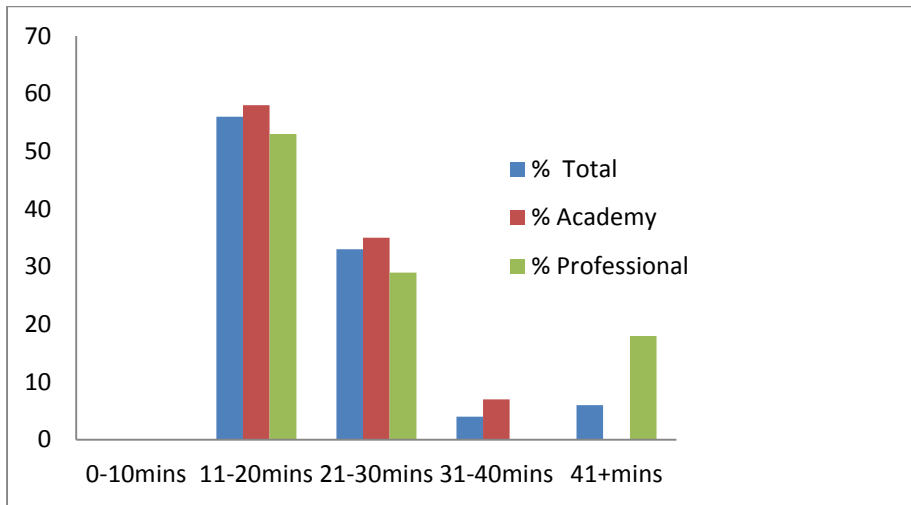
Figure 3.1: Actual video feedback session duration

The vast majority of players were of the opinion that feedback sessions should be no longer than 30 minutes in duration, with 54% of players suggesting that sessions should last 11-20 minutes and 35% suggesting that they should be 21-30 minutes.
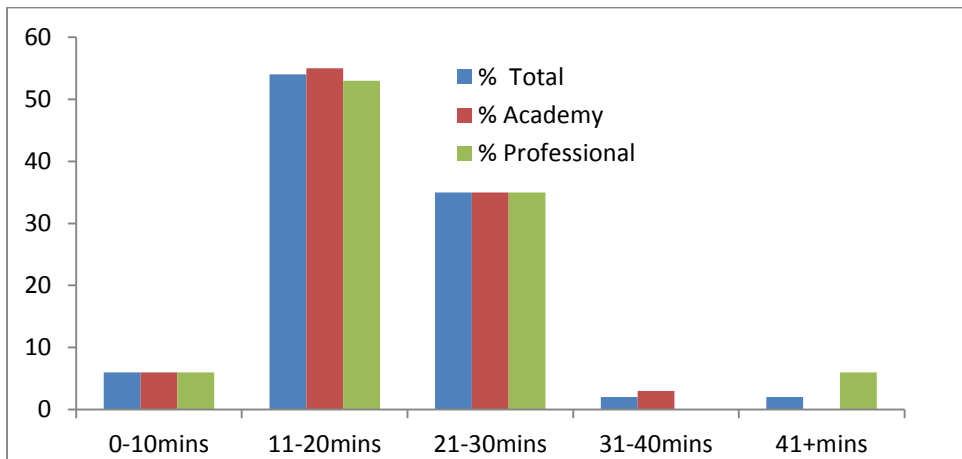
Figure 3.2: Preferred video feedback session duration.

By referring to Figure 3.1 and Figure 3.2 there generally seems parity between the actual duration of feedback sessions and what players would perceive as the optimal duration of such sessions.
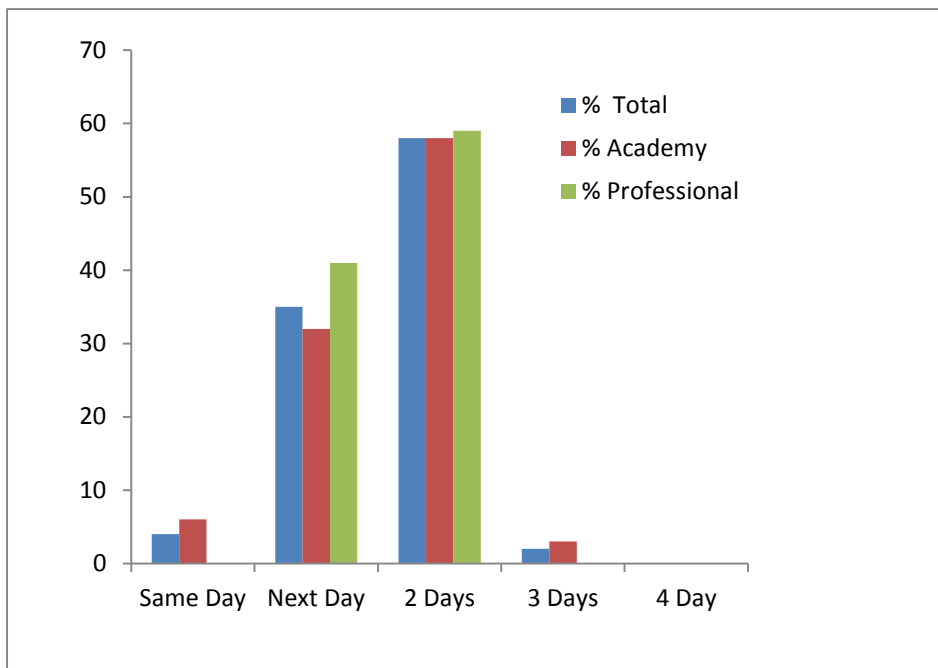
Figure 3.3: Preferred timing of feedback session.

With regards to post-match feedback, 93% of players stated that they would like to receive feedback one or two days after the game with just over half, 58% preferring video feedback two days after a game.
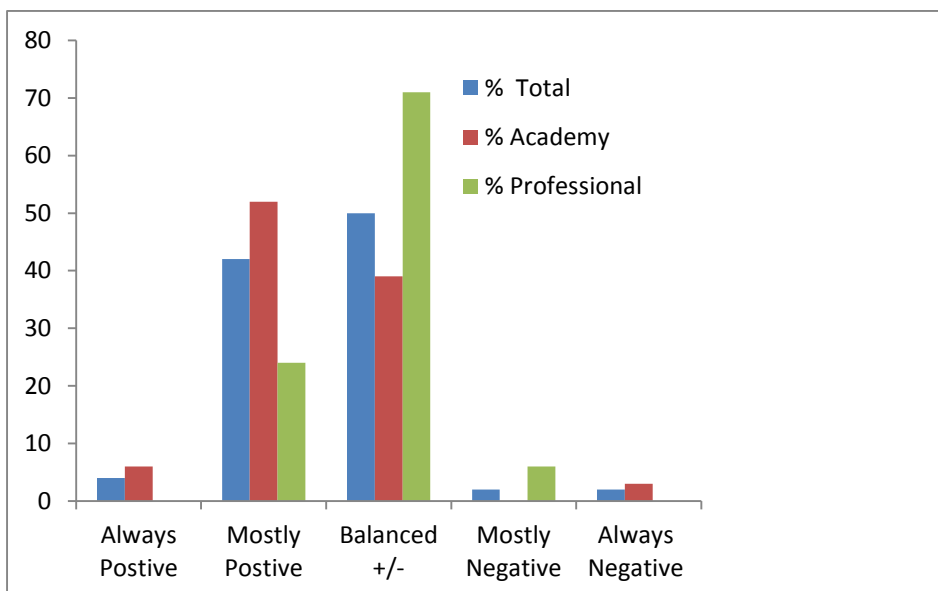
Figure 3.4: Type of feedback received.

The only significant difference identified between the academy and professional players was exhibited in relation to the type of feedback they would receive (see

Figure 3.4). With 52% of academy players and 24% of professional players identifying that feedback was mostly positive, while 39% (academy players) and 71% (professional players) identified that there was a balance between positive and negative feedback.

3.7: Qualitative finding from player interviews

The hierarchical content analysis illustrating the player perceptions are presented within APPENDIX A: Tables 3.1 to 3.5

3.8: Results and Discussion

The primary aim of this study was to identify player perceptions within football environments. Through the systematic analysis of player perceptions of PA, three important features emerged which was consistent across all clubs and standards of play (1) the level of debate and player interaction differed greatly during video feedback sessions, (2) the use of video analysis is central to player self-reflection but the level of engagement with self-reflection varied across players, (3) The majority of players preferred some delay before receiving video feedback.

3.9: Duration and level of interaction during PA feedback sessions

The findings from Figures 3.2 are of interest because they appear to differ from the findings of Groom & Cushion (2005) who found that with sessions lasting 30-40 minutes, 30% of players felt that sessions were 'about right' and 70% stated that they were 'too short'. In contrast, this study, appears to agree to some extent with Bunce *et al.* (2010) who states that individuals (non-athletes, non-sporting context) are only able to maintain focus on a task for a maximum of 20 minutes. Player responses from

this study were also in agreement with Francis and Jones (2014) where players suggested that group video feedback sessions were too long, showed too many clips and suggested that sessions should contain more relevant information to highlight valuable points. Some consensus was apparent amongst the players that post-match feedback was fairly consistent in its frequency in that each team would have some sort of team review following each performance and as such PA analysis is regularly implemented within all clubs' review processes. For all clubs the post-match sequence meant that a game would be followed by a rest day and the next day in the club would be a team review (with the exception of when an additional mid-week fixture occurs). No evidence was provided from the players suggesting that the duration of feedback sessions was directly linked to the outcome of performance. This had previously been identified that debrief could vary depending on performance outcome; 'I'd say the worse the result the longer the debriefing' (Groom & Cushion, 2005:4). Although consistency of the frequency of the sessions was adhered to, some variation in duration was reported. Some of the professional players identified that they were exposed to a combination of fairly short reviews but sometimes having to watching the full game cut down to 'ball in play' while the coach commented over the game. Previous research had also identified the association between performance outcome and length of the debrief can play an important impact on the performer's mind set coming into a feedback session, in that 'debriefing was taken more seriously post a loss versus a win therefore influencing the athletes' focus on the process' (McArdle 2010:138).

Despite these similarities and differences, a more pertinent consideration might be the level of engagement and interaction players perceived during these sessions. By referring to Figures 3.1 and 3.2 there roughly seems parity between the actual duration

of feedback sessions and what players would perceive as the optimal duration of such sessions, which might lead us to give further consideration to what happens in such sessions. Within the current literature research has tended to just focus on the player's preferred approaches and preferences (Groom & Cushion, 2005; Reeves & Roberts, 2013), thus ignoring potentially important aspects. Only most recently has research started to support the social complexity associated with PA feedback sessions (Groom, *et al.*, 2012). Evidence has suggested that performers learned more as a result of 'engaging in social interaction within feedback sessions' (Nelson *et al.,* 2011:9), however the timing for debriefing and implications for their subsequent effectiveness still remains vague (McArdle *et al.,* 2010).

Within this study, players appear to have a variety of opinions regarding their involvement in the PA process. From comments made by players across clubs at both academy and professional level there appears to be a large variation in the level of interaction and engagement during feedback sessions (refer to Table 3.1), which has not been reflected in the preceding PA related literature. A number of strong examples were provided by the players below, to support both high levels of engagement and positive debate during video sessions.

> Yes, all our feedback sessions are structured in a way that promotes discussions between players and staff both in a positive way as well as negative. Club A: Development Squad
>
> Yes feedback sessions are very much open so we can discuss what went right/wrong as a team. Pre-match opposition presentations are often more structured with less opportunity to contribute. Club A: Development Squad
>
> I think it's important that we get to give our side of the story about games during the video sessions. Debate is healthy. Club A: Development Squad
>
> Yeah, the coaches tell us to say what we were doing here and asking us how we could improve in that area. Club B: U21 Squad Player

But similarly some players experienced a more direct approach by the coaching staff, which could be perceived as being more directed and less engaging.

> Yes we get to give our side however this is often disagreed by other players and the manager. Club A: First Team player

> Team feedback sessions are very formal and lead by the assistant manager and manager, there isn't much opportunity for discussion. Club A: First Team Player

> The feedback is directed by the manager and assistant manager highlighting where we went wrong and what we did well. The players don't get much chance to voice their opinions. Club A: Reserve team player

> Not really, it's often a case of watch, listen, and take in. Club A: First Team Player

A more direct, instructions-driven method of delivery is consistent with evidence provided by Potrac *et al*, (2002) when evaluating elite coach behaviour during training sessions. Such approaches were associated with the need for the coach to establish credibility with players by demonstrating their technical knowledge of the game (Potrac *et al.*, 2002). This suggests that a mechanistic epistemological approach to coaching is evident in some coaches' approach (Grecic & Collins, 2013). Clearly the duration of the session, the number of clips and the duration of clips which are shown (Alvarez & Cavanagh, 2004) will impact on the session itself, however the coach's leadership style and delivery approach will also have a major impact. Possibly an important consideration will also be the amount and effectiveness of questioning being employed during feedback sessions, if any at all. These factors might help in establishing the level of engagement, if any, during feedback sessions, which in turn might increase likelihood of retention and transfer of learning (Collins, 2012). When reviewing the comments made by players who experienced open discussion during feedback a number of additional considerations were raised (refer to Table 3.1) One player seemed disappointed that the open discussion experienced during post-match was not replicated within pre match briefings as they were 'often more structured with less

opportunity to contribute'. Although open debate was employed one player identified that the coach had to employ clear turn taking in order to prevent the session turning 'into chaos'. It was also evident that one player saw the open debate as an important forum to put their own views forward as they felt this could influence the coach's assessment of their performance during feedback sessions.

3.10: Timing of feedback: Implication for self-reflection

The timing of feedback via PA approaches is something which to date appears to have received limited attention in coaching literature. These results presented in Figure 3.3 are comparable to those reported by Francis & Jones (2014) observed in Rugby Union. A number of the interviewees voiced their opinions why delayed feedback was preferable:

> Yeah I think like you should really have a think about it the next day and when you come back into training be able to watch it and maybe think differently about the game. Club C: Academy Player
>
> No, I reckon it's perfect like you get to think over the weekend...for a couple of days on how you did and then to reassure yourself you get to watch the clips. Club C: Academy player
>
> I think the timing's right because it gives you time to think about what's happened over the weekend and then when you come back you're fresh-minded. Club C: Academy Player

However, some players also made it clear that they preferred immediate video feedback. Key themes largely focused around dwelling on a poor performance or mid-week fixtures impacting on time constraints within the training week (refer to Table 3.4). Some players expressed a desire to complete the review process of the game immediately so they could begin to focus on the next match. McArdle *et al.* (2010) reported similar findings in that providing time to reflect within the debriefing environment was appropriate as this was key in allowing player emotions to settle down. McArdle *et al.* (2010) identified that some team performers are still too emotionally involved with the game, thus lacking the objectivity needed to complete

effective self-analysis due to their emotional state, if debriefing took place too close to the performance.   However it was not uncommon for some coaches to utilise immediate post-competition debriefing and feedback because they believed this was the point at which the athletes were most honest and their recall of performance was at its clearest (McArdle *et al.,* 2010).

> No I think it's better as soon as possible to be honest then you can work on it through the week and see where you went wrong and see what you did good and see if you can improve where you went wrong. Club C: Academy Player
>
> You've got to do it sometime so you might as well do it there and then. The game's still in your head. Club C: Academy Player
>
> Because you're thinking about how you've played and you just want to see it like the day after because you're still thinking about it. Club C: Academy player
>
> Post-game feedback is often delivered on a Tuesday, I think it would be better if this could be done on a Monday morning then it's out of the way and I can focus on the next game. Club A: First Team player
>
> I think Tuesday morning is the correct time for post-match feedback, however if we have a midweek game then Monday morning would be better. Club A: First Team Player

It is interesting to see the contrasting opinions of the players within the same squads. Although the majority prefer receiving feedback one or two days after the game, some players certainly value immediate feedback. It would appear a standard approach to a team post-match briefing might not be conducive with the potentially varied learning preferences highlighted. The use of technology could possibly facilitate a more individual approach by making video and analysis available to players straight away following a performance for the players who require more instant feedback. Using video sharing technology players could engage with any analysis in their own time in advance of team briefings which might take place later in the week. Similarly, the varied player preferences and different mind-sets towards feedback might also suggest more individual approaches to feedback and debriefing might be more conducive with learning, because they emphasise the importance of individual, small group and functional unit feedback opportunities. It is difficult to draw comparisons to

some of the early motor learning research which has employed simple skill acquisition tasks and parallels to how immediate and delayed feedback is currently used within football clubs (Hodges & Franks, 2008). However some evidence has started to support the advantages of delayed feedback on enhancing decision-making in sports which require tactical dimensions (Raab *et al.*, 2005; Lawrence *et al.*, 2013). When we consider the fixture congestion which occurs for professional players we can also see the need to change focus to upcoming games as soon as possible (Carling *et al.,* 2014a). The need for a quick feedback turn-around is given further credibility when we consider at first team level there might be an increased focus on an opposition's pre game analysis (Wright *et al.*, 2014).

A secondary advantage of delayed feedback is the opportunity created (intentionally or not) for players to reflect on their performance. The use of video has been suggested to support individual reflection enabling a deeper understanding of game events, subsequently resulting in an increase in confidence and motivation (Bower *et al.*, 2011). Francis & Jones (2014) suggest that video enables individuals to recall the whole event allowing for deeper meaningful reflection. A number of players value individual reflection stating that it helps them to 'track their progress' and remove presumptions in order to 'allow a more precise view of performance'. Another player stated that they record their own statistics 'in order to set targets to improve weaknesses'. The most common reflection episodes reported by players include: post-game team feedback; post-game individual feedback with coach, and individual self-analysis related tasks. Most players interviewed engaged in some level of self-reflection in their own time but the extent of this differs greatly, as highlighted by the player comments stated below. Most commonly clips and DVDs were provided for players to watch in their own time. In some instances players were set specific tasks

to analyse aspects of their own performance, common examples included pass completion, attempts on goal, successful tackles and set piece analysis. Players on the whole commented positively on the use of video and clips in their own time resulting in enhanced self-reflection and learning. This often related to an understanding of individual and team spacing, positional roles and decision making in specific contexts (Table 3.2). Players also commented on the importance of reflecting on both strengths and weaknesses within their game.

There are a number of positive examples provided within these findings where PA could potentially be a useful mechanism in facilitating more player-centred coaching. By allowing players to reflect, analyse and provide commentary on their own performance, more 'power sharing approaches' (Groom *et al.,* 2011) such as these might allow players to take responsibility for their own learning and subsequently result in a more positive learning environment (Cushion & Jones, 2006). However such player centred approaches are not commonly exhibited within elite football academy environments (Cushion & Jones, 2006; Groom *et al.,* 2012; Partington & Cushion, 2013). The approaches which are exhibited within elite football academy environments tend to be associated with oppressive, highly authoritarian styles of coaching with a clear power imbalance being maintained and sometimes being reinforced by directive approaches employed during video feedback sessions (Groom *et al.,* 2012). Football coaches have identified their coaching knowledge as being key to developing credibility and respect (Potrac *et al.,* 2002). It has been identified that performers on the receiving end of video sessions (ice hockey players) which were perceived to be not well organised and delivered with a lack of confidence and a 'weak presentation format' can often result in players questioning the coaches' instruction, thus resulting in a lack of respect (Nelson *et al,* 2011:9). Possibly football coaches

might be reluctant to employ approaches which are perceived to be more undirected with more open discussions, for fear that players might perceive this as a weaker delivery approach. It was also identified that a 'weak delivery approach' can result in players openly rejecting the coachs' analysis in front of the whole group (Nelson *et al.,* 2011:9). Clearly if respect is not established in the first instance and players are not accustomed to the use and importance of self-analysis and player focused learning they might struggle to accept such non-directed approaches. There are a number of very complex issues which the coach and analyst might have to consider while attempting to devise the most effective feedback sessions. Also careful consideration has to be given when interpreting Figures 5.2 and 5.3 in relation to player preference to feedback. Are these findings potentially as a consequence of the traditional approach that they are accustomed to rather than a legitimate concern for their learning or improvement.

I'd rather watch the game myself and like let the likes of you do the video and the analysis and the sheets and that because I learn more from that than I would do doing it myself. Club B: Academy Player

Yes it does help a lot because when you're watching back on clips you see things that you don't see on the pitch at the time whereas things like if I'm running with the ball somebody might've made a run and I haven't seen him but when you're watching it back you're like 'oh yeah I could've passed it to him there'. And it makes you aware of things that you're not really aware of when you're on the pitch so you can improve on it. Club B: Academy Player

I think over the past year on my scholarship I have developed my learning/game understanding and this will hopefully stand me in good stead for the future. Club A: Academy Player

Yes and this is something I enjoy doing, it's a different type of learning other than on the training field. Club A: Reserve team player

Yes, we get individual clips and have to fill in self-reflection sheets. Club B: Academy Player

Say if we didn't have the video we wouldn't be able to reflect on how we did and what we did wrong. So it obviously helps and then it makes us improve quicker. Club B: Academy Player

Yes I'm always willing to explore new ways in which I can improve my game. Club B: Academy Player

Watching my own clips since I've been playing in a new position...I feel that I've learnt a lot more than I did by just getting coached. Club C: Academy Player

I think it's important to, I mean if you care about it you'll do it in your own time anyway but I don't think many people do. Club C: Academy Player

Similarly a notable amount of players exhibited limitations in their ability to analyse performance themselves and found it difficult to effectively assess their performance without the aid of a coach present (refer to Table 3.2). Three players commented that they were much less likely to reflect and analyse their performance when they lost as opposed to when they won. Only four players valued on pitch training much more than video sessions, with the majority suggesting that video was an important supplement to their pitch training. Research has highlighted a number of challenges associated with the conditions surrounding effective reflection including: access to peers, current stages of learning and context/environmental factors (Cropley *et al.*, 2012; Gilbert & Trudel, 2005). Clearly effective self-reflection might not be a skill that all players possess without specific training. Similarly if we consider the amount of context information available to players generated by PA, some players might lack sufficient experiences to know what to focus their refection on (Martindale & Collins, 2007).

The process of picking out faults or corrections is usually done by the analyst, however we have the full DVD if we want to as well. I have to admit I'm more likely to do this after a win than a loss. Club A: Academy Player

Yes we can always watch videos and clips from the game, I think it can be useful but I prefer to be out on the training pitch. Club A: Academy Player

The players in this study appear to value self-reflection facilitated through the use of video footage. In the study by Groom *et al.* (2011), coaches identified the importance of having players who are able to reflect on performance. If the aim is to develop reflective players then the recommendation is that players should be given the

opportunities to help develop the skills to conduct effective self-reflection (Martindale & Collins, 2007).

Within the current literature only a handful of strong examples have provided evidence for the impact which PA has on behaviour change (Bourne, 2012 in cricket; Kuper, 2012 in football). Clearly the players in this study identified a number of specific instances where PA directly impacted on their subsequent actions and behaviours. Some of the key examples included: PA resulting in a deeper understanding; improvement in unforced errors and enhancement in decision making. Players also identified PA impact in terms of assisting in their understanding of coaching points and providing clarification of their instructions. An important concept identified is the role of PA in creating a dialogue between the coach and player relating to specific strengths, weaknesses and ability to execute a specific game plan. These aspects are recreated in a practical sense. Players commented on such opportunities as being central to their learning and development (refer to tables 5.3 & 5.4). Although only briefly identified within this study, these factors are important in further exploring to what extent PA might impact directly on behaviour change, and thus warrants further investigation.

> Yes, I think I make better decisions having watched my individual clips as I can identify regular weaknesses in my game. Club A: Academy Player

> Yeah I think so say if you can tell when something's not right or when you're doing something wrong and if he tells you then you can work on it straight away can't you, in training or something. Club A: Academy Player

The few differences identified between the academy and professional players was exhibited in relation to the type of feedback they would receive (see Figure 3.4). The difference depending on level is further supported by Table 3.5 which identifies key differences in terms of the winning orientated focus exhibited by the players from within

the first team and reserve squads while the academy players tended to illustrate the use of PA from a more development perspective. Clearly varied approaches to feedback could be observed (refer to Table 3.5), and based on these findings alone, it was not possible to establish the preferred approach or ways of working of the coach and how this might differ between first team and academy environments. Despite this previous research had supported that the coach's delivery philosophy was influenced by how they viewed the role as either being associated with winning or developing players (Groom et al, 2011). Although only a fairly modest sample was provided from three clubs it did provide some support for Groom's (2011) findings that PA approach might differ from a first team to an academy environment, these aspects with be further explored within the next chapter four.

3.11: Conclusion

Although this study is in agreement with previous findings on the importance of individual player learning preferences and approaches, our data has further developed important aspects which are consistent in relation to the use of PA across clubs and standards of play which impact on player engagement with PA approaches. The dissemination of PA information most commonly came via group / team feedback sessions, one to one individual feedback and player reviews. There was also evidence of unit feedback (functional unit group i.e. group of defender or strikers) and player led analysis tasks. Clearly approaches to dissemination of PA generated feedback differs greatly amongst coaches from an approach which is highly coach centred and which directs all information provided, to one which facilitates open discussion and debate during feedback sessions. In general a strong theme emerged as players commented positively in regards to feedback sessions when they were asked questions and given

the opportunity to engage in discussion. They felt that this resulted in a greater impact on their learning, game understanding, individual development and identification of strengths and weaknesses. Players also commented positively in terms of the importance of PA feedback opportunities providing them with an opportunity to analyse their own performance (refer to Table 3.2). Again players tended to be of a consensus that individual clips were most useful in terms of their own personal development in allowing them to assess their performance against set objectives. Notably, however, players still saw the value of watching a full game and receiving game statistics in certain situations. Most players identified that PA played a central role in their own personal reflection on their performance, but a handful of players commented on their inability to effectively self-reflect without the aid of the coaching staff. A number of other important factors relating to the psychological considerations of PA were identified and prominent. These could be attributed to the differences in PA usage at first team and academy level but were not explored due to the scope of the present study. These aspects have not been considered elsewhere and might warrant further investigation.

Although some common themes have been suggested across clubs and standards of play, the overriding conclusion of this study has been that a 'one size fits all' approach to PA is flawed. Not only should players' preferred styles of learning be a central consideration in planning effective PA approaches (cf. Groom & Cushion 2005), but also the manner in which PA approaches are formed and delivered will be central to their impact. A key factor in this is the coach's awareness of their own delivery approaches. Due to the scope of this study, no consideration was given to the implications of specific positions in the responses which players provided. Possible future research might want to consider if there are specific preferences exhibited

amongst specific positions. Also considering the diversity of the players nationality within the top tiers of football it might be of interest to consider the possible perceptions of none 'home grown' players.

In addressing the key aim of this section: identify player perceptions of PA use within football environments, the following key themes emerged: the level of debate between player and coach during debriefing session; the use of PA technology and approach to facilitate self-reflection; and the impact of player preference impact on the time of feedback and their engagement with self-analysis

Level of debate, seemed to varied across clubs, with some player identify positive accounts of open discussion around performance with others reporting more directive delivery of instruction information (refer to Table 3.1). Although it has been discussed that open debate might be seen as being conducive with developing athlete-centred learning and subsequently enhancing learning this could potentially be a majority challenge for coach to create an appropriate environment to facilitate such an approaches. Clearly some players are still exposed to a more directive and instruction experience during their feedback sessions. Also consideration should be given to player's willingness to receive and engage with more open and discursive feedback approach when they are more familiar with a directed approach. Potentially the skills required to facilities such sessions might be belong the current ability of some coaches who don't feel confinable standing in front of a group and managing difficult discussion and questions around performance. Although PA might have the potential allow self-analysis, enhance self-reflection and possibly increase the player role in the learning process, if delivery it is not carful consider it could have the opposite effect, and become very coach centred and instructionally directed. Possibly a balance to such

approach has to be established, where more directed team post-match briefing might be supplemented with more open discussion, player lead activities and discussions within functional units and or individual feedback environments.

The use of video and clips being made available to player was key in facilitating self-learning and reflection within the players own time, thus increasing their opportunity for independence and self-learning. However it appeared some player were not able to conduct their own analysis and found it difficult to critical analysis performance. This suggested that simply have the information available is not necessary sufficient to facilities effective self-reflection on behalf of the player. Some players clearer need further guidance and support in what to look for and why. Players also commented on the importance of self-refection being more close linked to performance expectation i.e. role requirements, team shape; clear coach expectation (refer to Table 3.2).

A number of factors have indirectly related to learning preferences and approaches. The most obvious example of this was some players have the need to analysis and reflect immediate following performance. While others player felt too emotional close to the game, thus need time more time before they could effectively and objectively reflection on performance (refer to Table 3.5). The potential of PA related technologies would possible provided a more flexible solution of these varied player requirements i.e. the full game or clips could be made available for all player to watch immediate after the game in their own time if they felt necessary, in advance of any team post-match review at the club. As a result player who wish to review performance immediately are able to, while player with other preferences can chose not to.

3.12: Some important lessons: Impact on players

Level of debate seemed to vary across clubs, with some players having identified positive accounts of open discussion around performance while others reported a more directed delivery of instruction (refer to table 3.1). Preceding research has provided some support for open debate as being conducive with developing athlete-centred learning and subsequently enhancing learning. However the ability of coaches to adopt such approaches might be a major challenge for coaches to create an appropriate environment to facilitate this, especially when they don't have the pedagogical skills, understanding or confidence to manage difficult group discussions around performance. Consequently it appears players still reported being exposed to a more directed and instruction-based experience during their feedback sessions. Consideration should also be given to player willingness to receive such an approach when they are more familiar with a directed approach, many players might feel they need high levels of direction and be reliant on the coaches to make all performance decisions on their behalf, entirely based on players values and expectations; this is potentially all they have ever known. In summary open discussions around performance can be extremely positive in terms of player learning and engagement within their own development, but some coaches might need additional support in being able to facilitate such sessions.

Although PA might have the potential to allow self-analysis, enhance self-reflection and possibly increase the player role in the learning process, if delivery is not carefully considered it could have the opposite effect, i.e. become very coach centred and instructionally directed. Possibly a balance to the feedback approach has to be established, where a more directed team post-match or pre-match briefing might be

supplemented with more open discussion, player led activities and discussions within functional units and or individual feedback environments. The use of video and clips being made available to players was key in facilitating self-learning and reflection within the players own time, thus increasing their opportunity for independent learning. However it does appear some players were not able to conduct their own analysis and found it difficult to critically analyse performance as they may not have the skills of self-reflection due to a lack of reflection up to this point. This suggested that simply having the information available is not necessarily sufficient to facilitate effective self-reflection on behalf of the players.   Some players clearly need further guidance and support in terms of what to look for and why. Players also commented on the importance of self-refection and individual feedback being more closely linked to performance expectations i.e. role requirements, team shape; clear coach expectations (refer to Table 3.2). A number of factors have indirectly related to learning preferences and approaches. The most obvious example of this was that some players had the need to analyse and reflect immediately following performance, while other players reported that they felt emotional close to the game, thus needing more time before they could effectively and objectively reflect on performance (refer to Table 3.5). The potential of PA related technologies would possibly provide a more flexible solution of these varied player requirements i.e. the full game or clips being available for players to watch immediate after the game in their own time if they felt necessary, in advance of an team post-match review the next point all players a back together within the club. More flexible approaches might potentially increase player engagement with self-reflection processes.

CHAPTER FOUR

4.0: Study Three: Coach-analyst interaction and the use of PA techniques in practice

Building upon the findings from the perspective of the player, it was decided focus should now turn to the coach and analyst use of PA within their specific club environments. As a result Chapter Four would be split into three parts: Study Three Part A: The coach analyst interaction in facilitating PA processes. Following this would be Study Three Part B: How elite coaches and analysts employ PA techniques in their everyday practices. Finally, Study Three Part C: Providing case studies and cross clubs comparisons to give additional club specific insight into the use of PA in practice.

The key aim of Study Three part A was to establish what factors elite coaches and performance analysts value in terms of their assessment of performance. Secondly it was to examine the congruency between the values and philosophies of coach and analyst, with specific reference to how they view and assess performance.

4.1: Introduction:

There seems to have been a recent growth in the application of what one would call PA related technologies within the coaching process (Mackenzie & Cushion, 2012). If we were to address PA in its broadest sense this might include an integrated application of video analysis, match analysis, notational analysis techniques and approaches. More recently, it has been suggested that PA technologies are employed within the coaching process to facilitate wider performance profiling, athlete monitoring, player feedback, match analytics, trend analysis and game analysis (Butterworth *et al.*, 2013; Carling *et al.*, 2014a; James, 2006; Madeiros, 2014). PA is now recognised as a skilled profession in its own right (O'Donoghue, 2013) and recent

job adverts have identified PA techniques being utilised within a number of roles including: performance analyst, head of analytics, match day analyst, opposition analyst, recruitment analysis, technical recruitment analyst, data base manager and video editor.

In contrast to the extensive research providing a positivistic representation of match play (Mackenzie & Cushion, 2012; Wright *et al.*, 2014), only limited consideration has been given to how coaches might view performance and how this is translated into analysis, match insight and subsequent behavioural change. Indeed, there is a lack of research which has investigated the pedagogical use of PA by coaches (Groom *et al.*, 2011), thus there is little underpinning explanation of the complexities which might shape or evolve the analysis work which their support team might conduct.

In addition to these gaps in scope, there may also be disjoins between providers and consumers of PA due to epistemological and phenomenological differences, as is evident in education settings (Fruge & Ropers-Huilman, 2008). It is anticipated that fundamental to the use of PA is the ability of the coach to establish an effective 'theory of the game', i.e. know what wins games, or have a strategy they associate with winning games and/or developing players (Anderson, 2013) but up until this point this has not been explored within the literature. Also crucial, however, is the coach's ability to articulate this to their support team and players. Unfortunately, this might be an alien concept to many coaches (Anderson, 2013) as such conceptual thinking is not central to formal coach education systems. For these reasons, this study was interested in how a coach might begin to shape their analysis around their own values, beliefs and philosophies. This was then set against the context of the club's

philosophy and how they communicate these factors to their team of analysts responsible for implementing any analysis.

As a final factor, the interactions between support personnel must also be considered (Collins & Collins, 2011). Although research has started to emerge around the use of sports science support in the high performance environment (Bishop, 2008, Drust & Green, 2013), little if any consideration has been given to the importance of role clarity and role ambiguity. One would speculate that these aspects will be central to ensure congruency between coach and PA support systems and approaches. Unlike PA related research, much of the coaching literature is much more developed in terms of its range and depth but also in being largely interpretative in nature. Such research has seen the coaching process as an inherently complex social system that is shrouded in issues of contextual contestation and negotiation (Butterworth *et al.*, 2013; Jones & Wallace, 2005). Clearly, the presence of a support team adds to the complexity of the coaching process, due in part to the micro-political and social issues that arise from the 'baggage' individuals bring when attempting to work together (Bowes & Jones, 2006; Butterworth *et al.*, 2013). Once again, however, such issues have not yet been explored when considering the relationship between the coach and the analyst which form the basis of their PA support system and how this fits into the wider use of PA within a specific club.

In an attempt to address these various gaps and shortcomings, the key aim of this study was to provide an understanding of individual perceptions of coaches and analysts and how they view performance and thus work jointly, to conduct subsequent analysis. Reflecting this aim, this study explored the individual perceptions and

practical reality surrounding the different interactions of consumers by utilising hierarchical content analysis (Sparkes & Smith, 2014). It was anticipated that, central to each individual's perception, was the specific context and every day practices they engage in. Consequently, pragmatic research approaches were adopted (Bryant 2009; Giacobbi *et al.*, 2005, as previously described in section 3.2). Specifically, this study addressed the following objectives: (1) to establish what factors elite coaches and performance analysts value in terms of their assessment of performance; (2) to examine the congruency between the values and philosophies of coach and analyst, with specific reference to how they view and assess performance.

4.2: Method: Participants, coach/analyst interaction.

An opportunistic sample was employed to investigate elite football teams' use of PA. Five clubs located across England were selected to take part within the study. Of these, three currently played at Championship level or above within their most recent history (the previous 5 seasons). The remaining two clubs represented League One and League Two. From each club, a cross-section of participants were questioned from the coaching staff and PA support roles (refer to Table 4.0) for further description of roles sampled). The key criterion for the selection of coaches within the study was that they had to be currently using PA within some aspect of their regular coaching. Analysts were selected only if they had direct involvement and interactions with a specific coach who was currently implementing PA strategies and techniques within their coaching. Initial access to the participants was provided by the author who had previously worked in collaboration with the participants, thus facilitating greater openness on the participants' behalf (cf. Groom *et al.*, 2011). All coaches held the top Union of European Football Associations (UEFA) Advanced Licence or held the UEFA

Professional Licence (award for coaches to work in the senior professional game in Europe). All analysts had a minimum of 2 years working as full time analysts within professional football clubs. Following the host institute granting ethical approval, all participants were provided with information relating to the nature of the study and completed a written informed consent form prior to each interview.

Table 4.1: Overview of participant's information

Descriptor	Total
Clubs	5
Coaching Staff	
1st Team Coaches	10
U21/ Development squad/ Reserves	8
U18/Professional Development Phase	3
U16/ Age Group coaches	5
Mean Age	41.3 years ±6.6
Mean time at the club	2.9 years ±1.4
Year in coach capacity	9.3 ±2.9
UEFA Pro Licence	All
Performance analysis support per level	
1st Team	11
U21's/ Development squad/ Reserves	6
U18's/ Professional Development Phase	3
U16/Age Group	3
Mean Age	24.5 ±2.2
Mean time at the club	2.8 ± 1.5
Year in PA capacity	4.7 ± 1.3

Analysts and coaches were only selected as part of this study if they had a close working relationship with each other and PA was used as a part of daily roles.

4.3: Procedure

Data collection was conducted over an 18 month period. All interviews were audio recorded and conducted in a quiet private location, usually in a setting familiar with the participants i.e. the club's training ground, or hotel during an away fixture stay. The coach interviews lasted on average 52 minutes ± 9.4 and the analyst interviews 65 ± 13.4 minutes. Interviews were then transcribed verbatim and analysis conducted using Nvivo (Qualitative Solution Research 2002, Version 10) to group key themes.

4.4: Interview design

A qualitative methodology was selected in order to provide a more in-depth insight into the nature of coaches' and analysts' perceptions of how they analyse performance and the relationship between the pair, thus facilitating the subsequent analysis. A semi-structured interview guide was developed to ensure open-ended responses thus yielding responses that were pertinent to both the coaches and analysts involved with PA (refer to appendix). Specific probes and prompts were used for clarification and elaboration of key points and to obtain consistency in the depth of responses across participants (Patton, 2002; MacNamara *et al.*, 2010).

The interview questions were developed with the aim of encouraging the coaches to feel comfortable to talk about the integration of PA within their club and to identify the range of constraints they face in relation to its use. Questions were developed with consideration of hierarchical content analysis and pragmatic research approaches in mind. As such, the questions were kept open and broad to allow the author to gain an unbiased insight into the participants' experiences and how PA was used in their every day practices. The interview was designed composing of 2 key themes, these included a participant's previous history and the extent to which this influenced how

they viewed the game; and their interactions and relationships with their performance analyst. Additionally a number of prompts were developed to stimulate discussion of the above areas and the participants were encouraged to talk freely around the key concepts outlined. A triangulation of research methods was used to establish appropriate themes within the coach and analyst interview, these included: an extensive review of literature relating to how PA is currently used and contemplation on how it might be used (Wright *et al.*, 2014); key themes drawn from preliminary field work (as explored in chapter two and three) and extensive pilot interviews and critical discussions held with coaches, analysts and academic practitioners currently engaged with PA related technologies. Having conducted an extensive review of current literature, a number of key themes were identified in terms of potential gaps relating to the use of PA in practice. These themes were extensively discussed with the research team and a group of professional practitioners (i.e. two coaches and two analysts). This took place over a two month period during the off season. Following these discussions initial themes and prompts were identified to establish a set of appropriate interview questions. Pilot interviews were conducted on two coaches (one academy 21's coach and one first team coach) and two analysts (one working with a national squad and one who currently works in an academy/first team setting) who were not included in the final data analysis. From this the potential interview themes were then refined again before conducting the final interviews.

4.5: Data analysis and trustworthiness

Steps to ensure trustworthiness of the data collection and analysis were followed as initially established in Study Two (as outlined in section 5.6). Two researchers carried out reliability and consensus validation checks, which involved the coding of 4 interview transcripts from coach and analyst interviews (Lincoln *et al.,* 2011;

Martindale & Nash, 2012). Inter-related agreement amongst researchers was found to be 93% for the higher order categories and 91% for the lower order categories. This was has considered relatively high (>80%, in Keegan *et al.*, 2009; Keegan *et al.*, 2014). The results of the reliability and validity checks were discussed by the researchers, who acted to finalise details and confirm the level of agreement and consistency of the merging themes and categories. Finally, participant member checks were conducted whereby a summary of the results coupled with the conceptual framework was sent to a selection of the participants so they could verify accuracy and provide feedback on their interpretations. Responses from the coaches confirmed the accuracy of the results and appropriateness of the framework. A sample of the coaches and analysts were interviewed at the end of the study for validation and reliability purposes to ensure that approaches and mind-sets relating to the use of PA had not changed significantly since the initial interview. In total, 71 higher order themes and 287 lower order data themes emerged from the results.

4.6: Results and Discussion

The key aims of this study were to establish what factors elite coaches and performance analysts value in terms of their assessment of performance. Further, to examine the congruency between the values of coaches and analysts and their philosophies, with specific reference to how they view and assess performance. Key themes which emerged which suggested that central to congruence were factors related to: role clarity, effective communication and discussion via the means of post and pre-match reviews. A key concept to congruence was the extent of the 'buy-in' by the coach to the processes and content associated with PA. Central to this was the rapport and trust established between coach and analyst. A number of important

concepts were also identified relating to what factors were valued in terms of their assessment of performance. Evidence was provided where coaches would use KPIs to assess factors they felt were of value and associated with their playing strategy and tactics. However in a number of instances dissonance was identified between a coach's conceptual description of their philosophical approaches and their practical utilisation of PA and their analysts.

4.7: Hierarchical content analysis

The hierarchical content analysis illustrating the coach and analyst perceptions are presented in tables 4.2 to 4.8 (refer to Appendix B).

4.8: Congruence within the relationships (refer to Table 4.2)

Four key higher order concepts were established as being evident when identifying congruency between coach and analyst. These included role clarity, communication methods, weekly planning meetings and understanding of the club's philosophy (refer to Table 4.2). Clear examples were provided where the coaches would give precise guidance of tasks to be completed. In one instance, the analyst was given a work schedule of 45 items to be completed from one game to the next. Notably, however, this level of specific direction was rare and, mostly, informal approaches were evident where the analyst had an understanding of the type of questions the coach would ask and thus ensure he would have a range of technical, tactical and physical data available to answer any such questions the coach might pose. Most commonly a concept emerged that analysts have to be proactive in providing information to the coach which they felt was relevant. Common goals and established working patterns tended to be developed over a period of time as the analyst started to appreciate what information the coach wanted, what they were most likely to be interested in and how the coach liked to work.

> Yes but I think that just comes down to everyone understanding their role and understanding what they should be doing and what they shouldn't be doing. Club Two: Pro Development Phase Coach

> I like to say to x what do you think? Can you find some of this for me? And I will go with him because I trust him and I am happy to do that. I certainly like to listen to his opinion. He might say 'what about this?' OK good and again if I felt that yes I like it or actually no I will just say, and it is exactly the same with sports science. Club Three: Pro Development Phase Coach

While some coaches thought it was important to give analysts clear markers of what was required, other instances in accordance with some clubs' developmental philosophies showed that their coaches were less directive and wary of just giving out orders, thus preferring to give analysts some basic outlines and let them bring what

they found and felt was relevant. In some cases, analysts were given 'free range/licence'. Such fluid and adaptive approaches to individual role clarity and requirements are not uncommon. Jones & Wallace (2010) suggested that the coaching process is characterised by a number of levels of ambiguity and uncertainty. This ambiguity is often associated with what everyone is trying to achieve, why they are trying to achieve specific goals, and the extent to which these goals are achieved. It was also suggested that ambiguity was as a result of the drive of each individual's goals and agendas. In consideration of this work (Jones & Wallace, 2010) it could be suggested it is almost impossible for a coach to ensure tight control over the process and its outcome, despite what current hierarchy might exist as a number of coaches employ a controlling and authoritarian approach, thus presenting the illusion of control. This authoritarian approach can be a constant cause of conflict as coaches are often attempting to implement definitive structures in an attempt to ensure grey areas are eradicated (Jones & Wallace, 2005). Clearly the complexities associated with coach, analyst and performer interaction are far from black or white (refer to Tables 4.3 and 4.4).

Participants identified a number opportunities for open communication via daily briefings, daily planning meetings and post-match reviews (refer to Table 4.2). A mechanism which facilitates meaningful communication was the weekly review of post-match/ pre-match planning, where coaches and analysts would engage in open, honest evaluations of the team and individual performances and also how this would impact on their training week / preparation for the forthcoming opposition. Central to these discussions was the analyst's ability to provide objective information and make valid suggestions on performance and subsequent training. The coach required these opinions to be based on evidence the analyst had collected and such information was

seen as essential as there was often conjecture over game events and personal evaluation, thus PA evidence was used to inform the 'frank discussion'.

> We're having two team debriefs a week so they are sort of based on what me and the coach see in the game. The coaches will come in and have their opinions, I'll have mine, we will discuss it and then I will go away, put that together. Club Four: First Team Analyst

> Yes because if I didn't believe they were getting us success then I would feel the need to tell the manager that… and he would expect us to say I am not sure that is right, then it is up to him to make the final decision but it is up to us to go to him with suggestions if we don't feel right. Club One: First Team Analyst

Ambiguity is also commonly associated with varied and contradictory beliefs. It is inherently challenging for the whole coaching, support staff and players to adhere to a shared goal when they all bring a diverse range of perceptions, specialisms, values and beliefs (Jones *et al.*, 2004b; Jones & Wallace, 2005). Clearly, this open discussion around objective evidence goes some way to addressing the ambiguity in effective decision making (refer to Table 4.2). This is an important consideration as preceding research has suggested that ambiguity within the coaching process is also inherently linked with the fact that coaches typically make decisions on the basis of incomplete information. Often coaches only have limited insight into which of their actions and approaches might impact on the short term and long term development of performers. Coaches will be constantly making rapid assessments and judgments based on their own mental model of expectations and make the appropriate changes and adjustments (Côté, *et al.*, 1995). The ability of managers to engage their support team in dialogue within what has been termed the Zone of Uncomfortable Debate (ZOUD) is synonymous with the best performance environments (Collins 2011). It has been proposed that this is key in order for clubs to challenge collective assumptions and values (Burke, 2012; Collins, 2011).   Some clubs and managers provide the mechanisms for discussion within the ZOUD to take place; this was largely evident

during pre-match and post-match planning meetings where critical open discussions were welcomed.

4.9: Congruence process and content (refer to Table 4.2 to 4.4)

In contrast to the above sections, there was also a number of specific factors identified which could be associated with a lack of congruence (refer Table 4.4). These included ineffective use of PA, perceived importance and lack of direction from the club.   A common issue identified by analysts was that they felt that coaches did not really understand or appreciate how PA could be effectively used. Specific problems were identified with the time required to complete certain requests. A clear example of this was the use of pre-match data presentation with an U21'S squad. The process of completing a systematic analysis of the opposition's last 3 games provided little insight when the team they faced were so inconsistent from one game to the next. Furthermore, a key frustration was the lack of discussion ahead of delivering the post-match feedback. In some cases it was expected that what the analysts produced would be sufficient, despite a lack of time invested by the coach to consider what might be included. Lack of congruence was identified in terms of a coach's perceived importance of certain aspects of PA. Some coaches felt that player clips were a waste of time as players were clipped every time they touched the ball. This resulted in many coaches suggesting it was essential that the whole team watch the whole game, as off ball and out of possession information was of more value. Clear evidence was also provided that the analysts were also clipping and analysing important aspects off the ball, but this was not fully appreciated by the coaches. A conflicting view also relating to these points was that some coaches were concerned that video sessions would cut

into their pitch time and subsequently did not value analysis sessions as being as important in the player's development.

> No I mean that is one of the things I have found sort of strange but good about being an analyst, no managers come to me and sort of said this is what you need to do, I need you to do this for then it has always been sort of you create your department, you know what you're best to be doing. Club Five: 21's / U18 Analyst

> You do know what I mean, it's always the case and it's not anyone in particular it's just sometimes you'll do something, like I say things can change last minute what the coach wants to see so you could have done four or five hours work on something that never leaves the computer, never gets seen, that kind of thing. I think it's, when you start out it'd be easy to get quite disheartened by it you know, other than that. Club Two: Academy Analyst

> He just likes to do the ball in play where he just pretty much commentates through it as much as he can and there are no specific clips, it is literally just that. I think it is too much information all at once, I think one on ones would be useful. Club One: 21's Analyst

A number of clear examples were provided by analysts where at no point would the coach take time to clearly outline important technical and tactical parameters which they were asked to observe. Only in some cases were coaches engaged with a discussion around the philosophy, style and strategies they were trying to employ.

> I mean I have never really seen a coach come and say this is what we want to do, this is our style so this is what we're going to look for. Club Two: Academy Analyst

An important consideration might be the coach's motivation for delegation. Does this come from a position of trust and empowerment, providing opportunities for the analyst to make meaningful contributions to the coaching process? Alternatively, is this from a position of ignorance where the coach has no inclination to develop his understanding of how PA might enhance his and the club's performance and approaches?

4.10: Buy-in implications for roles and responsibilities (refer to Tables 4.7 & 4.8)

Two fundamental concepts relating to congruence or a lack of it emerged around evidence of 'buy-in' and role and responsibilities (refer to Table 4.8). One of the key aspects related to whether coaches exhibited an open or closed mind set to the importance of PA. Some analysts felt coaches were closed in their mind set in that 'they know best' and that some are a little 'set in their ways'. The general thought was that some coaches thought 'they are the only ones with the right answer' and that coaches were 'not very good at listening to other opinions'. It was highlighted that many of the coaches would have not had exposure to PA as players, and still had successful careers, thus giving them a mentality that it was not essential for today's player development. There were a number of examples where analysts perceived the coaches as just using stats and video to validate their standpoint and used them to prove to the player that 'I am right, you are wrong', rather than for developmental purposes.

> I think one of the ways that I sort of try and look at is listening to people. I think that sometimes there is a lot of people within football that have got a great knowledge and great ideas and they are really good at expressing them but when it comes to listening to somebody else and listening to their ideas, I think sometimes people think that they are the only one and the have the right answer. Club Five: 21's/ U18 Analyst

Approaches exhibited by some of the coaches might be described as having a fixed mind-set where their team is not allowed to make mistakes or question them in any way and they are closed to ideas and input from elsewhere because this would reflect on their competence (Dweck, 2006; Jenkins, 2014). Despite this, there were a number of positive examples of openness to PA thus enhancing congruency within the relationship. This is illustrated well by a coach: 'There are no real constraints to its use, there is enough time. It just depends on how much you value it'. A number of coaches identified it as being central to their philosophy of developing players. In

some clubs it was evident that at the start of the working week the coach and analysts would spend a significant amount of time 'between 6-8 hours' reviewing footage and analysis while discussing the previous performance, resulting in the analysis being fully integrated into the coaching process and subsequent training week. However this was only achieved in some cases by analysts who understood the importance of aligning to how the coach wanted to work and ensuring the coach was at the forefront of any analysis i.e. would directly impact on performance aspects which the coach valued.

> I think when I came to the club I am at now because it was never there, the coaches were sceptical and didn't… were like we don't need this to help us, we don't need that but then within three weeks they kind of realised that we're not there to try and prove them wrong, we're only there to give them the information and at the start it was like well such and such isn't doing well you know and instead of the coach having to always be telling players right well we will just show the video and ask them the questions . Club Three: 21's/18's Analyst

 Based on the emergency of key themes from within this research, some coaches are more evidence-based in their approach than identified in preceding research, but only when the evidence is based on their specific club context. Additionally analysts were completing their own projects, to answer their own specific team performance problems and questions. It has been suggested that previously established methods of learning and coach education tend to value learning from more traditional methods i.e. other coaches rather than from evidence-based research findings (Partington & Cushion, 2013). Evidence for congruency developed as a result of 'buy-in' is further illustrated by examples where the coaches showed trust in the PA and the role of the analysts; 'we don't try to step on the analysts' toes', 'There has to be respect for what everyone's department can offer'.

> Yes it's difficult for everybody, yes, yes. We don't do it enough in my opinion, I would prioritise that over training, I would prioritise that on Monday, first thing you come in, , sit down and watch it, good, bad or indifferent and it's not you know, it just is as it is on the video and it's a great tool. Club Two: Pro Development Phase Coach

> The problem you face with a lot of video is you've just got to be careful it doesn't eat into your time, that's the problem you've got, it's can be quite time consuming analysing 20-odd boys individually. Club Two: Pro Development phase coach

Williams & Lawrence (2007) identified 'good rapport' as being vital to the relationship between elite coaches and sports science support (Table 4.7). The importance of ensuring sympathetic relationships and interpersonal skills were valued above the need for scientific knowledge, as without rapport elite coaches would find it difficult to develop the respect and confidence of their performers. The development of trust and rapport could be as a result of matched personalities between coach and analyst; this might prove difficult when we consider the varied social constructs of the formal and informal development of analysts and coaches. The vast majority of experiences and formative years of an analyst would have been in an educational setting, while most coaches will have progressed from a playing background, thus possibly having little shared common experiences and skills.

4.11: KPIs and assessment (refer to Table 4.5)

While establishing what factors coaches and performance analysts value in their assessment of performance, two common features emerged which were central to both groups' philosophies. These were commitment to either a winning orientated focus or a developmental focused environment. Although we might expect PA to be used from a more developmental perspective within an academy setting, while focusing more on a winning mentality in a first team setting, this was not clear cut across all clubs. These two factors often caused conflict in terms of the relationship between the coach and analysts and the practical applications of specific approaches and methods. It was common practice for coach and analysts to conduct pre-match / opposition analysis to give players exposure to first team approaches. This seemed to be in direct conflict with providing opportunities for individual learning and

development as a team focus seemed to take priority and resulted in a 'winning matters' mentality exhibited by the coaches, despite their best intentions to prepare academy players for first team routines and processes. Despite this, some coaches and analysts did seem committed to developing their players as independent learners and the players use of PA was conducive with this as their focus was very much based on analysis of themselves and how they could improve and develop, which was seen in both academy and first team settings.

> I don't think stats are much use in the academy because it is not about winning, well it is but it is not meant to be, it is about developing, developing you are making individuals rather than a team, so the team stats will come and there is not a lot you can do with them, I mean you can store them, you can put them up on the wall but they don't really mean anything if one player is making 50 passes a game, but he is still not quick enough or doesn't read the game right, it is like giving them false hope, like you are the top passer but they might have been a five out of ten so it is sort of false. Club Two: Academy Analyst

> Obviously at youth level it's not so much on results, at pro level it is results, you analyse slightly different really, but from analysing players you can say well I'd like them to have a really strong work ethic and a real good attitude, I think that will take them an awful long way and obviously they've got to have a certain amount of ability. Club Two: Pro Development Phase coach

A common criticism with sports science support when implemented within coaching practice is being focused on dealing with the here and now rather than potential development and preventative issues (Harwood & Steptoe, 2012). This is often a challenge in elite football when a lack of short term success can cost a manager their job.

In the present context, most coaches and analysts attempted to provide conceptual and practical illustrations of how their coaching and club philosophy impacted on their analysis, tactics and strategies. The tension between a winning focus and development focus seemed to cause conflict between their conceptual standpoint and their practical application of PA approaches. Specific KPIs were identified which they might associate with success. These were largely related to technical, tactical and physical parameters but some intangible parameters were also identified as being

central to success, for example; 'work ethic, good attitude, want to improve, attitude off the ball, desire and commitment and being competitive'. A number of challenges were associated with the need for a fluent philosophy that included the parameters identified especially at first team and U21's where teams just needed to find a way to win during high pressure games; 'certain teams might not let you play the way you want, players playing up and down, changing the manager; resulting in an inconsistent club philosophy'.

> Not so in the academy just because we have got a philosophy that we believe in in terms of formation, a way of play, the way each position plays so I think in the academy not so because we will stick to that philosophy as such. First team obviously when they look at opposition and then might tinker what they do themselves really. Club Four: 21's/18's Analyst

Research has highlighted an epistemological gap or cognitive dissonance where the language and/or the conceptual thinking of the coach do not marry up with his behaviour in practice due to a lack of understanding (Partington & Cushion, 2013; Light, 2008). A common and complicated conflict was not only evident in the ideological thinking about developing players but also in the practical approach in place in order to win games.

4.12: Trust and Rapport: Interaction and interpersonal skills between coaches and analysts

The development of trust and rapport as a result of interaction opportunities between the coach and analyst was identified as an important emerging theme from this thesis' findings relating to 'buy-in'. Due to the limited literature exploring this aspect, insight and parallels could only be drawn from preceding research which was largely conducted in relation to the coaching approach in academy football; coach-athlete interaction and the role of sports science support (sports psychology, physiology and strength and conditioning). As a result this thesis was only able to provide an initial

158

insight into what appeared to be a number of extremely complex issues, thus warranting further investigation. As discussed in previous sections, strong evidence has been provided for the flexible and fluid nature of the coaching process and subsequently the models used to describe the implementation of PA have been identified as idealistic and not representative of the dynamic and context specific nature of the coaching process and potentially how PA is used (Cushion et al., 2006; Jones *et al.,* 2002; Potrac & Jones, 2009). As a result a need for a more evidence-based approach for the use of PA in highly competitive environments has been proposed (Groom *et al.,* 2011). An additional level of complexity is potentially caused as a result of introducing PA, because it provides an alternative perspective on aspects of actual on-field performance which are central to the coaching role i.e. observation, analysis and feedback on technical and tactical performance. The extent to which the analyst is fully integrated and accepted can impact on their ability to effectively analyse aspects of performance which are central to the coach's values, philosophy, strategy and tactics. There is some strong evidence which had identified coaching behaviours and approaches employed in academy football environments (Cushion & Jones, 2006; Partington & Cushion, 2013). Possibly these behaviours might provide some insight into further understanding the use and delivery of PA by coaches. Evidence has suggested that these environments are synonymous with highly instructional, oppressive and authoritarian approaches (Cushion & Jones, 2006; Partington & Cushion, 2013). Potentially PA approaches could be exploited by coaches, in some instances, to further reinforce their power dominance (Groom *et al.,* 2012; Huggan *et al,* 2015). A potential disconnect between philosophy and practice has been described (Partington & Cushion, 2013), thus resulting in inconsistencies in relation to what coaches appear to value and the behaviours they employ in practice. If there is a

disconnect between what coaches value and the behaviour they employ, this might

cause additional confusion when analysts attempt to establish performance measures

based on aspects central to what the coach perceives as being important. Some

evidence has identified the role of sports science support within the coaching process,

but no consideration has specifically been given to the role of performance analysts.

As a result evidence is often drawn from physiology, psychology and strength and

conditioning support roles. Role clarity and role ambiguity have been identified as

important aspects in relation to the implementation of support services (Bishop *et al.,*

2008; Drust & Green, 2013). Evidence has also been provided for the additional

complexity brought to the coaching process by sports science support as a result of

the 'individual baggage' and the need to justify their roles (Butterworth *et al.,* 2013;

Bowes & Jones, 2006). Some consideration has been given to the importance of

developing good rapport and interpersonal skills between support staff and the core

coaching team (Williams & Lawrence, 2007). Coaches might be able to detach

themselves from sports science support, as sports science support within football

tends of have less involvement with technical and tactical aspects of performance.

The challenge in the case of the performance analysts, as explored within this thesis

so far, is their close alignment with actual on field performance. This potentially might

cause a blurring of the lines between the domain of the coach and the analyst role.

As seen within this thesis, the analyst in many cases may be required to provide

analysis and interpretation of key technical and tactical patterns occurring and present

them with recommendations for further practice to the coaching team to help aid their

decision making processes. In some cases (as demonstrated in this thesis) working

in such close proximity with what both the coach and analyst are trying to achieve

could potentially result in conflict if it was perceived that the analyst was attempting to

exert too much influence on the 'football side of things'. This is especially of the analyst as it is likely that they will be providing evidence on features that the coach would perceive themselves to be experts on. In order to manage an effective working relationship the importance of interpersonal skills and interactions are potentially key. Coach-athlete literature has highlighted that coaching is more than imparting content knowledge via a particular pedagogy (Nelson *et al.,* 2011; Jones, 2009). As with the coach-analyst relationship, the interactions and relationships with which the coach and performers engage in are critical, thus the connection between the two parties subsequently can significantly impact upon the athletes' learning (Jones *et al.,* 2004). Evidence within this thesis also highlighted the effective implementation of PA being dependent on interactions between the coach and analyst. Some evidence has been provided for the softer skills of the analyst in facilitating rapport during these key interactions, but it is important that this is further explored within future work.

4.13: Conclusion

Due to the scope of this study it has been important to only highlight the key themes relating to following aims: (1) to establish what factors elite coaches and performance analysts value in terms of their assessment of performance; and (2) to examine the congruency between the values and philosophies of coach and analyst, with specific reference to how they view and assess performance. In relation to this first aim, evidence emerged regarding the development of KPIs and assessment of performance as being largely focused on a winning orientated or a developmental environment. The emphasis of analysis revolved around either being a pre-match focus on opposition and how they could be exploited, or a developmental focus which placed more emphasis on post-match analysis to review the effective and less effective performance parameters within the team's control.

There are a number of specific factors which could have been pulled out and illustrated in more detail but, due to the relatively new scope of these findings, it was appropriate that a more general overview of the focus of a coach's use of analysis and the interaction with the analyst was required at this point in time. As a result the second objective was also achieved. While examining the congruency between the values and philosophies of coach and analyst a number of key factors were identified. These factors related to how coach philosophy, strategy and tactics might inform the analysis which they conduct and how they utilise the performance analysts. However, more fundamental to this is the level of congruence which might exist within the coaching staff and PA. It was established that 'buy-in' was evident at 3 levels; interpersonal, PA processes and PA content and underpinning these factors was the extent to which trust and rapport was established. This study is only able to shed light on a small aspect of this phenomenon, thus further consideration should be given to the practical

implications of the processes and approaches associated with PA (to be explored within the subsequent studies). In addition to these achieved aims, it might also be relevant for future research to consider specific case studies of how PA might be used within the constraints and challenges of a specific club and finally to what extent common themes and differences in approaches might be present across clubs, coaches and analysts.

4.14: Study Three Part B: How elite coaches and analysts employ PA techniques in their everyday practice

Progressing the initial focus within Part A, the aim of Part B was to explore how and why elite coaches and analysts employ PA techniques in their everyday practice and how their PA strategies facilitate feedback, planning and preparation for performance.

4.15: Introduction Study Three Part B

In recent years, there has been a significant growth in the number of paid and voluntary roles required in football to support coaches with PA related techniques (Edgar, 2013a; Hatton 2013; O'Donoghue, 2013; Wright, *et al.*, 2012). This growth is further supported by the introduction of the Elite Player Performance Plan (EPPP), by the Premier League; a new initiative which outlines the mandatory implementation of PA and sports science support for clubs wishing to receive the highest classifications: Category One or Category Two Academy (Youth Development Rules, 2012). Despite these significant developments however, little attention has been given to the impact which PA may have on improving performance in the coaching context (Hayes, 1997). Only recently has research started to explore the integration of PA within coaching practice.

In addition to gaps in the usage of PA data (Hayes, 1997; Mackenzie & Cushion, 2012; Wright *et al.*, 2014), there are parallel omissions in how it is best conducted. Little consideration has been given to the specific techniques and approaches which clubs might employ in practice in an attempt to give a distinct performance advantage. For example, how might a club go about establishing and collecting meaningful information which has the potential to facilitate behaviour change? Currently little is known about

the specific and effective integration of analysis in an applied setting within high performance football clubs.

Of course, it is possible that analysts working within football clubs have seen the information they produce as being predominantly relevant to their own specific applied context, thus limiting their motivation to publish such findings (Drust, 2010). This consideration notwithstanding, case studies and action research type inquiries would seem essential in providing an important insight into the exemplar use of PA in an applied context (Mackenzie & Cushion, 2012; Nelson *et al*., 2011). Accordingly, a move to a more interpretive and naturalistic, even qualitative, type approach would most likely provide a better understanding of the effective use of PA (Mackenzie & Cushion, 2012). This might also provide useful insight into how different teams, organisations, managers and coaching teams might adapt their approach and available resources to meet their own and the external needs which they face. By further exploring how coaches and analysts utilise PA we might start to identify pockets of best practice in the use of PA approaches and systems within high performance football.

In order to explore the complexities and constraints which coaches and analysts might encounter, this study explored their perceptions on the 'workability' of different PA techniques and approaches. Specific focus was on the implementation of feedback, planning and preparation for performance. A pragmatic research design was employed to ensure practical solutions and exemplars of actual behaviour were reported (Giacobbi *et al*., 2005; Morgan, 2007). The line of inquiry within this study was primarily concerned with the practical issues and solutions coaches and analysts face when implementing PA techniques within their everyday practice at the football clubs for which they work. Specifically this aspect of the thesis was interested in

exploring how elite coaches and analysts employ PA techniques in practice and how PA strategies facilitate feedback, planning, and preparation for performance.

4.16: Method: Everyday practice of coaches and analysts

This study shares the same research design and method described previously as employed in Study Three Part A. Please refer to Method and Participants 4.2; Procedures 4.3; Interview design 4.4; Data analysis and trustworthiness 4.5. The focus of this study was everyday practices / pragmatic considerations for the use of PA by coaches and analysts. Any significant additions have been highlighted below.

4.17: Method/Participants

Refer to the previous section 4.2

4.18: Data analysis and Trustworthiness

Refer to the previous section 4.5

4.19: Results and Discussion

The hierarchical analysis identified 72 higher themes and 308 Lower order themes (refer to the APPENDIX C tables 4.9 to 4.14).

The impact PA had was seen in a number of applied areas within all clubs, this emerged as one of the strongest themes for the practical applications of PA. PA clearly had an impact within: pre and post-match planning, transfer of PA information into specific deliberate practice and the setting and monitoring of individual and team training objectives.

PA was central in the use of feedback, de-briefing and pre-match oppositions meetings. Despite this the extent to which coach and analyst had an understanding of pedagogical issues in delivering such sessions varied greatly. A number of practices were used to encourage player self-analysis and independent learning.

The evidence also highlighted that some clubs employ individuals to take an overview of sports science related data to provide Performance Analytics that could be used to answer key performance related questions from a more holistic standpoint.

4.20: The impact of PA (refer to Table 4.10)

Possibly due to the flexible nature of PA tools, their impact has been seen in a number of applied areas within all clubs, this emerged as one of the strongest themes. Evidence is provided for PA directly impacting on everyday practice, with one of the most obvious being its potential impact on planning and training. The specific context within each club influenced their pre-match or post-match focus in the form of either opposition planning meetings or game reviews. Whether the focus was internal (on their own team's performance) or external (looking forward to the opposition), information was collected, interpreted and presented to the coaching team. This was often used in some clubs to present a potential game plan by the analyst and

subsequent discussion as to how information might translate into preparation on the training pitch that week. Important aspects related to how they could; 'exploit the shape and space based on how the opposition set up and exploit weakness during set pieces' and 'exploit certain individuals' were commonly identified and discussed (refer to Figure 4.1 example of a club's integration of pre-match/oppositions analysis). Teams with more of an internal focus used the information to feedback on 'specific individual player targets' and review the extent to which targets set during the training week were achieved (refer to Figure 4.2: varied focus on pre and post-match across clubs).

> So the way we have it set up is no feedback sessions can happen or no reviews or targets or aims or training weeks can be written until the coach watches a full game, so we have that structure that has to be honest and they have had to review the game before we allow them to write this is how we're going to work this week for you, this is your targets so we want to be as accurate as possible and not going off the coaches memory for the games, they have to watch it. Wednesday the players would be off so that gives me a Tuesday and a Wednesday for me to prepare anything and build a session. Club Three: 21's / 18's Analyst
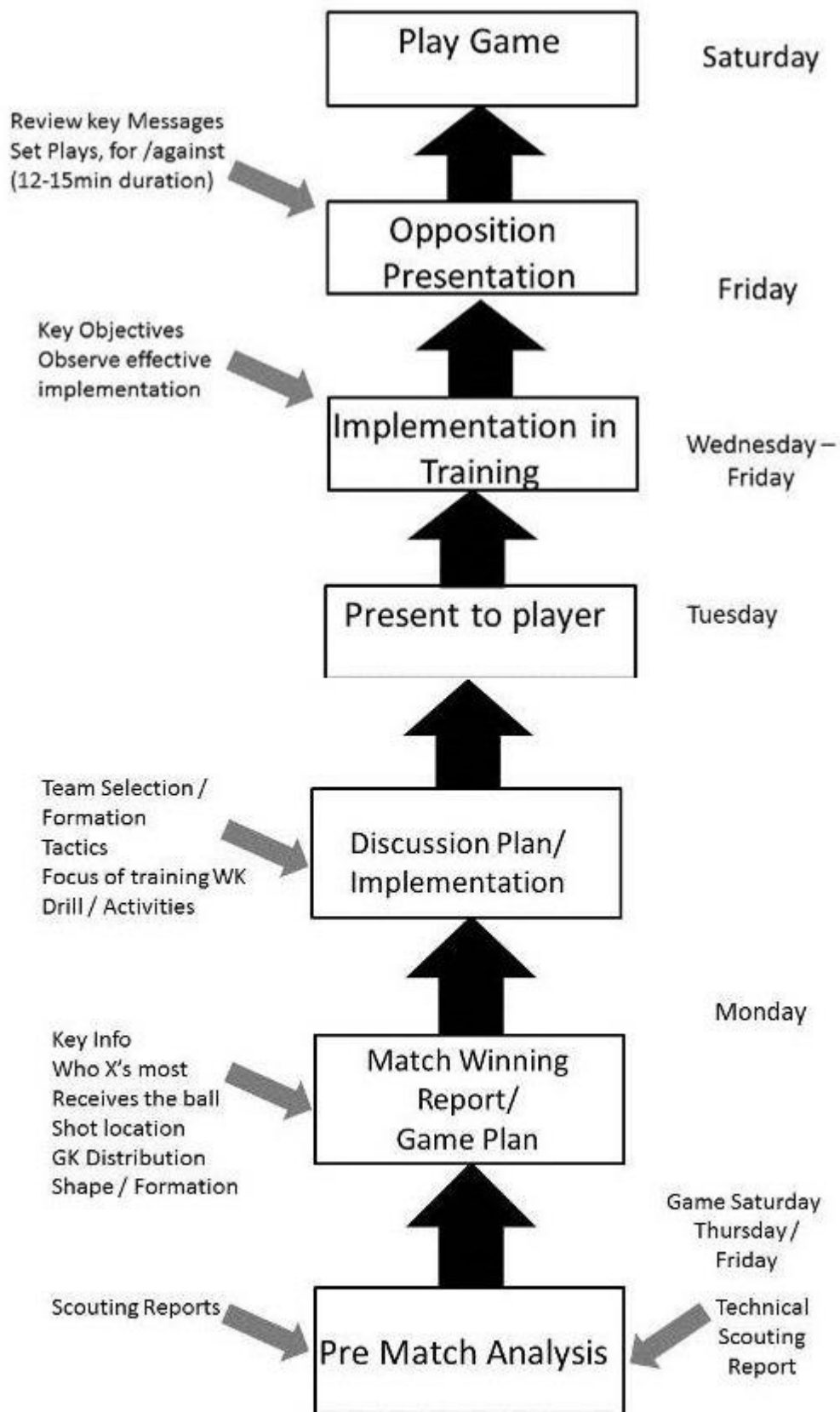
Figure 4.1: Pre-match focus when a club employs a 90/10 split in favour of pre-match/post-match analysis, Key: GK, Goalkeeper; WK, Week.

Club One			Club Two			Club Three		
1st Team	Elite Dev	U18	1st Team	21's/ Reserves	U18	1st Team	21's	U18
90/10	90/10	10/90	60/40	50/50	10/90	60/40	50/50	10/90

Figure 4.2: A summary of the clubs' pre-match/post-match focus, as established from the coach / analyst interviews.

It has been proposed that a disconnection exists between the collection and analysis of PA related data and the everyday realities in which coaches operate and engage or do not engage with PA approaches (Groom *et al.*, 2011; Groom *et al.*, 2012). PA information is central to the debate around planning and generation of ideas for training and the subsequent training week, thus PA is seen as having a direct impact on many key facets of performance (refer to Figure 4.1 and 4.3). The extent PA is consistently used varies depending on the preferred methods of each coach and a clubs established approaches to PA.

There was clear evidence that training objectives were based on key factors identified as part of post-match discussions and analysis, this was seemingly evident across a number of levels of play and clubs. Clearly some strong examples were provided where analysis information was translated into specific on pitch training; 'identify scenarios from the video and analysis then put into practice on the training ground', thus informing specific drills, activities and scenarios etc. This was even more overt when the focus of the analysis was on the oppositions as this would inform 'the runs we need to make….. these are drills we need to use to prepare for the game' and with the U21's age 'the oppositions analysis will directly determine and dictate my set up from a technical point of view' (refer to Figure 4.1 and Figure 4.2). The obvious exceptions to this were when PA was used in an academy setting where training was

largely influenced by the pre-set technical and tactical syllabus. In such cases the influence of the previous performance on training varied and was dependent on the coaches' personal philosophies and approaches.

There was clear evidence that the practical implementation of the review / feedback cycle was consistently adhered to in some clubs, despite the result, as it was described as being central in 'boxing off the performance'. However the time committed to this varied depending to what extent positives and negatives were evident following a performance. It was identified in some cases, following a loss, that feedback might last up to one hour, whereas only 15 minutes might be required following a win.

> I think it should be more consistent than it is now, I think otherwise people get in to the mind-set 'oh well we have got beat so we're not going to watch the video' and 'we have won, we will watch it this week' and I think you end up missing valuable information which in the long run as footballers, if that is what we are trying to make professional footballers they are going to experience winning and losing every single week so I think we have structures in place and we have weekly plans, monthly plans, schedules that you work to, that shouldn't change for analysis in my opinion. Club Two: Pro Development Phase Analyst

Preceding research has suggested a wide variation in timing and approaches to feedback sessions (McArdle *et al.*, 2010). Some evidence has suggested that they would be influenced by outcome in that when the team lost, the post-match briefing was much longer. This is supported to a certain extent, but coaches and analysts were also aware of the importance of being consistent in their approach because it potentially impacted on learning and player development.

4.21: Analytic approaches

Despite what has been described as the short-termism approach in football, examples were provided where PA information informs end of season reviews where teams will evaluate their own and other teams' performances around them i.e. 'how many points are needed to get promoted' and will consider 'what other KPIs other teams are hitting' as 'this will be used for planning at the start of the season'. Evidence was provided that PA played an important role in establishing trends in KPIs throughout the course of the season from which information was used to establish benchmarks to assess performance against. It was suggested that this was important in providing an 'effective way of measuring how effective each player is in a position within our specific formation'. Clearly some clubs have the capacity to employ analyst staff to take a more longitudinal overview of key measurements of performance one might describe as 'bigger picture type stuff'. Such analysts provide important performance information which might supplement a number of applied areas / departments. Important information drawn from a number of sports science tools ensures a good overview on all aspects of holistic performance. These commonly include physical, technical and tactical analysis of oppositions which is then used to create initial opposition reports and often supplements existing scouting reports. The assessment of physical data and load over the season with specific attention to match congestion was an important feature, as was the practice of completing injury audits and evaluation of mechanisms to aid recovery. Some clubs have invested in roles with the specific focus of wider analytics, in bringing together all sports science information by reviewing, monitoring and feeding back PA on a range of performance related information. Such roles are becoming critical as some analysts suggest that they are now in a position where they

had too much data and information to handle. In some clubs they used such information to answer specific performance related questions which might be fundamental to their success. Many projects are initiated by specific inquiries / discussions raised by a coach; 'key analysis projects are based on the initial communication of subjective expertise which might direct some analysis'. Although these roles were not common at all clubs, to a varying extent all clubs, analysts and sports scientists were collecting and acting upon key performance related information.

> it is a lot of long term, medium term stuff, I mean for instance we have looked at a simple thing, we have looked at game spread and where our sort of thicker periods across the season in terms of number of games in a short turnaround of time, so more intense periods right, previous years, how many injuries have we got across there? Therefore what is the best way then in discussions with the fitness coaches and the sports scientists to right well if we pick up a training intensity between them and as we are just about to hit those intense periods, drop the training intensity right down because on previous occasions actually during those intense periods training has also been intense so let's drop it right down. Club One: First Team Analyst

De-briefing and feedback sessions have also been associated with psychological benefits; learning and development, relationship building and translation of technical and tactical information into practice (McArdle *et al.*, 2010). Translation into practice is potentially where great impact can be made from a PA point of view, which is seen in the widespread use of assessment of goals and targets both technical and tactical in nature. Debriefing is important in the manipulation and refinement of medium and short term goals and the refocus and adjustment of short terms goals (McArdle *et al.*, 2010). PA related information potentially has the ability to provide triangulation in evidence thus reducing the likelihood of conflict due to misinterpretation of the tactical / technical situations or events. Also in the widespread use of one on one de-briefing, using clips and stats has the potential to enhance the quality of the learning experience if conducted correctly due to the development of rapport and motivational impact a one on one might have over a team de-briefing. Such one to one reviews might play an important role in further protecting and developing the coach/ athlete relationship.

4.22: Feedback process (Refer to Table 4.11)

The feedback process employed is an important aspect for the practical application of PA. Previously research has not explored the extent of coach/player interaction and the role of the analyst within these processes. As identified previously the specific context of the club's approach might influence their investment of time into either pre-match or post-match. It was evident for teams with roughly an even focus (50/50 pre and post-match focus) that their initial post-match player briefings were largely focused on the successful execution of their game plan (refer to Figure 4.3). In an academy setting the key focus was to what extent individual and team objectives based on the training week were achieved. Feedback within the academies tended to revolve around these aspects also, while at first team level there was more of a focus on specific mistakes or problems which might emerge. The specific role of PA in behaviour change was often associated with addressing individual errors within video clips and improving them on the pitch. This was seen as specifically important at first team level where an individual's isolated error can be costly and often impact on the outcome. At this point it is important to give consideration to coaches' pedagogical issues in bringing about changes in their players. To what extent can coaches use the data and information to manipulate the situation or environment to facilitate technical or tactical change? How might a coach's approach differ depending to the individuals or the message they are trying to convey? In some cases coaches were exposing players to the information, expecting them to identify errors and correct their behaviour accordingly. Research (Abraham *et al.*, 2006; Abraham & Collins, 2011) has suggested that some coaches have a poor comprehension of the feedback approaches available to them, one would suggest a good comprehension of feedback

methods and approaches is essential in translating information into specific behavioural change.
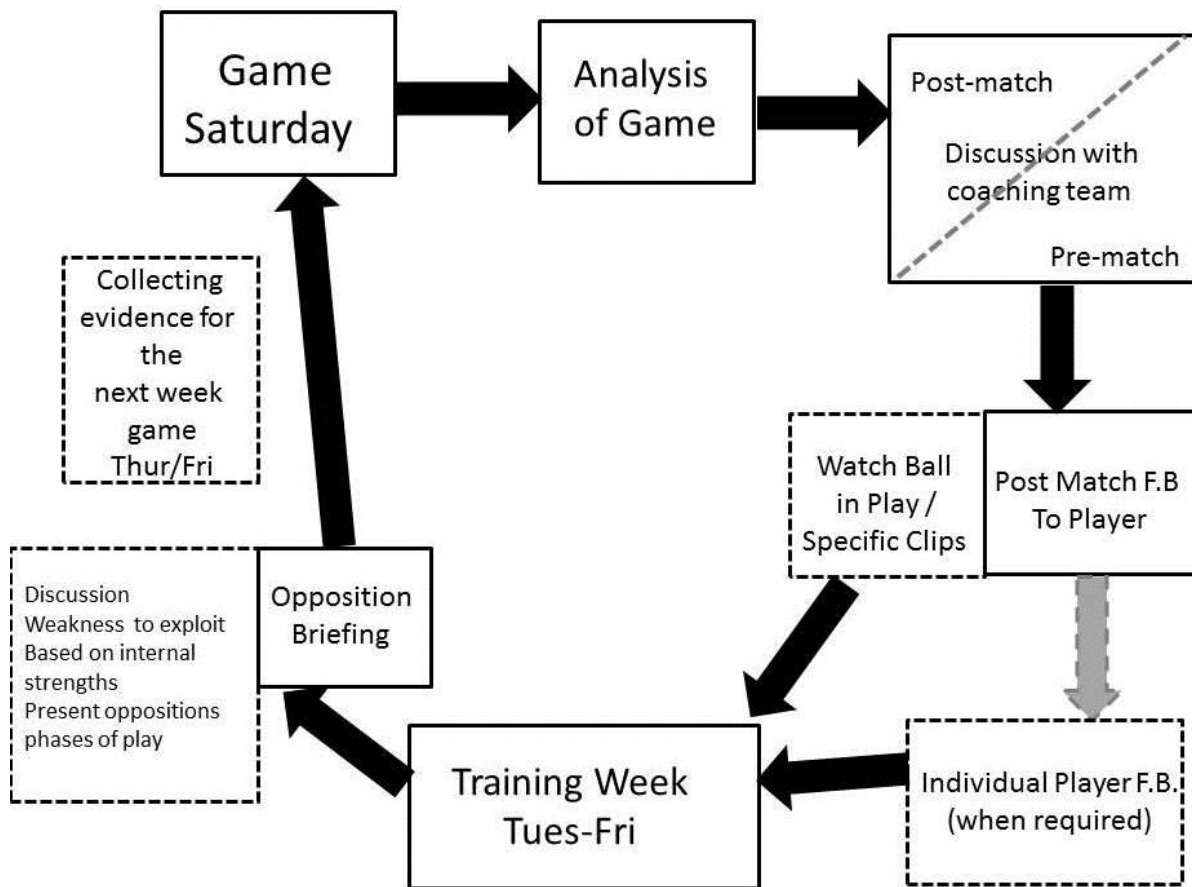
Figure 4.3: Balanced pre and post-match focus (50/50), Key: F.B, Feedback.

The coaches and analysts give close consideration to players as individuals when planning and delivering feedback sessions. An important consideration was to what extent the result might impact on player receptiveness to feedback. A number of other important considerations were also raised when considering the planning, construction and delivery of feedback to players, these included: player concentration level, learning preferences, personality, motivation/ self-belief and the learning environment. Some coaches and analysts have an appreciation of the factors which might impact on player learning, but there was a wide spectrum across coach and analyst which did and did not consistently give consideration to factors impacting on player learning. In

some instances coaches restricted player access to the viewing of videos and clips without the presence of a coach. Some coaches clearly attempt to engage players by developing their independence and ability to analyse themselves by engaging them in two way discussions as well as implementing a number of tasks to get players actively learning during such sessions. In one instance players were responsible for leading part of the feedback session as units, where each unit delivered 5 minutes to the rest of the team. Evidence was also given where players completed individual tasks where they would draw on a pitch template their own passing and distribution maps, shots and tackles from watching their clips. This allowed coaches and analysts to check players' learning and understanding. Players clearly actively engaged in one to one and small group discussions about their performance and in some instances attempts were also made to establish constructive peer assessment. Many of the approaches described above were mostly employed within academy settings.

> Look at making players more independent learners really rather than just have it… purely commands sort of authoritative style I think. Club Two: Pro Development Phase Analyst

> We don't have a long session, it is all sort of smart board interactive pens, two way conversations. We ask the question or we say show something, the players get up and have to draw on the smart board and then we will just take anything that players will do in that sense we will screen shot everything, we will then have evidence and so remember when you said this and that? So we can reflect and go back to things. Club Three: 21's/18's Analyst

> Yeah we find them very engaging when it's just one to one with the coach and the boys, i.e. individual clips and what we're trying to bring in is like kind of rather than it being coach led all the time, the player more input, one on his targets for his next review and two on the individual clips and ask him sometimes well what was the problem there? Or what do you need to do better there? You know and let him come up with the answers. Club Two: Pro Development Coach

Currently de-briefings are widely used in sports settings to facilitate learning, improve performance and to aid the recovery process (McArdle *et al.*, 2010). Learning is often promoted by the facilitator posing appropriate questions at the appropriate time, with the intention of promoting self-reflection by the learner to process the experience. This would possibly lead us to question to what extent effective briefings will be employed

when the football coaching approach is largely authoritarian (Harvey *et al.*, 2010; Potrac & Cassidy, 2006; Partington & Cushion, 2013; Williams & Hodges, 2005). In some instances despite the coach/athlete power imbalance, briefing and feedback sessions appear to facilitate a significant degree of collaborative performance evaluation and subsequently are a great opportunity for coach/athlete interactions, especially during one on one or small group feedback (McArdle *et al.*, 2010). Some coaches have struggled with their personal delivery approach, but there is clear evidence of coaches having made a deliberate effort to engage players via questioning, discussion and other group work identified above. In football there is a traditional approach to practice which is highly directed, very prescriptive in nature and highly autocratic, with instruction counting for the vast majority of the session (Harvey *et al.*, 2010; Partington & Cushion, 2013; Potrac & Cassidy, 2006; Williams & Hodges, 2005). There was evidence of such an approach within the application of PA feedback, but this was not representative of all coaches or levels. Evidence in a number of domains has suggested that motivational climates help mediate better quality learning (Vallerand, 1997). Creating such motivational climates is dependent on the ability of the coach to facilitate members' perceived competence, perceived control and perceived readiness (Magrau & Vallerand, 2003). In the cases where coaches and analysts are trying to employ feedback which places the player at the centre of the analysis and feedback process they seem to have achieved the 3 parameters as outlined by Magrau and Vallerand (2003). As a result it is anticipated that this will increase the likelihood of maximising its learning effect.

4.23: Self-reflection (refer to Table 4.9)

A strong case has been provided for PA's ability to enhance coach and player learning and development via the self-reflection and self-analysis process. These processes were used in setting individual/team learning objectives and in enhancing decision making but a key challenge to successful implementation was a player's involvement and willingness to engage. Via the feedback process identified above PA played a central role in self-reflection and analysis, which allows players to develop their ability to analyse their own performances proactively. Most academy settings have established a formal method of completing player evaluation and self-reflection reports. The idea is that following each game, players will log onto the management tool, review their clips and complete their own assessment of performance. It was also evident that some players needed additional support in identifying their own strengths and weaknesses. In most instances at academy level regular one to ones were offered on a weekly basis to discuss game clips. A more formal approach was seen with the 6 weekly reviews. At 21's and first team level it was more common that informal one to ones were helping players on an ad-hoc basis as and when needed. In some clubs there was a process in place where it was accepted for players to approach analysts and request video and statistical information when they felt it was needed, while in other clubs such approaches were closely controlled. Coaches also confirmed that players were a little more open during one to one feedback and discussion. The introduction of a range of FA youth modules have highlighted that an overly prescriptive approach which is reliant on directed instructions and feedback can negatively impact on learning (Hodges & Franks, 2008; Ford *et al.*, 2010), and thus a less prescriptive approach to instruction is recommended (Williams & Hodges, 2005;

179

Ford *et al.*, 2010). There is evidence suggesting that some football coaches are further attempting to adjust their approaches to meet the performers' needs (Partington & Cushion, 2013). Many examples of this are provided via the implementation of off field feedback opportunities.

Yes, I think… yes you're right but I think you can sort of do a debrief after a game with video clips with senior players and sort of generalise you know, and then maybe if there is some individual work to be done that wouldn't probably be done in a group process. Club Five: 21's/18's Analyst

you probably then take… I take the player aside, that wouldn't happen every week but it would happen periodically, look just get the two strikers together, look at the work they did, get the full backs or whatever and to be fair once you get the lads as an individual, I am sure you have heard this before, they actually do appreciate it, in the group they are a bit… oh is he picking on me, is it all about me? Whereas when you say look I have got some clips for you, they actually love it and they are listening and they are like yes, could you have been tighter there and what about that? What do you think you could have done there? I perhaps could have got a bit… so you're getting a nice little rapport going which you wouldn't get in a group setting. Club Four: First Team

Isolated incidents of I don't know maybe poor defending, poor pressing, whatever it might be would have to be then flagged up because you've not got a checklist but we have got a way that we want to do things with the ball, we have got a way that we want to do things without the ball and when you're watching the videos you are almost looking for them. You find them, you find the good, you find the bad. If the good totally outweighs the bad you don't even touch on the bad. If you have got a 50/50 you go look some of these need to be flagged up, we need to show so how well we have done there and we haven't there. Club Four: First Team coach

4.24: Conclusions

The primary aim of this study was to explore how and why elite coaches and analysts employ PA techniques in their everyday practice and how their PA strategies facilitate feedback, planning and preparation for performance. Clearly PA plays a role in a number of practices which are important to the coaching process; multiple examples have been provided where PA is crucial when reviewing performance, the planning of training, preparations for the opposition and establishing individual / team objectives. The specific preference a coach or club might favour can result in a significant impact to the extent and consistency in which PA is used within the previous process identified. PA was fundamental within self-analysis and self-reflection processes for both player and coach but variations in coach comprehension of pedagogical issues impacted on the successful deployment of PA approaches. It was also appropriate that PA techniques and approaches were central in addressing a number of wider sports related issues and questions. Further consideration of these issues may be required when establishing the effective use of PA.

Future research should consider specific case studies to provide further clarification of the context in which PA is employed in each club setting. These case studies might illustrate the constraints which constitute the effective or not so effective use of PA.

4.25: Considerations for the implementation of case study approaches

The use and perception of PA by the coach and analyst (as highlighted in Study Three Part A and B) appeared to be influenced by the distinct way in which they previously acquired knowledge relating to their roles. Their acquisition and construction of knowledge appeared to be largely influenced by their own personal development and formative years. As a result consideration could be given if specific epistemological chains were exhibited in relation to the requirements of the coach and their ability to articulate what they required from the analysts they work with (Grecic & Collins, 2013). In some instances a disconnect was evident between the coach and analyst, due to a lack of interaction, possibly as a result of epistemological, social and culture differences (Grecic & Collins, 2013). Also from the findings there appeared further insight into social constructs which might have influenced the coach and analyst use of PA per club and even per level. This was seen in the very different development route to their current roles. The coaches and managers largely progress through a successful playing career into coaching and assistant roles, whereas the formative years of an analyst were largely developed within educational settings. These two very different progression routes most likely result in significantly different values and beliefs being developed, which in turn also impact on how each group develop their views and opinions and ultimately inform how they evaluate performance. Coaching literature has started to identify the varied ways in which coaches might develop expertise (Abraham *et al.,* 2006; Nash *et al.,* 2012) and subsequently impact on their decision making. In order to explore the specific social and cultural context impacting on the use of PA at different clubs and different levels within the same clubs, it was felt necessary to explore club specific case studies. As a result it was felt necessary key findings should be further illustrated using case study approaches and cross club

comparisons within the final part of this study Part 3. It was anticipated that this would further clarify the use of PA and the coach/analyst relationship in each specific club's context, which also provided additional comparisons.

By employing detailed case studies to illustrate the key themes and challenges faced by each club, it was felt this would provide greater specific insight into the real problems and challenges each club faces, thus also providing important contexts for why specific constraints are evident or approaches are followed within each club. Also important concepts explored included how coaches and analysts develop an understanding and make meaning of the effective use of PA within their environments. Further explanation for the most important constructs could be addressed theme by theme rather than reducing them down into higher and lower order themes. These approaches would reflect the pragmatic nature which coaches and analysts face in their everyday experiences.

4.26: Study Three Part C: Club specific case studies and cross-club comparisons

In order to reinforce the aims explored within Study Three part A and B, it was felt necessary to further illustrate in more detail the context, constraints impacting on PA at specific clubs and even the difference within the same club at multiple levels. It was anticipated that employing case studies and finally cross clubs comparisons would provide additional insight for readers into the nuances and contradictions for the use of PA across different clubs, level and coach-analyst pairings.

4.27: Introduction: Club case studies

The findings presented in Chapter Three have provided insight into general themes establishing the use of PA analysis within elite football environments from a player, coach and performance analyst perspective. A number of key themes have emerged from the investigations across the 5 clubs, 26 coaches and 23 analysts interviewed. So far the research supports the 'complex realities in which the coach works and interacts with support services' (Côté *et al.,* 1995). The precise constraints and realities impacting on each individual club, coach and analyst are 'slightly diluted' because of the grouping of data into themes and categories. In order to further build upon the pragmatic interpretative approach implemented in the initial studies, it was anticipated specific case studies would be the most effective manner to further illustrate and bring to life the complexity and diversity which PA is used within each individual professional clubs.

Within the field of sports psychology the use of case studies have been widely promoted to report effective intervention strategies which have enhanced performance

(Giges & Van Raalte, 2012), this has resulted in a useful body of research which has been able to exemplify the experiences of sport psychology practitioners (Baghust & Parish, 2011; Hemmings & Holder, 2009; Tonn & Hamison, 2004). It is anticipated that by providing an interpretative critical account as to how PA is used while at the same time giving careful consideration to the constraints and parameters for its use, readers might be able to draw their own conclusion for the effective or less effective use of PA in relation to the specific context provided. A further rational for the use of case studies is to further describe a variety of situations, unexpected occurrences and unique circumstances in which PA is utilised (Giges & Van Raalte, 2012). This is pertinent due to the very diverse nature of PA use as described in the previous three studies.

4.28: Additional methodological consideration

The hierarchical content analysis which was developed from Parts A and B was used to establish a table representing Higher Order Constructs (cf Cruickshank *et al.*, 2013) to illustrate a club's analysis focus, the coach-analyst relationship and the practical applications of PA (refer to Figures 6.4-6.13). It was anticipated that this would provide a representation of the wider application of PA across different levels within each club. This would also give insight into the extent of the continuity in relation to its implementation within each club. In order to provide sufficient depth of interpretative investigation, key examples were selected to typify the interesting and most pertinent themes of the use of PA for that specific club (as established in Figures 6.4-6.13). These pertinent themes were established by reviewing the higher and lower order codes within the Nvivo data base and were stratified into each club. The emerging themes were identified and discussed with the research team to explore the

significance in relation to the specific club. The interviews and transcripts were again reviewed to ensure themes were contextually relevant. Comparisons were made between multiple coaches and analysts within each club at the same level and across levels (i.e. first team, U21's; academy) in order to enhance familiarisation of the culture and triangulation of the findings (Shenton, 2004). Throughout this process frequent debriefings were held by the research team which were maintained to identify the key themes emerging within the raw data. The themes identified were subsequently explored within the discussion sections. At each level within each club multiple parties were interviewed (i.e. coach, assistant coach, analyst, lead analyst at the specific phase, sports scientist, lead sports scientist, technical scout). The individual perceptions were triangulated (Cruickshank *et al.*, 2013) with each other within the same phase and within the wider club to corroborate the most important features relating to the use of PA. Due to the depth of detail available it was deemed appropriate to limit the scope of this section to the most pertinent examples from 4 of the 5 case studies observed. Currently there is limited use of a case study type approach in the area of PA (cf Groom & Cushion, 2004; Groom & Cushion; 2005; Jenkins *et al.*, 2007); as a result the aim of this section was to employ a case study approach to provide further illustration of club specific issues aligning to the central concepts of the thesis:

1. What factors elite coaches and performance analysts value in terms of their assessment of performance.

2. The congruency between the values and philosophies of coach and analyst, with specific reference to how they view and assess performance.

3. How elite coaches and analysts employ PA techniques in practice and how PA strategies facilitate feedback, planning and preparation for performance.

Enhanced member checking was also conducted at this stage. This included the following steps:

1: After the initial drafts of the higher order construct tables were produced they were presented to analysts and coaches within each club. At this point the author provided a brief explanation of the judgment made on each construct (as seen in Figures: 4.4-4.13).

2: The coaches and analysts were given the opportunities to identify if they were not in agreement with any of the judgments made relating to each construct and their interpretation as either being evaluated as yes, partial, or no.

3: At this point some minimal amendments were made to the tables based on the coach and analyst feedback.

4: Specific case studies were made available to the respondents providing an overview of the findings from that club. This included a finalised higher order constructs table and direct quotes from the interviews which were supported by an explanation of the key themes which emerged.

5: Following the case studies being made available to each club final discussions were held with some of the coaches and analysts from each club to establish the following questions: A) Are there any specific themes or issues presented which you disagree with, were not fully explained or you feel have been unfairly represented? B) Are you in general agreement with the findings and their interpretation provided? 6: Any suggestions highlighted from these discussions were used to amend the final interpretation and write up of the study's findings.

4.29: Results / Discussion

	1st Team		Elite Dev Phase		U18		U16		Foundation		
	Coach	Analyst	Coach	Analyst	Coach	Analyst	Coach	Analyst	Coach	Analyst	
Relationship factors											
Congruency within relationship	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	
Open communication/ interaction	Y	Y	Y	P	Y	Y	Y	Y	Y	Y	
Clear explanation of required role/duties	Y	Y	Y	P	P	P	P	P	P	P	
Clear requirements of analysis	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	*
Focus of analysis											
Evidence following a specific philosophy set by the club / coach	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	*
Practical application of philosophy / outlined approaches	P	P	Y	Y	Y	Y	Y	P	P	P	
Use of KPI's to assess performance against	Y	Y	P	P	P	P	P	P	N	N	
Evidence of buy-in to the importance of PA	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	*
Considered and systematic approach to PA	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	*
Development vs. Result Focus											
Evidence of result based focus to analysis	Y	Y	P	P	N	N	N	N	N	N	
Evidence of player development focus	Y	N	P	P	Y	Y	Y	Y	Y	Y	
Use of analysis to develop learning of players	Y	P	P	P	Y	Y	Y	Y	Y	Y	
Use of analysis to enhance self-reflection (player self-analysis)	N	N	N	N	Y	Y	Y	Y	Y	Y	
Value of relationship score	**5**	**5**	**2**	**3**	**5**	**5**	**5**	**5**	**5**	**5**	

Figure 4.4: Club One higher order constructs: congruence/ focus of analysis

Key: Figures 4.4-4.14: Two consecutive Y's suggest congruence between 2 parties for that construct i.e. YY

*Denotes congruence the club, for a specific construct/ Y. Represents clear evidence to support the presence of the construct.

P. Represent partial evidence to support the presence of the construct.

N. No evidence to support the construct.

Value of analysis score out of 5: 5: essential, 4: often essential, 3: somewhat essential, 2: rarely essential, 1: not essential.

Value of relationship score out of 5: 1: poor, 2: fairly poor, 3: good, 4: very good, 5: excellent

	1st Team		Elite Dev Phase		U18		U16		Foundation		
	Coach	Analyst	Coach	Analyst	Coach	Analyst	Coach	Analyst	Coach	Analyst	
Specific PA Approaches											
Post-match team review of performance	Y	Y	Y	Y	Y	Y	P	P	N	N	
Pre-match team briefing	Y	Y	Y	Y	Y	Y	P	P	N	N	
Use of individual clips and stats for self-reflection on performance of players	N	N	N	N	Y	Y	P	P	P	P	
Evidence of impact PA											
Individual player evaluation	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	*
Team evaluation	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	*
Specific player reviews	N	N	N	N	Y	Y	Y	Y	Y	Y	
Specific player targets	N	N	N	N	Y	Y	Y	Y	Y	Y	
Specific team targets	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	*
Evidence of impact on training											
Key analysis themes developed into training	Y	Y	Y	Y	Y	Y	P	P	P	P	
Analysis informs training scenarios	Y	Y	Y	Y	Y	Y	P	P	P	P	
Pre-match analysis focus on opposition	Y	Y	Y	Y	P	P	N	N	N	N	
Pre / Post-match balance	40/60	90/10	90/10	90/10	10/90	10/90	-	-	-	-	
Videos available via management tool	P	P	P	P	Y	Y	Y	Y	Y	Y	*
Feedback process											
Video provided via DVD's	Y	Y	Y	Y	N	N	N	N	N	N	
Regular observation of the whole game (ball in play) as part of post-match team feedback	Y	Y	Y	Y	N	N	N	N	N	N	
Regular use of one to one feedback sessions	N	N	P	P	Y	Y	Y	Y	Y	Y	
Analyst plays an active role in feedback	N	N	N	N	N	N	N	N	N	N	
Analyst plays an active role in planning feedback	Y	Y	P	P	Y	Y	Y	Y	Y	Y	
Player actively engaged during feedback sessions	N	N	N	N	Y	Y	Y	Y	Y	Y	
PA use to reinforce coaches perspective	Y	Y	Y	Y	P	P	P	P	P	P	
Importance of PA in: Assessing performance	5	4	5	4	5	5	5	5	3	3	
Importance of PA in: Supplementing feedback	5	4	5	4	5	5	5	5	3	4	
Importance of PA in: Information practice and training	5	4	3	4	5	5	3	3	5	4	
How effectively PA is currently used	5	4	3	4	5	3	3	4	5	4	

Figure 4.5: Club One higher order constructs: practical implementation of PA (Key: refer to Figure 4.4)

	1st Team/ Reserves		Elite Dev Phase		U18		U16		Foundation		
	Coach	Analyst	Coach	Analyst	Coach	Analyst	Coach	Analyst	Coach	Analyst	
Relationship factors											
Congruency within relationship	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	*
Open communication/ interaction	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	*
Clear explanation of required role/duties	P	P	Y	Y	Y	P	Y	P	Y	P	
Clear requirements of analysis	P	P	Y	Y	Y	Y	Y	Y	Y	Y	*
Focus of analysis											
Evidence following a specific philosophy set by the club / coach	P	P	P	P	P	P	P	P	P	P	*
Practical application of philosophy / outlined approaches	P	P	P	P	Y	Y	P	P	P	P	
Use of KPI's to assess performance against	P	Y	Y	Y	Y	Y	P	P	P	P	*
Evidence of buy-in to the importance of PA	Y	Y	Y	Y	P	P	Y	Y	Y	Y	
Considered and systematic approach to PA	Y	Y	Y	Y	P	P	Y	Y	Y	Y	
Development vs. Result Focus											
Evidence of result based focus to analysis	Y	Y	P	P	Y	P	N	N	N	N	
Evidence of player development focus	Y	Y	P	P	Y	Y	Y	Y	Y	P	
Use of analysis to develop learning of players	Y	Y	Y	Y	Y	Y	Y	Y	Y	P	
Use of analysis to enhance self-reflection (player self-analysis)	Y	Y	Y	Y	Y	Y	Y	Y	Y	P	
Value of relationship score	5	5	5	5	4	2	5	4	5	4	

Figure 4.6: Club Two higher order constructs: congruence/ focus of analysis (Key: refer to Figure 4.4)

	1st Team/ Reserves		Elite Dev Phase		U18		U16		Foundation Phase		
	Coach	Analyst	Coach	Analyst	Coach	Analyst	Coach	Analyst	Coach	Analyst	
Specific PA Approaches											
Post-match team review of performance	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	*
Pre-match team briefing	Y	Y	Y	Y	Y	Y	N	N	N	N	
Use of individual clips and stats for self-reflection on performance of players	Y	Y	P	P	Y	Y	Y	Y	Y	Y	
Evidence of impact PA											
Individual player evaluation	Y	Y	Y	Y	Y	Y	Y	Y	P	P	
Team evaluation	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	*
Specific player reviews	Y	Y	Y	Y	Y	Y	Y	Y	P	P	
Specific player targets	P	P	P	P	P	P	Y	Y	Y	Y	
Specific team targets	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	*
Evidence of impact on training											
Key analysis themes developed into training	Y	Y	Y	Y	Y	N	P	P	P	P	
Analysis informs training scenarios	Y	Y	Y	Y	P	P	P	P	P	P	
Pre-match analysis focus on opposition	Y	Y	Y	Y	N	N	N	N	N	N	
Pre / Post-match balance	Y	Y	Y	Y							
Videos available via management tool	Y	Y	Y	Y	N	N	N	N	N	N	
Feedback process											
Video provided via DVD's	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	*
Regular observation of the whole game (ball in play) as part of post-match team feedback	N	N	N	N	P	P	N	N	N	N	
Regular use of one to one feedback sessions	P	P	P	P	Y	Y	Y	Y	P	P	
Analyst plays an active role in feedback	P	P	P	P	Y	Y	Y	Y	Y	Y	
Analyst plays an active role in planning feedback	Y	Y	Y	Y	P	P	P	P	P	Y	
Player actively engaged during feedback sessions	Y	Y	Y	Y	P	P	P	P	Y	Y	
PA use to reinforce coaches perspective	Y	Y	Y	Y	Y	Y	Y	Y	P	P	
Importance of PA in: Assessing performance	4	5	5	5	5	5	4	5	4	4	
Importance of PA in: Supplementing feedback	3	5	5	5	5	5	4	4	3	3	
Importance of PA in: Information practice and training	2	5	4	4	5	5	4	4	2	3	
How effectively PA is currently used	4	5	5	5	4	4	4	3	2	4	

Figure 4.7: Club Two higher order constructs: practical implementation of PA (Key: refer to Figure 4.4)

	21's/u18		
	Coach	Analyst	
Relationship factors			
Congruency within relationship	Y	Y	*
Open communication/ interaction	Y	Y	*
Clear explanation of required role/duties	Y	Y	*
Clear requirements of analysis	Y	Y	*
Focus of analysis			
Evidence following a specific philosophy set by the club / coach	Y	Y	*
Practical application of philosophy / outlined approaches	Y	Y	*
Use of KPI's to assess performance against	Y	Y	*
Evidence of buy-in to the importance of PA	Y	Y	*
Considered and systematic approach to PA	Y	Y	*
Development vs. Result Focus			
Evidence of result based focus to analysis	P	P	
Evidence of player development focus	Y	Y	*
Use of analysis to develop learning of players	Y	Y	*
Use of analysis to enhance self-reflection (player self-analysis)	Y	Y	*
Value of relationship score	5	5	

Figure 4.8: Club Three higher order constructs: congruence/ focus of analysis (Key: refer to Figure 4.4)

	Elite Dev Phase		
	Coach	Analyst	
Specific PA Approaches			
Post-match team review of performance	Y	Y	*
Pre-match team briefing	Y	Y	*
Use of individual clips and stats for self-reflection on performance of players	Y	Y	*
Evidence of impact PA			
Individual player evaluation	Y	Y	*
Team evaluation	Y	Y	*
Specific player reviews	Y	Y	*
Specific player targets	Y	Y	*
Specific team targets	Y	Y	*
Evidence of impact on training			
Key analysis themes developed into training	Y	Y	*
Analysis informs training scenarios	Y	Y	*
Pre-match analysis focus on opposition	P	P	
Pre / Post-match balance	30/70	30/70	
Videos available via management tool	N	N	
Feedback process			
Video provided via DVD's	Y	Y	*
Regular observation of the whole game (ball in play) as part of post-match team feedback	Y	Y	*
Regular use of one to one feedback sessions	Y	Y	*
Analyst plays an active role in feedback	Y	Y	*
Analyst plays an active role in planning feedback	Y	Y	*
Player actively engaged during feedback sessions	Y	Y	*
PA use to reinforce coaches perspective	Y	Y	*
Importance of PA in: Assessing performance	5	5	
Importance of PA in: Supplementing feedback	5	5	
Importance of PA in: Information practice and training	5	5	
How effectively PA is currently used	4	4	

Figure 4.9: Club Three higher order constructs: practical implementation of PA (Key: refer to Figure 4.4)

	1st Team/ Reserves		Elite Dev Phase		
	Coach	Analyst	Coach	Analyst	
Relationship factors					
Congruency within relationship	Y	Y	Y	Y	*
Open communication/ interaction	Y	Y	Y	Y	*
Clear explanation of required role/duties	Y	Y	Y	Y	*
Clear requirements of analysis	Y	Y	Y	Y	*
Focus of analysis					
Evidence following a specific philosophy set by the club / coach	Y	Y	Y	Y	*
Practical application of philosophy / outlined approaches	Y	Y	Y	Y	*
Use of KPI's to assess performance against	Y	Y	Y	Y	*
Evidence of buy-in to the importance of PA	Y	Y	Y	Y	*
Considered and systematic approach to PA	Y	Y	Y	Y	*
Development vs. Result Focus					
Evidence of result based focus to analysis	Y	Y	P	P	
Evidence of player development focus	Y	Y	Y	Y	*
Use of analysis to develop learning of players	Y	Y	Y	Y	*
Use of analysis to enhance self-reflection (player self-analysis)	N	N	N	N	
Value of relationship score	5	5	5	5	

Figure 4.10: Club Four higher order constructs: congruence/ focus of analysis (Key: refer to Figure 4.4)

	1st Team/ Reserves		Elite Dev Phase		
	Coach	**Analyst**	**Coach**	**Analyst**	
Specific PA Approaches					
Post-match team review of performance	Y	Y	Y	Y	*
Pre-match team briefing	Y	Y	Y	Y	*
Use of individual clips and stats for self-reflection on performance of players	Y	Y	Y	Y	
Evidence of impact PA					
Individual player evaluation	Y	Y	Y	Y	*
Team evaluation	Y	Y	Y	Y	*
Specific player reviews	P	Y	Y	Y	*
Specific player targets	P	P	Y	Y	
Specific team targets	Y	Y	Y	Y	*
Evidence of impact on training					
Key analysis themes developed into training	Y	Y	Y	Y	*
Analysis informs training scenarios	Y	Y	Y	Y	*
Pre-match analysis focus on opposition	Y	Y	P	P	
Pre / Post-match balance	60/40	60/40	20/80	80/20	
Videos available via management tool	N	N	N	N	
Feedback process					
Video provided via DVD's	Y	Y	Y	Y	*
Regular observation of the whole game (ball in play) as part of post-match team feedback	N	N	N	N	*
Regular use of one to one feedback sessions	P	P	Y	Y	
Analyst plays an active role in feedback	N	N	P	P	
Analyst plays an active role in planning feedback	Y	Y	Y	Y	*
Player actively engaged during feedback sessions	P	P	Y	Y	
PA use to reinforce coaches perspective	Y	Y	Y	Y	*
Importance of PA in: Assessing performance	5	5	5	5	
Importance of PA in: Supplementing feedback	5	5	5	4	
Importance of PA in: Information practice and training	5	4	5	3	
How effectively PA is currently used	4	3	4	5	

Figure 4.11: Club Four higher order constructs: practical implementation of PA (Key: refer to Figure 4.4)

		1st Team		Professional Dev phase		
		Coach	Analyst	Coach	Analyst	
Relationship factors						
Congruency within relationship		Y	Y	Y	Y	*
Open communication/ interaction		Y	Y	Y	Y	*
Clear explanation of required role/duties		Y	Y	Y	Y	*
Clear requirements of analysis		Y	Y	Y	Y	*
Focus of analysis						
Evidence following a specific philosophy set by the club / coach		Y	Y	Y	Y	*
Practical application of philosophy / outlined approaches		P	P	Y	Y	
Use of KPI's to assess performance against		Y	Y	Y	Y	*
Evidence of buy-in to the importance of PA		P	P	Y	Y	
Considered and systematic approach to PA		P	P	Y	Y	
Development vs. Result Focus		Y	Y	N	N	
Evidence of result based focus to analysis						
Evidence of player development focus		Y	Y	Y	Y	
Use of analysis to develop learning of players		Y	Y	Y	Y	
Use of analysis to enhance self-reflection (player self-analysis)		P	P	Y	Y	
Value of relationship score		5	5	4	5	

Figure 4.12: Club Five higher order constructs: congruence/ focus of analysis (Key: refer to Figure 4.4)

	1st Team		Elite Dev Phase		
	Analyst	Coach	Analyst	Coach	
Specific PA Approaches					
Post-match team review of performance	Y	Y	Y	Y	*
Pre-match team briefing	Y	Y	Y	Y	*
Use of individual clips and stats for self-reflection on performance of players	P	P	Y	Y	
Evidence of impact PA					
Individual player evaluation	Y	Y	Y	Y	*
Team evaluation	Y	Y	Y	Y	*
Specific player reviews	N	N	Y	Y	
Specific player targets	N	N	Y	Y	
Specific team targets	Y	Y	Y	Y	*
Evidence of impact on training					
Key analysis themes developed into training	P	Y	P	Y	
Analysis informs training scenarios	Y	P	Y	P	
Pre-match analysis focus on opposition	P	P	P	P	
Pre / Post-match balance	70/40	70/40	50/50	50/50	
Videos available via management tool	Y	Y	Y	Y	
Feedback process					
Video provided via DVD's	Y	Y	Y	Y	*
Regular observation of the whole game (ball in play) as part of post-match team feedback	N	N	N	N	*
Regular use of one to one feedback sessions	P	P	Y	Y	
Analyst plays an active role in feedback	P	P	P	P	
Analyst plays an active role in planning feedback	P	P	P	P	
Player actively engaged during feedback sessions	Y	Y	Y	Y	*
PA use to reinforce coaches perspective	3	3	4	5	
Importance of PA in: Assessing performance	3	1	4	5	
Importance of PA in: Supplementing feedback	3	3	2	4	
Importance of PA in: Information practice and training	3	1	4	3	

Figure 4.13: Club Five higher order constructs: practical implementation of PA Key: refer to Figure 4.4)

4.30: Case Study Club One: Development focus vs. result focus (refer to Higher Order Constructs Figures: 4.4 & 4.5).

An important feature of the focus of club one related to the balance between what might be described as a result based focus vs. a development focus. This was largely influenced by the beliefs of the coaching staff about the extent to which professional players were able to learn and improve. There seemed to be conflicting views with some members subscribing to the belief that first team players were 'the finished article' and as a result they perceived players as either able to execute the required task relating to the playing philosophy of the coach or not. The analysts suggested that the players which were unable to execute the plans of the coach effectively were likely to have a short life span at the club. There appears to be quite a fixed mindset exhibited by the manager and analyst relating to this concept (Dweck, 2006). The analyst seemed to be influenced by the approach of the coach, which was understandable considering his close working relationship and previous history with the coach. The first team coach who was responsible for working with players on the training pitch on a weekly basis seemed a little more developmental in his way of thinking, exhibiting more of a growth mindset. As a result the first team coach clearly saw analysis as playing a central role in developing individual and team performance (Dweck, 2006). This was influenced by his previous experience as a player, in that he was always treated as he was the finished article and as a result he received little guidance or assistance in his own improvement as a professional player. He found this strange as he always thought he was far from a complete player and clearly had areas to improve in his game. The coach felt he would have benefited from video analysis if it had been available when he was a player. In extremely competitive environments such as in professional football there are severe ramifications for losing or poor performance which explains why a performance / result focus was so prevalent. However research has suggested that this tends to create an environment

where members are threatened by losing and a fear of failure is prevalent (Chase, 2010). This in turn can result in ego orientated environments which can negatively affect the efforts and motivation of players (Chase, 2010; Dweck, 2006); whereas a more developmental approach would focus more on a mastery-orientated motivational climate and allow players the opportunity to make brave decisions without fear of failure.

> this is I think at first team level is a personal opinion, again at first team level I don't think the players are learning any more, I think their opportunity to learn has gone, and if the player doesn't do something that is required then they are not the right player for this club and they will be transferred or loaned or their time span at this club won't be as long as long as it could be and that we have got players that we have got and if they are not right then our recruitment needs to be better whereas different age groups which I don't necessarily have a direct link with but there is a different opportunity to learn. Club One: First Team Analyst

> Yes, there is no doubt about it, and what we do sometimes is we may recruit and try and you know get someone that isn't polished and isn't counting to 12 and we think with the analysis and with our sports science department that we can get him to go quicker or we can get him to be this and that so again that comes down to the character of the guy as well as the analysis. Club One: First Team Coach

4.31: Pre and Post-match focus: replicating the first team approach

The standardised use of PA at first team and U21's level further highlights the conflict between a result verses development focus. The U21's currently mirror the first team approach to PA, for which the U21's analysts and coaching team provide a strong rationale for this approach; to prepare the players for what will be encountered within the first team environment. It could be perceived that using analysis to focus on the opposition may potentially create a winning orientated focus. In this context the analysis is largely weighted to pre-match opposition analysis, where the analyst team will scout the opposition. This information will then largely influence the training week and subsequently the way the coach decides how the team should play and set up. The key challenge at U21's level is that the teams they play rarely name the same starting 11 as from one match to the next some players from the U18's play up or professionals from the first team play down. This makes the

scouting of the opposition very problematic, however the first team coach highlights the importance of being flexible in their approach as the focus will be on themselves if they have not executed important aspects relating to their own internal performance. This provides further evidence for the flexible and fluid nature of the coaching process as a result of complex social processes and a myriad of interacting variables which the coaching team have to contend with (Cassidy *et al*., 2004; Jones *et al*., 2004b). Relatively inexperienced analysts might not be as attuned to the subtle messages and signals as the seasoned coach, who might suggest that a diversion from the sessional, daily or weekly plan might be required (Kiely, 2011).

> when I say 60% about the opposition as I said earlier, 40% about us, it might be 60% about us if we're not happy with what we're not doing, 40% will be opposition, do you know what I mean? So I think that if we're in a comfortable position that we kind of know what a team is doing and they know the jobs and they know what we should be doing from the template then I will concentrate more on the opposition. If I think we're all over the place it doesn't really matter what the opposition does because we're going to be all over the place so yes so we're always moving and always working and today we worked on our shape and that was it, we didn't talk about xx the opposition. We just talked about us, just reinforce, reinforce, reinforce, reinforce, tomorrow we will talk about xx the opposition. Club One: First Team Coach

Some consideration to this is also given by the U21's as their weekly post-match review will consist of observing a cut down version of the whole game 'ball in play' while the coach adds comments over the game, providing technical and tactical instruction. An overly prescriptive approach which is reliant on directed instructions and feedback can negatively impact on learning (Ford *et al*., 2010, Hodges & Franks, 2008), thus less prescriptive approaches to coaching are recommended to enhance learning and retention (Collins, 2012; Partington & Cushion, 2013). It has been suggested that focussing on player potential rather than mistakes is much more likely to create a mental state which is more conducive to learning (Whitmore, 2009). Although sitting through the 'ball in play' or the full game as part of the feedback process has some merits (higher level of contextual information and understanding

of each other's roles), the challenge for the coach would be to reflect on the extent to which each approach allows the facilitation of learning or not.

> I think this is quite result based, experience… the way to look at it is that these players will because we are doing the same process, they will get used to that routine and the idea is that they can take in information that then they will use in a game situation which is very much like because with me saying it is 90% pre-match, and then if that is what they are going to do with the first team then they need to be ready for that so take the points on board, go and play, so that is how we approach it but it is exposure to what they are going to… what life would be like with the first team. But then again it is… it does seem very, we are trying to win the game by doing this. Club One: Elite Development Phase Analyst

> I would probably say it was about 90% of everything we do is pre-match. And once the Saturday has gone it is the managers philosophy which we're guided by at the end of the day if that Saturday has gone, obviously there is things we can improve but that Saturday has gone, what has happened then we can't do anything about so we are looking on how we are going to put that in to the next game. Club One: First Team Analyst

> Because I was conscious of what his work load was, now as we are developing it and we are diluting it slightly but trying to mirror and mimic first team, day before the game we do a presentation on the opposition. Day of the game my presentation of my set pieces, power point, yes? Have we worked on that? Yes. Is it reinforcing? Yes. Is it following the same format as first team? Yes. Why? So when you step there then the process and the protocol is the same for them therefore it is easier so if you like brain training them to the system that we use or if you like the routine so already in a time I have evolved from only doing the presentation of the game on the Thursday to now on a Sunday doing power point presentation which lasts 12 minutes, no more, don't speak any more, get my clips, there and we are going 12 minutes, why? Club One: Elite Development Phase Analyst

4.32: Impact on training and opposition focus.

A number of examples were provided where analysis informs training, specific scenarios and interventions. Analysis from the opponent's previous game plays a significant role in informing aims and objectives at both a team and individual level for the coming training week. Objective information is consistently used to enhance the quality of interpretation of what had happened during the game, this is then developed into deliberate practice to reflect specific instances of live match play.

> He actually sits there and says these are my objective thoughts, now for that to actually impact on our training and match, this is what we need to do, these are the runs you need to do in training, these are the drills you need to do in training and therefore there is a… there is actual impact with performance analysis rather than just saying these are the numbers, this is statistically significant, this is what I have seen from the video, this is… you're actually having an impact on training and matches and that is what we need, it is more real world, Club One: Sports Science/Analytics Lead

> I have seen… I have been part of a… more further development I suppose in to set piece analysis and actually implementing better set pieces which I have seen ultimately have an upturn in set piece goals on our pitch which is probably a… you know I would like to think it is a direct correlation and sometimes it is hard to measure because of course you're playing different teams to where you were in the previous ten games which you are comparing it against so it is not necessarily again statistically significant, I don't think it would hold up in any sort of mathematics journal or anything but in terms of having impact on our team at that moment in time, yes it did. Club One: Sports Science/Analytics Lead
>
> Yes well xx coach sort of… he will set training objectives for the week as well as match objectives, you know you can sometimes see xx coach's training objectives are influenced by perhaps what we have touched on in the video session. So you know if he has picked out a particular area as he mentioned to you they will get out and work on it in training and then perhaps the following Saturday the lads individual match objectives will again reflect something that we have touched on in the video analysis session. Club One: Academy Analyst

The link between analysis and impact on training is even more overt when we consider the application of pre-match opposition scouting analysis. As part of pre-match analysis, the head of analytics would provide a Technical Scouting Report which identified important technical, tactical and physical data specific to the forthcoming opposition. This often included: which player received the ball the most, which player passing pairings were present, shot location, goal keeper distribution and the opposition shape and formation. This information would be used by the opposition analysts to create a 'match winning report'. This would be presented to the coaching team and would form the basis of discussion around a number of important performance questions for example: team selection, team formation, what tactics to employ, the training focus that week and what drills and activities to implement in practice in the lead up to the game. The opposition analyst would often observe training to ensure the analysis and subsequent training has been translated effectively to on pitch training. Clearly the use of pre-match opposition analysis had a number of inherent problems when employed at 21's level, these often revolved around access to video and the inconsistencies of playing personnel. Despite this problem it has been anticipated that opposition analysis at 21's level would provide important insight to the teams: formation,

shape, playing style, set plays and key opposition threats. This seemed to provide a strong example how evidence-based PA information is having a direct impact on behaviour change and decision making, which in turn is implemented via the training and deliberate practice. Such evidence is relatively sparse in the current literature (Kuper, 2012).

> Yes I suppose it is a form of feedback, each week I provide our opposition analyst with a report on the next upcoming opposition, purely based on data, data alone, so that it is sort of his job then to utilise this, the video, the scout reports, his own knowledge as well as communication with the coaches to then put together a match winning plan so in that sense my role is purely to put the objective data and facts in front of him, then I suppose the thought process beyond that is his Club One: Sports Science/Analytics Lead

> I really need to know what the last four teams were, who the most crosses is, who receives the ball the most, how many shots they have had, where does the goalkeeper kick it to and stuff like that and then we put that in to a pack so for me it is a lot about the opposition. We speak at different times about what we need to do as a team so we need to tweak this because we're playing against a different shape whatever so for me it seems more opposition, probably me and the analyst are more opposition based with the nuances, the little pieces that we go 'you need to do that'. Club One: First Team Coach

> From the analysis of the opposition it determines and dictates my set up from a tactical point of view, so for example the game tonight against club xx, we are playing against a four, three, three system so when I did my Zone game yesterday I played with three midfield players against my two and had a rotational system because that is what they do, why do I know that? Because of the information, so therefore it has an impact and effect, the earlier I have the information the better. Club One: Elite Development Phase Coach

Sufficient evidence has been proposed for the use of PA in addressing limitations in the memory retention and recall of coaches (Franks 1993; Franks & Miller, 1986:, Laird & Waters, 2008). PA has also been identified in addressing the subjective nature of coach analysis (Franks, 1993) and contextual factors influencing their ability to observe during live situations (Carling *et al.*, 2005; Maslovat, 2008). Despite these explanations, further pedagogical consideration could be given to the mechanism for which PA facilitates coach reflection and subsequently enhances planning. Do these processes allow the coach to engage in more explicit thinking after the event? Decision making in the situation might be more tacit or semi-tacit in nature (Abraham & Collins, 2011) making it difficult to recall the precise information

required to formulate precise and detailed deliberate practice. The reflective process might engage a deep level of contemplation via explicit learning if coaches are able to draw upon other wider pedagogical considerations while reviewing and discussing key events and issues with colleagues (Abraham & Collins, 2011:218).

> if the manager wants us to mainly focus on opposition then that is what is affecting what happens with us during the week whereas we are mainly I would say 90% pre-game and only 10% post-game which I think differs in different environments and I think we are quite extreme but then the manager controls that but that is what he is after so we can do post-match and we can pull statistics in the game but it is irrelevant because the manager is not going to look at it and it is not going to be taken in to consideration so we are better off focusing our energy on the pre-match knowing that, that is what is going to be relevant. Club One: First team Opposition Analyst

4.33: Feedback of post-match information

In the under 21's the predominant source of post-match feedback was via the whole team watching the whole game back, 'ball in play', which is the whole game edited down to around 60 minutes. During the sessions the coach would commentate over the video identifying important technical and tactical information. The coach would stop and pause the video when required to reinforce points that he felt were relevant. The sessions tended to be a one-way delivery of technical and tactical information and clarification of effective or ineffective behaviours. As a result of the delivery approach it is possible the coach is missing an essential opportunity for shared learning and reflections (Lorimer & Jowett, 2013), such approaches are associated with enhancing learning (Gilbert & Trudel, 2013). The analyst highlights that they were limited to this approach not only because this was the initial preference of the coach but also because of the pre-match analysis being so time consuming, thus leaving little time for post-match analysis. No use of individual feedback or self-reflection was evident due to the restrictive use of video being available to players. As identified by

McArdle *et al.* (2010) such a restrictive use of information and a very directed approach might compromise the relationship between coach and performers. It is has been proposed that an open, honest, two-way communication process is likely to develop trust, thus creating the emotional environment required for effective debriefing. This was very different to how PA was used at academy level where following each game players would log onto Football Squad to review their own clips and the ball in play footage before completing their own self-reflection reports. This seemed conducive to an effective learning opportunity as they are not only critically reflecting on their performance but also receiving comments from the coaches specific to their own development goals each week. Systematically coaches would then complete their own reports and review the player self-evaluations ahead of the following training week. This information would heavily supplement the long and medium term coaching schemes of work.

> He just likes to do the ball in play where he just pretty much commentates through it as much as he can and there are no specific clips, it is literally just that. I think it is too much information all at once, I think one on ones would be useful. …..I do agree with the point that you could watch that completely differently than you should do if you're not with the coach so I don't know where… there is not enough time to sit down one on one with every player in a week but then… I don't know you want them to see it, it is tough one. Club One: Elite Development Phase Analyst

> so for us our post-match would be the ball in play session on a Thursday which can last from an hour to an hour and a half. So that would be our post-match, that would be it really, there is no real analysis or breakdown for me. Club One: Elite Development Phase Analyst

> OK so I would say starting straight after the game I will basically once the coaches come in I will go through to the coaches room with the laptop, anything they want to see there we will show that to them then, then back in to my office and I will upload the match highlights as we call them on to the Football Squad so straight away they are available for players and coaches to watch, following that once the game has been broken down further I will upload all the lads individual clips on to the Football Squad so they have got their own unique log in so they can just go on and they will be able to see the highlights, their individual clips and the ball in play action if they wish. Then we would obviously have the feedback session at some point during the week, we also have a goalkeeper feedback session with xx, so yes I would say as far as I can think now that is the extent of the feedback. Club One: Academy Analyst

4.34: Case Study Club Two: Analyst targets / role and responsibility (refer to Higher Order Constructs Figures 4.6 & 4.7).

Both coach and analyst commented that very rarely did they sit down and outline their analysis approaches and the implementation of analysis tended to evolve over time. At a number of levels it was clear that huge trust is placed on the analyst to interpret and anticipate what is required by the coach. It was obvious that important specific football technical and tactical parameters were not always clearly explained in terms of what all the analysts were expected to look for and why they were looking for them. One of the biggest concerns and frustrations shared by the analysts was that not all of the coaches at the club understand the processes involved in completing analysis and the subsequent time requirements. Misunderstanding of the role resulted in analysts completing activities which were perceived by them to be a waste of time or that time could better spend doing analysis related work. It was felt if the coaches had a better appreciation of this the analysts could be used more effectively. Often analysts were asked to film training sessions from which the footage would never be used, also they were asked to resolve any IT related problems which might occur. In a high performance environment we might expect a performance manager to provide some consistent guidance in terms of task: agreement, alignment, accountability and adjustment (Wiltshire, 2013). However it has been suggested less formal methods of mentoring and support are accepted within football (Grecic & Collins, 2013; Partington & Cushion, 2013).

> I have tried to make it happen but we never really sat down and discussed what he is interested in as such, I mean he always asked how many repossessions we have had in the opposition final third ….but he has never sort of been interested in how that changes week to week or anything or you know going more in-depth for incorporating that with the video it is sort of like you said that might just back up what he is kind of thinking. Club Two: Professional Development Lead Analyst

> Yes, yes it is left up to me what we show in that but there won't always be highlights but if there is any sort of critical incidents that I think are important then I include them because you spend almost every day with the coaches you sort of think well he will be very interested in seeing that, and sometimes you're wrong but I think…So that is actually putting quite a lot of trust in you that it is just going to be right?... Yes, yes I think so yes. Club Two: Academy Analyst

> … I shouldn't just say that they don't understand and that is why it is bad but I think it is our job to try and educate them but I think that is a very gradual process and I think you do in this industry in

dealing with results so if you can prove that your analysis has these results then you would get them on board quickly but as I have said that is quite difficult really. Club Two: Academy Analyst

Yeah he is flexible, like he'll go off what we want, what we need, he's quite proactive as well, I think he knows what we want, like the motivational DVD, you know if I'd have sat down with him and said this is what I want he'd have come up with it, he'd have come up with something that he did and that was what I was looking for. Club Two: Youth Development Phase Coach

4.35: Inconsistency in use / approach

The analysts felt that in some situations following a heavy defeat or even a comfortable victory, analysis and the post-match de-briefing session might not be used, thus resulting in a very inconsistent approach to its use. Analysts felt this could have a negative impact on the player development as a result of such an inconsistent approach. Most analysts shared the value that PA should be used to help players to learn from their mistakes, however at the same time they were also aware of the negative impact on player confidence if analysis was too negative, repetitive or an overload of information was evident. Such inconsistency in the PA approach impacted on their anticipated working schedule and work load, as it was common for the coach to make requests at the last minute. This often resulted in analysts having to complete additional analysis just in case it was requested. Similarly when plans changed it often resulted in hours of work not being used; 'it can get very disheartening when 4 hours of work might not leave your lap-top'. Elite coaches will engage in decision making at an explicit and implicit level in relation to how to react and manage certain situations (Nash & Collins, 2006), as in this case a heavy loss or a good win. Evidence also suggests that elite coaches should pay close attention to subtle information from both the environment and performers and thus be adaptive to such responses (Kiely, 2011). However it has been highlighted that fundamentally developmental systems and processes should be systematic in their approaches and good coaching 'is and indeed must be systematic' (Abraham & Collins, 2011:210).

Yes it has worsened I mean whether that will change I am not sure but I understand that at the start of the season when there is no pressure on the results and you know we started the season well that probably he is saying well we will do some video and that is great but when we have been on a really bad run as we have been he has probably… I mean maybe I don't know I haven't spoken to him but maybe he thinks well we keep getting beat, why bring the lads in and say this is why you have got beat and you might see it as a negative thing I don't know, that is something I should discuss with him but yes. Club Two: Professional Development Lead analyst

Yes I think due to the bad results recently it has not been… we have not used the video or the stats as much and the lads have had less feedback to them but maybe the coach just wants to show positive feedback rather than negative and thinks that will, you know, affect their confidence, motivation of the players so as a result I am probably perceiving it in a negative light thinking that he doesn't value performance analysis when really he does so I think a few weeks ago if we had spoke or maybe in a few weeks' time I will be a lot more positive but at the current moment it is… I am seeing it in quite a negative light. Club Two: Professional Development Lead Analyst

I think it's a good tool, I do really. The problem you face with a lot of video is you've just got to be careful it doesn't eat into your time, that's the problem you've got, it's can be quite time consuming analysing 20 odd boys individually. You know it's getting that balance and sometimes if they've done really well, like for example they won three nil at xx last week, they've seen the video, they've seen the highlights and sometimes you don't need, bang, you don't need video this week, let's just get them on the grass and keep it going shall we say. Club Two: Lead Coach Professional Development Phase Coach

Yeah, sometimes I go with my experience, I think well I don't think they need that much video, now if they get turned over six nil obviously they've got to watch what's gone wrong, but sometimes, OK you've won three nil, you've done really well great, OK that'll do you, off you go again. I'm a great believer in if you've done really well keep going, sometimes if you praise them too much they get a little bit loose but saying that if they lose heavily somewhere along the line they've got to see their mistakes because at the end of the day sometimes that results only show you, the result points out ah look you need to be better there don't you. So they keep crossing into the box and my centre halves don't head it I need to show them well look at the centre forward they scored with a header, why didn't you go and head it and sometimes people think it may embarrass people but I think if we're all in the business of trying to get better and improve them they should be able to deal with it, or yeah I have made a mistake maybe in front of a group of ten or a one to one situation. Club Two: Lead Coach Professional Development Phase Coach

4.37: Use of PA to support coach perspectives: 'to prove I am right, you are wrong'

A common theme across the Academy use of PA was the perception from analysts that coaches primarily use PA to 'prove I am right, and you are wrong'. It was felt that video and stats were primarily used to support the subjective thoughts of the coach, rather than for the primary focus of player development. As a result analysts often felt that the required use of PA was very superficial thus not maximising its use. It was also evident from the analysts and the coaches themselves that it was largely used to support their intuition, and often coaches valued their gut instincts highly and then saw PA as a mechanism to validate their approach. Evidence suggests that many coaches still base their performance evaluation on 'hunch' or 'gut instinct', thus their decision making process is being driven by tacit rather than declarative knowledge (Nash & Collins, 2006). The 'gut instincts' of the coach will be based on their substantial playing and coaching experience so such tacit knowledge is unavoidable especially in a coaching context (Abraham & Collins, 2011). However evidence has also suggested it is important coaches attempt to gain an explicit awareness of their decisions, which is where PA evidence might enhance critical reflection after the event, as scaffolding of declarative knowledge is still key in ensuring effective decision making (Abraham & Collins, 2011).

> We video training as well, only sometimes ….. also it confirms what you think and what you've seen and sometimes after a bad result and you put an 11 v 11 on and you see well he needs to be in the team now you can have a look at the video and well he did really well, it backs you up sometimes, it backs your thoughts up and what you're thinking about a player both individually and collectively as a team. Club Two: Lead Coach Professional Development Phase Coach

> I'm a little bit, how can I put it, old school shall we say, I like my eyes to tell me more often than not, but if I need it to back it up obviously I'll draw upon it to be honest. I like going with my gut feeling sometimes and my experience shall I say. But that doesn't mean to say I would not use it, now maybe quite periodically, I wouldn't say I live, eat and sleep it, I like it just to have it there where I can say let's have a look at that. Club Two: Lead Coach Professional Development Phase Coach

4.38: Case Study Club Three: Congruence within the relationship (refer to Higher Order Constructs Figures 4.8 & 4.9).

There is clear evidence that following the game the coach and analyst engage in clear, open discussion while reviewing post-match information. Interestingly the coach invested significant time reviewing the post-match analysis and valued opinions of the analyst and their perspective of the game, which was based on PA information they had analysed and interpreted. This highlights that coach and analyst have an effective working relationship where PA is directly linked to the coaching process. This successful integration was attributed to the fact that the analyst was willing to be flexible in their use of PA rather than trying to dictate or direct the coaching process too much. It was viewed as crucial to meet the needs of the coach before trying to fulfil the agenda of the analyst. The coach also identified the benefit of this approach compared to previous negative experiences of sports science support, where support services tried to influence 'the football side of things' too much and over stepped their boundaries. When employing an interdisciplinary approach a common concern are the egos involved as these can often be overpowering as experts try to prove their worth to performance (Collins & Collins, 2011). It has been proposed that central to effective interdisciplinary approach is role clarity, to ensure one specialist is not encroaching on the role of another. In this case it would appear a lack of ego and a clear understanding of the analyst role within the working process has allowed effective integration. However a key challenge is in the absence of a performance manager when the coach will have to keep a grasp of all disciplines to know exactly what is happening in all areas of long-term (macro), intermediate (meso) and day-to-day (micro) practices (Collins & Collins, 2011). Possibly over time this might be less onerous if the coach gives more autonomy to his support staff as is the case within this club.

> I meet with the coaches every day across the two age groups that I work with. We will have conversations about what are we doing today? Is there anything I can give you this week that is relevant to what you're doing, is there anything additional that you might need? Is there anything that

we need to try and focus on: that will be daily discussions, especially the 21's level where we spend quite a lot of time where it is me and the coach. If we travel anywhere it will always be me and the coach that will sit opposite each other and go through stuff. Club Three: Lead 21s / 18s Analyst.

I think that is something that is very important but I think it is being able to deliver what they say and what they need, if there are certain ways that they want to work that is how they are going to work, you know us as support staff can't be coming in and saying this is how I want to work, this is what is right. We need to fit in to their process and help them and that is what, with like the analysis and some of the things that we have spoken about, the coach will always be the main lead on what we do, how we develop things, how we lead things and then we work around the coach to put in more analysis and training based stuff, but for me the coach is always at the forefront and then we work around the coach. Club Three: Lead 21s / 18s Analyst.

because if there are examples that I can relate back to, over periods of games, I can then pull them in on the sessions as well, say 'look' here is across different games as well but it is quite open and you know I have got the freedom to say what I think and what I want without thinking that anything is going to come back from it, it is quite open and we just have an honest conversation about it. Club Three: Lead 21s / 18s Analyst.

4.39: Informing the planning and training week

The working week is influenced by initial meetings where coach and analyst review footage and data to the extent where no plans are made for the forthcoming week, or no team and individual player targets are set, until this happens. Examples were provided where key themes identified in the analysis informed specific training situations and practice activities. Coaches saw the video sessions as important in developing independent thinkers and the ability of players to identify specific patterns emerging within the game, based on work completed during previous video sessions. Video would be used to identify specific themes and situations within training then if these themes occurred within a game the player would be aware of this happening themselves without being prompted and react accordingly. As suggested earlier in this study, the significant investment of time into reviewing performance via a PA approach might encourage a more explicit level of decision making. The backwards and forwards discussion amongst the coaching team and analyst might provide a deeper level of pedagogical contemplation in relation to the subsequent training week (Abrahams & Collins, 2011).

So the way we have it set up is no feedback sessions can happen or no reviews or targets or aims or training weeks can be written until the coach watches a full game, so we have that structure that has to be honest and they have had to review the game before they write how we're going to work this week, this is your targets so we want to be as accurate as possible and not going off the coaches memory for the games, they have to watch it. Wednesday the players would be off so that gives me a Tuesday and a Wednesday for me to prepare anything and build a session, build that so then on a Thursday morning we would feedback so then that is the game tied up, finished with, they have got all the work that they are going to do for the next week and then they are starting that after the session on Thursday morning. Club Three: Lead 21s / 18s Analyst.

With the 21's the working week will be formed after we have watched the game back with them, there will be a bit of structure in place that within our six week period of work that we want to relate to, but we will watch the game and it might be our fullback doesn't overlap his runs or not very good, we need to create a session and it will be something important on the base of that, a lot of that comes from the games, from what the coaches have reviewed and what we have clipped and what we have put together. And if there is a specific element that they have done, that they haven't done well in the game, I would do a training session on it. We will come in and watch the video maybe five minutes before they go out; right remember struggling doing this in the game? Today's practise is this, it is hopefully going to help do that so we have got… this is why we're doing it, couldn't do it well in the game, this is what we're going to do and then we go out if we have the time. We will video that session and we can have a kind of comparison of hopefully you see where that can relate back in to the game. Club Three: Elite Development Squad Coach

Now that might change against another team because they play deep so all of a sudden players have to identify well there is no space so we can't get in behind so now we might have to think of another way of you know particularly around that final third of how we work the ball. So there might be a new scenario, you know, in terms of how we do things, which is… we will use that information from the video, cut certain things and our training will… we would throw things in to training that would complement what we're seeing and what would benefit us as a team maybe to try and hurt the opposition. So yes it can vary from game to game but we do do… you know like I say our planning would be, well, this is what we do, this is how we do it, but we're going to add certain things to it that could happen because of the way they play both on the attack and defence, defending side. Club Three: Elite Development Squad Coach

4.40: Interaction with players during the feedback

The coach and analyst team must give careful consideration as to how they deliver player feedback and have come up with a number of innovative methods to develop player engagement. The staff were aware they tended to get more from the team feedback sessions when they were short and concise. It was suggested that players would engage more and 'speak out' more during the small group/ unit feedback or individual feedback sessions rather than the team feedback session. The coaches and analysts agreed that players were concerned with not wanting to say the wrong thing in front of the rest of the group. It was

common practice to get the players to plot their specific passing maps on a pitch template, other relevant variables were also analysed and plotted by the players themselves such as: challenges made/missed, attempts on goal or runs in behind. It was anticipated that this would ensure players were watching their clips more vigilantly. A number of other approaches were employed to encourage player interaction during the video sessions, this often included functional units leading part of the video feedback and open discussion. A key rationale for applying these techniques was to provide a variation in the players' learning approaches.

> They do now their pass maps so we have, each individual will have his DVD of the game, we give him just a A4 sheet of paper with a pitch on it and we say to him right you show us your pass maps so every time he passes the ball, one, because it makes them then look at the video, definitely, there is no hiding away from it so look at the video and have to just mark where they've passed the ball, was it successful, unsuccessful, different colour pen. Club Three: Lead 21s / 18s Analyst.

> I quite like is the small groups. So I might go to the back four, alright in you come today, right OK come on then, let's have a little chat about it and again you can do it in different ways, it might be just a chat, it might be a flip chart, it might be let's look at some of these clips, what do you think? What are your views? Try and maybe open up like a workshop where they… you know have to come up with a challenge within watching the video, I think there is different ways you can do things, yes. Club Three: Elite Development Squad Coach

There was also a large focus on developing their ability to analyse their own performance. The analyst provided examples where players were aware they had specific opposition coming up so they would request specific clips and information on their opposition, to help them prepare for the game. To facilitate independent learning an online platform was used so players could access their clips at any time. Preceding research has championed the use of reflective practices as part of a development process suggesting they are central in empowering players to engage in their own technical and tactical development (Mills *et al.*, 2012; Richards *et al.,* 2009). Developing players with the skills to be 'reflective thinkers' and

'independent learners' has a number of wider benefits to their holistic socio-emotional development (Mills *et al*, 2012).

> I think it does to the extent that now our opposition stuff, we have got players coming in asking: 'oh we know number 10 drops off out of all the midfield and our centre halves will be like can you get us footage just on that'? So they are already thinking ahead, we already know what that sort of person is going to do or coach has been telling us that their 10 does that, can you show me it? So they know that that process is there for us to kind of help them and guide them. Post-match, there is probably 10 players that will come every six weeks and ask for a review of that six week period so when they sit down with the coaches they want to have, well, here is some of the good things they have done, here is some of the bad things, this is where I think they have come so they know that that system is in place for them. Club Three: Lead 21s / 18s Analyst.

> we have got an online platform where the players can watch it, but we have got a wireless server with 20 laptops that every players clips and the full game is on and they have access to it 24 hours a day so they will come in and watch things. They will make certain… they will say in certain clips like clip 10 can you highlight clip 10 and we will just put like a little label on that that was a positive or negative review clip. So again then we will database all the positive, all the negatives or areas of development and then we can just pull them out of the database for when the players need it to sit down with the staff. Club Three: Lead 21s / 18s Analyst.

> it is not just the technical aspects, it is you know, it is the tactical aspects as well, there is a physical aspect to it and there is different ways of learning so players, you know, can learn not just on the training field but you know in the classroom with maybe video stuff, so it is, you know, I think there is a big variation to it.. Club Three: Elite Development Squad Coach

> I think there is a lot of positives from it, I think when you get someone who's not played very well… depending on the character, some may look at it and not want to see it, some that might go… why did I do that? I can't believe I have turned back in that again, why didn't I just open up and go out that so it might work for a lot, it might not work for some but at the moment it seems to be working OK and the good thing about it is there was one lad in particular that we'd said he was not playing forward enough, he kept going sideways, backwards because his map showed it as well, so when he done his map he looked at it and I said what do you notice? And he went I am backwards and sideways, right OK so look let's have a look of the DVD of it so we clip the… we looked at the DVD, with all his pass maps to see what he was doing and how he was doing it and actually he had so many opportunities to open up and go forward he said oh wow, so in training the next day he actually was in his head thinking I am going to play forward so it had an effect on him…..Right straight away yes……Straight away. Club Three: Elite Development Squad Coach

4.41: Insight into data

Although frequency data was collected for important performance variables, it was seen as essential that this information could be linked to each specific instance (video clip) within the frequency database. The analyst described a longitudinal shooting analysis which was initially developed on the basis of the need for a more detailed analysis of shooting occurrences. By linking the frequency of shot location using micros within the Sports Code

database, it ensured specific videos could be quickly selected from the database of shot frequency totalled on an interactive pitch template. Important information would be filtered out from the database i.e. home, away fixture, cup fixture, result to name a few. The main advantage of this approach was that it was intuitive to use for both analysts and coaches. Once set up the coaches felt confident using this tool to search for information on their own. Most performance teams will adopt methods of electronic storage to database key information allowing them to enhance decision making capabilities (Strudwick, 2013). A key challenge for the analyst is the ability to distinguish which data are important and which are not (Strudwick, 2013). In this case the templates seem to provide such insight.

Yes, so you're looking at trends, databases that are central to what you…?....I believe so yes, that is something we do a lot of, it is monitoring… like we are to have a season review on our strikers; where we shoot from and all that sort of stuff, looking at how that reflects with the first team and I think that is more performance analyst role to where a match analyst is more maybe just video based all the time. Club Three: Lead 21s / 18s Analyst.

It was great, not even just for the coaches, for myself, if I had a… I was like; 'have we really had shots from there'? And then going back and looking at them and thinking what are we doing? You know I mean it was so easy that I just didn't have a number and I had to try and think in my head, well when was that game? Or that shot? Or 'it can't be true we wouldn't have had a shot from there', in a click of a button I can say well actually we have and watching the video the keeper might have been 30 yards off his line and think well you put that little bit more context to it, we have the part of the video and then with the coaches with it being so interactive that they can quickly look through anything they want or if we want player specific, if we're doing individual shooting sessions, you know, we can then start looking at why do certain things keep happening? Why does he shoot from there? Is it his movement? But because we can pull all of that from the video we have got two sources there that the coaches can all look at so it has been a great tool. Club Three: Lead 21s / 18s analyst.

4.42: Case Study Club Four Club: playing philosophy and developmental focus (refer to Higher Order Constructs Figures 4.10 & 4.11)

At first team level the coaching team have a clear understanding of how they can use PA and what is required from the analysis as a result of the continuity in the club commitment to the use of PA, irrespective of the result. Central to the club coaching philosophy is the commitment to developing players as independent thinkers. This approach is also extended to the analysts as they are given a significant level of responsibility and ownership. Analysts are given the opportunity to highlight what is important from their perspective and given the autonomy to go about the analysis in their own way. Such ownership was not commonly exhibited across all clubs, this highlighted the coach is aware that a directive and instructional approach might not be the most conducive way of utilising PA and the analyst team.

> I think again with the analyst side, I think it is that one, as much as we are all guilty of this at times because sometimes you work to time restraints, sometimes I will speak with the development analyst after a development game and I will say listen, been thinking, the game yesterday, I think we look at pressing, we look at team shape out of possession, we analyse set plays for and against, that will do, them three, so get all the clips up on that. Then sometimes I think hmm I have just really just gave an order there, so I have just told him to basically go away and do that. So now sometimes I am wary or sort of… I will sort of say look I think this, this and this, anything else you think, anything jumps out at you when you are watching it, bring it to the table so then he will bring his bit; 'look as I was watching it I thought we were a bit deep', watch it back, yes that is a good point. Stick that in. So otherwise they are just carrying out an order, doing it, do you know what I mean? Club Four: First Team Coach

> I think they… both lads, I think xx analyst in with the first team and xx analyst with the development, they are… they carry out the role very well, my only criticism would be as I said that sometimes we dish too many orders out to them, can you get this done? Can you get that done? Can you get that done? Look could you put something along these lines? Could you put something… so you don't tell them, you give them a little framework and see what they come back with. So I think we can do more of that, it won't be… well put it this way, I tell you, you have got me thinking now, maybe it is one of them we need to know a bit more of what they think as in what do they want from the job? Do they want to be ordered? Do they want… oh I just want to come in and you tell me what I need to find and I find it. Club Four: First Team Coach

Congruence across the club is also apparent in terms of the shared playing and coaching philosophy, which seems to align with a number of factors relating to its practical implementation. It has been suggested that the philosophy of the manager/coach is one of the biggest influences on sports science delivery within football (Burgess & Drust, 2013). In this case the coaching philosophy seems to align with the use of PA and sports science and

216

thus enhances rather than restricts its delivery (Burgess & Drust, 2013). However due to the balance of power held by the role of the coach PA and sports science might not always be widely welcomed, as personal coaching philosophy could differ from one extreme (complete integration/valued) to the other (not integrated/valued at all).

> Yes, sometimes there are questions on how you want to play and what we have tried to do here is, we would like the team to be recognisable. So if it is playing that it is always recognisable. We want it to be offensive minded so we always go out and try and go that way and win. We want to be creative which I am sure every coach says, we want to be fast, quick and dynamic so we want to be offensive minded with fast, quick play. Within that we need to be flexible, that is all, it is not a get out but you have to be because there are times that can't happen and then the thing that underpins all that, we find a way to win. And that is the key and when you talk at the sharp end of the market you have to find a way to win. So that is really our… if you're asking, I think that is how we put it together. Club Four: first team coach

4.43: PA and developmental process

Throughout the club, even at first team level, a development mentality seems central to the club's philosophy and approach, supplemented via the effective use of PA. It was apparent all players were assisted in enhancing and developing their own abilities as well as the team's performance. Such approaches were facilitated by an open use of video and stats where analysts were free to share any information which was requested by players. Analysts played a very active role in making information available and supporting in the feedback process. Although the developmental approach is shared by the coaching team and analysts, it has taken time for players to adjust to such a mindset as some players had associated feedback with previous negative experiences.

> or I thought you could have done that, say look, watch the game Saturday, put some clips together we will have a look at them after, and it is interesting. I have done some work with a couple of the lads here and I don't know what has happened to them in the past but when I have said to them look after lunch we will grab ten minutes, their first reaction has been oh I suppose I am going to get a telling off am I? I suppose I am going to get a telling off and you're thinking no, not at all, we're doing a bit of sort of corrective work, some good points, some different points, seeing what your thoughts are which we then can shape… what I found from it is that can then shape some of the stuff you do out there. So you might grab a player, for instance a full back, and his distances etc. or the way that he closes them down too far off and you show him and then you might after training put a little practice on with a couple of the lads look, dur, dur, dur, they don't know the process but he is getting a little bit of individual work and it helps. Club Four: First Team Coach

217

A range of evidence was provided to support the club's commitment to a development based philosophy. Despite this the coach also identified the associated pressure of developing a winning mentality. The coach identified the fine balance between developmental philosophies and the need to be critically honest in preparing players for a first team environment thus increasing a player's likelihood of being successful. Discussion in what has been termed the 'Zone of Uncomfortable Debate' has been seen as being conducive with problem solving and making effective performance decisions (Collins, 2011:160). However maintaining uncomfortable debate can be extremely challenging when there is an established coach/player hierarchy. It is also important to develop a culture where it is expected and accepted in the first place (Collins, 2011); again this can be a challenge.

We are, with the development squad, we are starting to lean towards that sort of stuff and part of the coach and the whole thing with them is trying to make them understand that have come from youth football, that they have to learn how to find a way to win because they are going in to that… the next step is that is where they are going so they need to know all that other side of the game, game management, set play importance knowing your job, doing your job. All these little things that within the earlier years you can sort of, not paper over but you go 'hey unlucky about that', 'don't worry about that' and 'hey good try with that'. Where here now we go 'I'm not sure how many times I can say good try with that' and then that is the thing that we do ask ourselves actually you're just getting me thinking now, if we have got an instance like that, say we have got a young player that you go… he is not doing this, it is easier to say he's not doing this, he can't defend one v one. Then we would sit down as a staff and we say right what have we done for him? Have we gave him video feedback? Have we gave him any other analyse work? Have we actually gone out there and done some work with him in the situation? Have we then shown him? So have we put a programme together or are we, like a lot of coaches, you can't do that and he is thinking well there is no future in that then. So we use analysts for that as well where we identify player's weaknesses and sort of then put a processed plan together. But yes then certainly that is now starting to go in with the development group. Club Four: First Team Coach

… we had an incident the other week with a… against a big Premier League team and a young player we think a lot of made two really poor individual errors that led to two goals that we lost the game 2-1 when we were in control. Now where does that live? How do you deal with that? So we showed the videos, we have done some work out on the pitch, he is getting better, he is improving but I couldn't

get away from the fact that I had to let the player know and I had to let the group know that that is the details that at first team level, get your three points or don't get your three points... I say where does it live? Because I guarantee if that was Match of the Day on Saturday night after that, that right back is getting shown those two isolated incidences again and again and again and if we were a club in the top three of the Premiership trying to push for the title, Alan Hansen would be saying 'they need to find another right back if this is happening continuously'. Now it sounds quite harsh but this is a young player we think very highly of and do you just paper over that and go 'unlucky with that, next time, next time' because if he is playing at Liverpool or Man U or Arsenal, there won't be a next time and that is what I am just trying to get... with development to learn, we have used that video analysis a lot... Club Four: First Team Coach

4.44: Team review

The coach identifies team briefings as being key in evaluating recent performances and setting up subsequent training sessions. The analyst worked closely with the coach to outline what will be included in the team briefing. During the team briefing open discussion was evident between the coaching staff, analyst and players especially at 21's level. However with the first team the players tended not to be so vocal during group feedback. One on one and small group feedback was a common feature of feedback at first team level, and during these opportunities the players were extremely comfortable in having an open discussion. Feedback revolved around the strengths and weaknesses of both teams, all information and statistics, where databased, to track important trends over the season. The team briefing provided specific clips to illustrate areas of strength and areas of development, and these normally lasted between 20-30 minutes. Individual sessions on average lasted about 15 minutes, which were consistently held every 3 weeks for 21's, but tended to be as and when needed at first team level.

I think we have got a way that we want to play here, the development squad are the same, they follow a very similar trend, and what we would do quite a lot of, we would through training methods we would like to think we get our point across, then we have the game, then we watch the games back. If we see things that we like we show, if we see things we don't quite so like we show equally so that would be… so the players need to know look are we doing this right? You're sort of showing us out there what we want, we think we are doing it, we are playing on Saturday are we doing it? So we reinforce good work so that hopefully they can bridge that thing between yes that looks like what you showed us out there, we're trying to carry out what you're asking and we felt like we carried it out, you have now reassured us with the video clips that we have. Equally on the flip side if there are some

things that don't quite look so right we use that as a corrective process. ..Yes, yes and do you still tend to find that happens at first team as well as academy? …100%, 100%. Club Four: First Team Coach

Again yes probably a mixture because obviously, you can't obviously during the game it is not going to be all strengths and you're not going to do everything right 100% of time, so I think you have got to look at not so much weaknesses but areas you could improve on so obviously that we look… we look at what we have done well but what we could have done a bit better do you know what I mean? So again it is a bit of a mixture of both so I think it is important to look at what you maybe haven't done so well I think. Club Four: First Team Analyst

Post-match it goes firstly to the coaches so they will get a copy of the DVD, they will watch it through, I will have seen it through myself and we all will come together and we will sort of discuss different areas, mainly with… the analysis in the academy is mainly based with the 21's and the 18's because it is brand new to the academy this season so we think, well, if we can get a good sort of instalment with them then we can look to progress it so we started off with just… it was minimal but now we have gone in to… we're having two team debriefs a week so they are sort of based on what me and the coach see in the game. The coaches will come in and have their opinions, I'll have mine, we will discuss it and then I will go away, put that together, we usually have some good practice in there and then we present that twice a week, mainly with a match debrief and then sort of position specific we call it so if they are working on a certain area of the match, we have like a ten minute clips of champions league and stuff like that for them to do. Club Four: 21's Analyst

We also have individuals, individual sessions so the players come in with me and the coach like I have mentioned before based on them. We talk through the games and look for areas for improvement so that was like the basis for the academy and then we're looking for like… we are looking to evolve it for access of clips online, it is going into motivation stuff for the players. It is all databased so everything we do, all the video clips are databased so if any players are being released etc. so. Club Four: 21's Coach

Coaches commented that they were much more likely to get some sort of positive discussion about performance during individual sessions, whilst there was often a reluctance by the players to speak out in front of their peers during the group sessions. This might be explained by the 'coach / athlete power differential' as outlined by McArdle *et al.* (2010:12). It has been suggested that athletes might be reluctant to engage in an honest, open debriefing because of their fear of possible negative ramifications of giving honest performance evaluations (Hogg, 2002; McArdel, 2010,). However as indicated within the feedback from players in chapter three, clearly such a power discrepancy did not exist in all clubs as some coaches were willing and able to create an environment to facilitate open discussion. Even in clubs where the coaches seemed to employ more a player focused environment in relation to development and improvement some coaches still saw individual one to ones as being the

most conducive environment to explore the points of view of an individual player when evaluating performance. Findings from the coaches and analysts seemed in agreement with McArdel *et al.* (2010) which highlighted that team players would prefer one to ones rather than briefings in situations which were perceived as performance orientated because these situations had the potential for public humiliation or embarrassment if done openly.

4.45: Group and individual feedback

The players at both the first team and 21's level seem really receptive on a one on one level, as it was accepted that this feedback was used to assist their development and performance rather than to just criticise them. This is only possible due to the trust and understanding established between the coaching team and players. In both contexts, first team and 21's, the analyst role is very passive in the feedback process. It was identified that the analyst might play a role in posing questions and drawing specific attention to certain aspects when needed, however this was mostly at 21's age group and the analyst was careful to follow the coach's lead.

> I would say 70% coach and then probably 30% me, if that, to be honest with you. It is majority of the coach but then they will look over to me and then maybe ask questions or whatever, although with the academy because of the learning, we do fire quite a few questions at the players themselves so we will say what do you think of this? They will say well I think it is pressing or we could have gone harder, well why didn't we? What factors?… so then the players themselves are thinking and learning Club Four: 21's Analyst

The first team coach identified most players were a little defensive in team situations, but this was understandable as at previous clubs video sessions were commonly used to directly criticise players or edge them out of the team. Huggan *et al.* (2015) confirmed this type of approach where analysis has been used to provide evidence for player deficiency thus supporting performance evaluations while providing a justification for releasing players.

221

Some players have 'been tarnished' in terms of their perception of receiving feedback as, when called by a previous coach for a one on one de-briefing, had an automatic response of they were going to receive a 'telling off' or 'dressing down', when the desired effect was actually to help the players' development. The first team manager was also adamant that despite player age, even the likes of a 30 year old professional player still has the capacity to learn, as it was highly likely that previous coaches might not have highlighted or tried to develop the players' deficiencies in the past.

> Yes, I think… yes you're right but I think you can sort of do a debrief after a game with a video clips with senior players and sort of generalise you know, and then maybe if there is some individual work to be done that wouldn't probably be done in a group process, you probably then take… I take the player aside, that wouldn't happen every week but it would happen periodically, look just get the two strikers together, look at the work they did, get the full backs or whatever and to be fair once you get the lads on individual, I am sure you have heard this before, they actually do appreciate it, in the group they are a bit… oh is he picking on me, is it all about me? Whereas when you say look I have got some clips for you, they actually love it and they are listening and they are like yes, could you have been tighter there and what about that? What do you think you could have done there? I perhaps could have got a bit… Club Four: First Team Coach

> Yes and I think it is like I said earlier, I think if it is about them, they love it, it is like anything of course. Good or bad, but you wouldn't pull a player and say can I have five minutes and just give them a barrage of negatives. Sandwich, you give them a couple of positives, a bit of negative and then a bit of positive. Club Four: 21's Coach

> Correct and the reason it is driven one way in the group is because it is like all of us, we are a bit shy really to speak up in a group, for fear of the wrong answer, fear of the others within the group thinking oh, whereas get any of them one on one that is a great opportunity so yes I think with a group it is generalised, you try and get that trust built up within the group to say look this isn't an individual thing it is not about this, it is helping all of us so you can sometimes get a bit of feedback but you can see that the arms get crossed where as one on one it is much more relaxed. Club Four: First Team Coach

> Ad-hoc with the first team, it is sort of an as and when, sort of… I might be wrong here but I don't think first team players would want you… right Thursday afternoon your 15 minutes with the analyst, although saying that… it is like everything, everyone is doing it, some of the lads actually come for clips. Development group, different, development group we have almost got a tick box where we sort of go; right, team debrief, and then within that week individual clips as well but not over doing it, not over doing it. Club Four: First Team Coach

> Yes, yes, yes definitely. Definitely I think what you've said there and feedback you have perhaps has been around other clubs, there is that thing where you sort of, could be a little bit… even us as coaches think you know what do you think? Can you really tell… what do you think? He is 30, is he going to think a bit… you do think that, surely he should know, should he not know that? But maybe they don't, maybe they have never been shown, maybe the last time they have been shown was when they were 16 and then they are just refreshing but the video evidence has been absolutely fabulous, it really has, with not just individual but units as well, back fours, midfields, front twos, teams, it has been terrific. Club Four: First Team Coach

4.46: Collection of key discussion points to provide cross club comparisons

In order to bring together the previous three studies it was felt necessary to comment on the shared commonalities and key differences across clubs, coaches and analysts. There are a number of common challenges and conflicts while implementing PA which were shared by most clubs. Similarly there were a number of issues which polarised clubs in terms of how PA is utilised and how club analysts are deployed. In order to summarise the findings it was appropriate to discuss some of these key points in more detail. The hierarchical content analysis presented in the previous sections was used to summarise some of the key factors as tree diagrams to present the themes emerging from the findings. The number of clubs (out of 5 total clubs) and number of levels (out of 4) were indicated next to each theme to identify the extent to which the themes were shared across clubs and across levels, the four levels were; First team, 21's/Reserves, Academy U18 & U16 and Foundation phase (refer to Table 4.15).

Table 4.15: Representation of common descriptors of each phase within the football clubs (refer to glossary of terms for further clarification).

Level 1	Level 2	Level 3	Level 4
Level 1	Level 2	Level 3	Level 4
First Team:	U21, Pro Dev phase, Reserves	Academy / U18 Elite Dev phase	Foundation Age groups i.e. U16-U8

4.47: Roles and Responsibilities: Specific roles, tasks and duties

The extent to which roles and responsibilities were established or not appears to be a consistent issue emerging across coaches and analysts at each club and every level. Important aspects supporting the congruency between coach and analyst were a clear requirement of the analysis needed and role clarity. Although most analysts gave an extensive indication of their key duties and tasks they would engage with, this appears to have been developed over time. This could be attributed to two key factors; understanding what the coach wants and how they like to work, however this also depended on the coach having a sufficient working knowledge of PA and PA approaches. Analysts who appear to have positive relationships with the coach and wider coaching teams they worked with were often able to outline that they had an understanding of: what the coach wants in terms of type of performance parameters to focus on, what questions the coach is likely to ask and when it is appropriate to have a say or share their opinions on performance related matters. Across most clubs at every level, roles and duties were often influenced by the coach's approach; this was often based on a balance between pre-match (opposition analysis) or post-match (internal focus). Although the use of pre-match was mostly common at first team/reserves and 21's across clubs, the extent of pre-match focus was more dependent on each individual coaching philosophy and preferred preparation, rather than level. This varied greatly at first team level with Club One focusing largely on the opposition (90% pre-match, 10% post-match), while Club Three used pre-match opposition but their focus was still largely on themselves (internal focus, 'how can we hurt them') even when looking at their pre-match opposition analysis (40% pre-match, 60% post-match focus).

> Yes, pre-match we would flag up the opposition, it is an interesting one actually because when you are looking at the opposition we used to sort of do a strengths and weaknesses but we don't really want to overemphasise their strengths but we have to show what they are sort of about I feel. So we have sort of gone away from strengths and weaknesses, we still stay with weak areas we can exploit, but with strengths we have changed that more just to what they are about or we show them a phase of play that sort of tells you a story about what they are trying to do..... We give the lads an indicator

so I would then try highlight areas that we think we can exploit with the way that we play. Club Four: First Team Coach.

Basically the manager will kind of come to me with an idea of what he wants to show in terms of post-match stuff, so then I will have already clipped up the game so I will have looked at obviously the game again once or twice, looked through it, clipped up what I see and then he has done the same to see what he has seen and then we will kind of marry the two together. Club Four: First Team Analyst
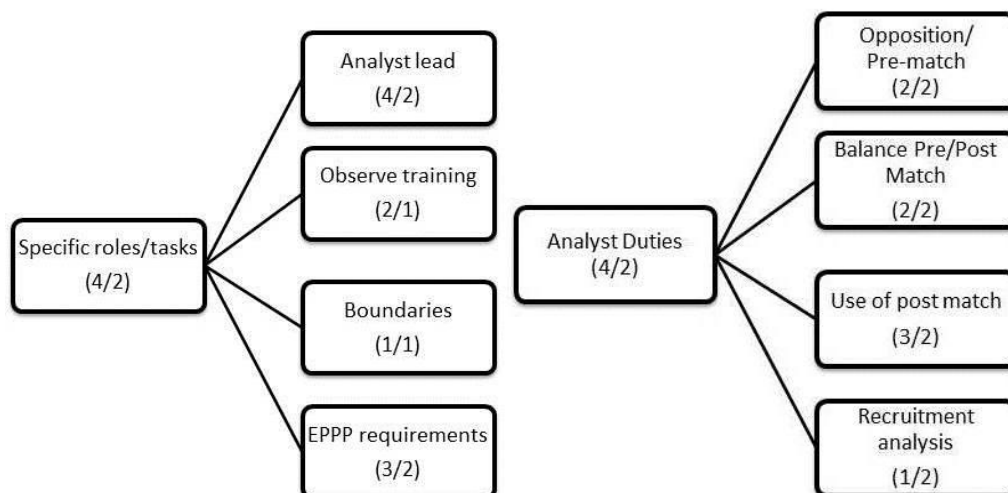
Figure 4.14: Higher order themes relating to roles and responsibilities: tasks and duties.

4.48: Role and responsibilities: Previous experience and education

An important factor impacting on a coach and club's ability to set roles and responsibilities is their previous experience and exposure to analysis. These experiences were largely associated with: player career, formal education / training, wider experience, and coach influence. Analysts and people in sports science support roles were largely influenced by their educational backgrounds, thus often completing a combination of HE courses alongside coach education and sports analysis qualifications. Coaches and managers largely progressed from player careers where their transition to coaching and management was made via FA coach education awards such as the UEFA A and UEFA B licencing scheme. This often meant their exposure to PA and how to use PA and support staff was limited, as most coaches had no experience of it as players, other than the youngest coaches, and their

exposure was often from shared experiences of working with other coaches. Often learning was developed via trial and error, learning through their own experience themselves and those around them. Learning via traditional mentoring has been criticised for developing surface learning as coaches fail to comprehend the pedagogical understanding of the application of their approaches (cf Abraham & Collins, 2011). Some coaches who embraced analysis were willing to work with analysts to see its potential and how it might be effectively implemented, possibly establishing a better understanding for the appropriate application of PA at the correct time. While others would use it at arm's length and non-systematically 'dipping in and dipping out'. An important point relating to the potential barrier was that some of the coaches exhibited fixed mindsets towards analysis (Dweck, 2006) might possibly be that coaches see the analysis as a threat, undermining their knowledge of the game which has been established over their years of playing and development of their coaching (Anderson & Sally, 20014; Kuper & Szymanski, 2012). This concept can be critical to the 'buy-in' of a coach to the use of PA or not.

Clearly the formal and informal learning of analysts and coaches differs significantly in that the coaches tended to leave school potentially from the age of 14-16 (depending on their age) and join a football club via a youth training role before being offered a professional contract. Having played as a professional player, most coaches completed fast track FA qualifications at the end of or alongside their playing career, learning their profession alongside and under the mentorship of other coaches. Analysts commonly progressed from college at the age of 16-18 onto a university degree, with most completing undergraduate or post graduate studies in a sports coaching, sports science and/or performance analyst related discipline.   Most likely the analyst will have completed some formal / informal internship alongside the university programme to give them sufficient experience to progress into roles within football clubs. These very different formative years and experiences might

have influenced the different values and beliefs between coaches and analysts. On the one hand coaches valuing coach intuition and expertise developed through a playing career, while on the other analysts possibly placing more emphasis on scientific knowledge. Formal, informal, non-formal, mediated and non-mediated learning have all been identified as impacting on the development of expertise within coaches (Nash *et al.,* 2012, Abraham *et al.,* 2006), this in turn has been shown to impact on their decision making within their coaching context. Although it is beyond the scope of this study, the varied types of formal and informal learning and mentoring the coaches and analysts are exposed to might significantly impact on their decision making regarding what is and is not of value within their assessment of performance.

> I think you are exposed to… I think different perspectives and different ways of seeing things through education, and through different sorts of education, and different sorts of experiences you know so you are meeting different people so because you're having these different experiences it shapes how you see things, add science on top of that and the nature of what science is you're always questioning things aren't you? Do you know what I mean? That is the idea of it, one problem with sport as a whole and football is extremely guilty of this, but all sports are guilty of this, is the saying that 'oh I did this when I was a player, it works', very true but I mean it doesn't mean it is the best, it might work but it doesn't mean it is the best and I think that is how it shapes you I think personally. Club Two: Academy Head of Sports Science
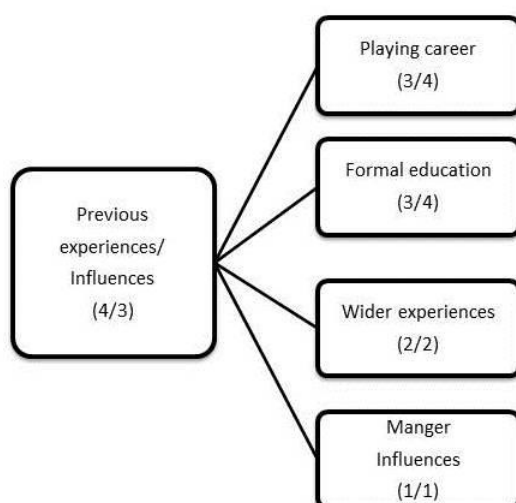

Figure 4.15: Higher order themes relating to roles and responsibilities: experiences and influences.

Evidence from most analysts suggested that role responsibilities and role clarity appeared to develop over a period of time as trust and rapport were developed between the coach and analyst. Both trust and rapport were also associated with coach 'buy-in', to be discussed later. Club Four typified the evolving and flexible process as their coach highlights that 'sometimes we dish out too many orders', and that he would encourage the analysts to use their own initiative in terms of how they go about producing the work required. This is further supported by most analysts across clubs who felt they were often required to use their own initiative to complete tasks how they saw fit. The only exception to this was in Club One where the analyst was given a job list of 45 factors to work through from one game to the next. This was possibly associated with the manager's need to control all aspects of the performance environment. It is common in football for a number of coaches to employ a controlling and authoritarian approach, thus presenting the illusion of control. This can be a constant cause of conflict as coaches are often attempting to implement definitive structures in an attempt to ensure grey areas are eradicated (Bowes & Jones, 2006; Jones & Wallace, 2005). This was also evident at the same club at the 21's level although expectation and duties were set out at the start of the season the analyst felt that they had changed / shifted without being told. Such fluid and adaptive approaches to individual role clarity and requirements are not uncommon within elite sport. Jones & Wallace (2005) suggested that the coaching process is characterised by a number of levels of ambiguity and uncertainty. This ambiguity is often associated with what everyone is trying to achieve, why they are trying to achieve specific goals, and the extent to which these goals are achieved. Most analysts made reference to the changing context and constraints which they face; 'your role is solely dependent on the decision maker at the top'. In one of the clubs with a well-established tradition for the use of PA it was identified that their role was dependent on the 'decision

makers at the top' referring to the chairperson's commitment to such resources. In other

clubs with more modest resources it was identified their role was dependent on to what extent

the new coach values its use. A high proportion of analysts still commented that one of their

first tasks at the club was to get some of the coaches to 'buy-in' and convince them of the

merits of PA in assisting their process.

I think at the start of the season you try and get as much of an idea of what the coach wants as you can so that you know you've got a good base to build on but inevitability it changes slightly throughout the season but that could be down to results and whether the team is performing. Club Two: Academy Analyst

I want this, can't do it, why? So once you adapt to how I work it makes it simple and does that take a certain personality? Yes. Do you need to understand it is never personal? Yes, so when people are coming who are from this environment it can be initially a tough environment to cope with in terms of the way I am but welcome to reality, you affect my job, you are my support team, you're not going to affect my job because I have standards therefore I am going to make demands, I am going to squeeze pips out of you. Club One: Elite Development Phase Coach

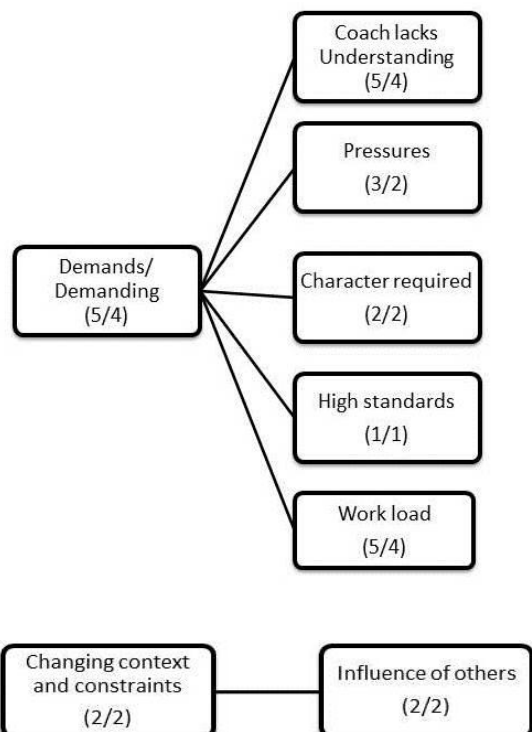## 4.49: Roles and responsibilities: Demanding nature

Figure 4.16: Higher order themes relating to roles and responsibilities: demands and constraints.

A key aspect which impacted on roles and responsibilities was the demands of the environment in which the analyst and coach worked. The size of the club, the current league they played in, the impact of having been relegated / promoted recently and financial position of the club often impacted on the resources and number of roles they had available for PA and sports science support. Well-resourced clubs often had a team of analysts working at multiple age groups/ phases; while in the case of Club Five two analysts had to work across age groups and had the responsibility to provide PA support to multiple teams. Clubs with fairly well-resourced provision would often have a team of analysts which would provide a wider spectrum of PA related roles and duties: first team pre-match analyst, technical scout, match analyst, video analyst, and lead analyst at each phase. Subsequently the duties and specific tasks of each varied depending on their position and level of responsibility. In clubs with analysts working across age groups, analysts were often limited in the range and depth of information and services they were able provide to the coaches. Financial resources and support from the chairman for such positions was identified as an important factor for the availability of resources, (human and equipment) as identified in Club One. Also having the support at strategic levels i.e. first team or academy coach who endorsed the use of PA, often resulted in more extensive roles and support for PA (as in Club Two).

4.50: Results vs. Development focus

The conflict between results and development focus was prevalent at most clubs. This was mostly obvious at the 21's age group where the key focus of the coaches was to prepare and progress players for a career with the first team and it was anticipated that developing a 'winning mentality' was central to this. Most U21's coaches identified their role as being judged on developing and progressing players. The U21's coaches and academy coaches at 18 and 16 identified the importance of developing players holistically ('the wider person'), thus not just being concerned with the technical, tactical and physical development. This often appeared to cause conflict for the coaches, in terms of finding the correct balance between a developmental and winning focus. Preceding research, as highlighted by Groom *et al.* (2011), has supported the concept that the delivery philosophy was shaped by the goals of the coach and their specific role which was often focused on the development of players or on winning games. This concept strongly aligns with the factors which influenced the PA approaches employed by the coaches and analysts within this thesis. Interestingly Groom et al. (2011) also identified that previous negative experiences of video analysis had shaped the delivery philosophy of coaches, which was also widely reported within this thesis, with one coach describing PA at first team level as often being used to highlight a player's faults in order to edge them out of the team.

> and in football at first team level you are not in a fortunate position to be able to do that because it is a result driven business, for me, I am in the fortunate position, what am I forming? I am forming representatives, low maintenance, for the club so therefore it is important that you look beyond, you look beyond the effect or impact it has on results, can I get players in to the first team, when they get there, are they low maintenance and good representatives? Why? Because it is life skills, anybody that thinks football is detached from real life, because they live in a bubble is mistaken because of the fallout rate. I have got… I had 12 in my group last year, 9 of them got released, 3 of them are playing football at a level, 6 aren't, so what is your responsibility? Structure, discipline, organisation, respect. Club One: Elite Development Phase Coach

One coach identified that the players had to win in order for them to believe and buy into what he was telling them. This was further highlighted by the importance of winning in developing the authority and credibility of the coach. The coach suggested that this increased the likelihood of players buying into the coach's philosophy and approaches. Preceding research has also suggested that an instructional approach is commonly employed by football coaches because of the need to prove their knowledge and establish their credibility (Groom *et al.*, 2012).

Preceding research has also supported these thesis findings, highlighting the need of football coaches to employ directed and instructionally heavily approaches. It has been proposed that the predominant use of instructional approaches by the coach is important to demonstrate 'knowledge of the game' (Potrac *et al.,* 2002:192). It has also been suggested that a failure to show such technical knowledge would be exposed by players, who would try to test gaps in knowledge which would seriously strain working relationships with players and could ultimately lead to players losing respect for the coach (Potrac *et al.,* 2002:192). Evidence has suggested that a lack of direct instruction by a coach can be perceived by players as being indecisive and lacking in knowledge, while a willingness to be open to suggestions potentially influencing decision making might be interpreted by players as ' lacking expertise or being weak' (Potrac *et al.,* 2007:40). It has also been proposed that coaches maintain a belief that instructional approaches are closely associated with success and that players respond best to such approaches. Key to this belief is that instructional approaches are vital in providing players with a clear understanding and outline of their individual roles, specific team frameworks and organisational structures (Potrac *et al.,* 2007).

> Well it is development so it is not results, I would say that we would judge success on improvement we would look at individual as much as team results, if our players are ready to go in to the first team environment, first team squad or learning the position or the roles then that is how we would judge success. Club One: Elite Development Phase Analyst

for me it feels more results based even though it shouldn't, that is how I would approach it, I approach it as if results matter more than development but that is not necessarily the case because you could argue like we were saying before that it is developing their understanding of what it is like to be in the first team. Club One: Elite Development Phase Analyst

A second important concept identified for the first team and 21's coaches in Club Four, was that players have to be made aware of how the magnitude of individual fault and mistakes can cost a game. The coaches within this club were wholly committed to a development of player philosophy and as such tried to approach such factors in a very humanistic manner, while at the same time identifying the impact of such mistakes and magnitude of their consequences at first team level.
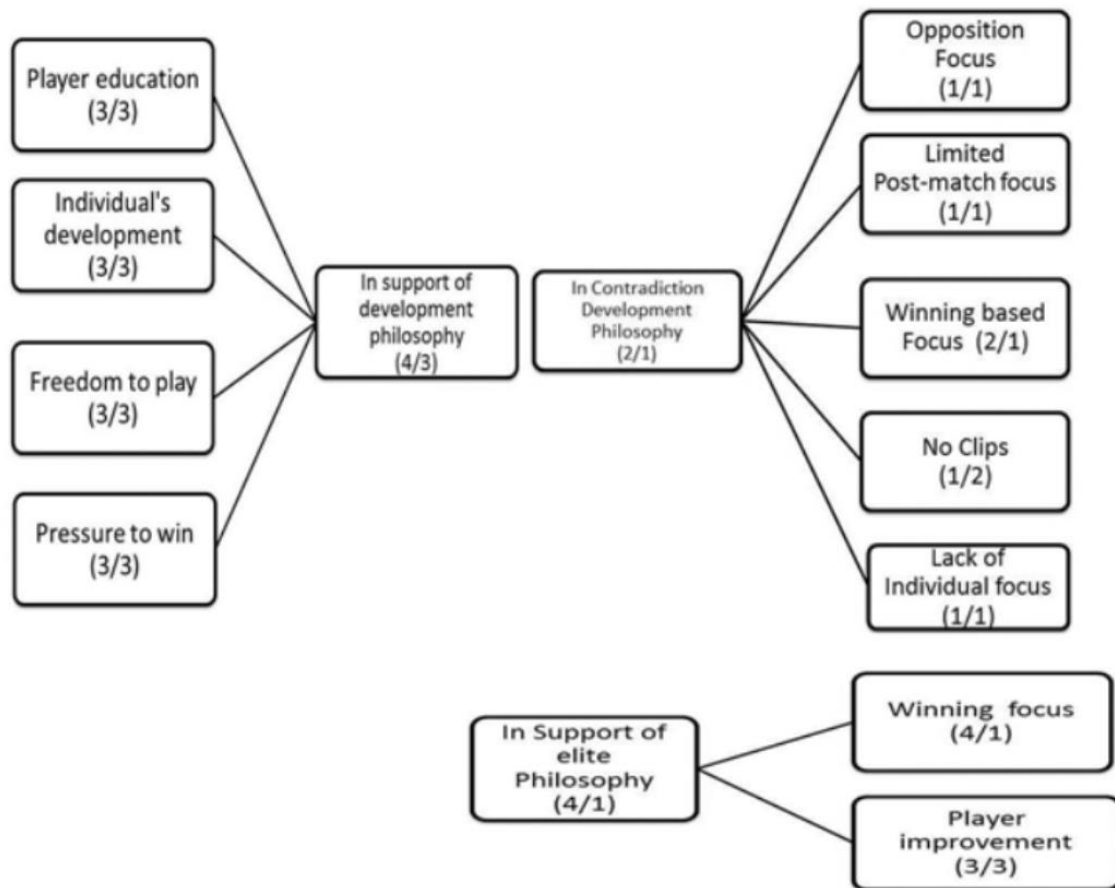
Figure 4.17: Higher order themes relating to roles and responsibilities: development and elite philosophy.

An important concept relating to the use of PA for developmental purposes was the use of individual feedback sessions and debriefing. PA is fundamental to most clubs' focus on developing players at all levels of academy football. One on one de-briefings using video and stats were commonly seen as being important in facilitating player learning and improvement by both the coach and analyst. In some clubs clips and stats were freely made available to every player following every game. However the consistency as to whether one to ones did or did not take place each week depended on the club and the extent to which the coach either valued it or could find time within the player's weekly schedule. In Club Two the emphasis was placed on the players to approach the coach if they wanted to sit down and discuss their clips with them, no formal requirements were set. Within Club Five each player would view their clips within the education session and spend a few minutes discussing them with the coaches/ analysts on a weekly basis. In Club One, within the academy, each week every player would review their clips online within football squads, complete the self-reflection sheets to appraise their performance and also consider the coaches' appraisal of their performance. In accordance with the clubs EPPP classification formal reviews happen every 6 weeks with every player at U18 and U16 age groups. As part of the development process a number of self-analysis and reflection tasks were employed (to be discussed later in this section). Literature considering the use of debriefing by coaches (McArdle *et al.,* 2010) has more readily identified debriefings as being more result focused as a consequence of identifying specific faults in performance. McArdle *et al.* (2010) also identified debriefing approaches which attempt to establish practice associated with athlete learning and development, i.e. self-reflection and self-analysis, are more conducive with effective debriefing. McArdle *et al.* (2010) also identified that the nature of the debrief was dependent on performance outcome. Following a loss debriefing was normally longer as the debrief would focus more on areas for improvement. It was also perceived by players that debriefs

were taken more seriously following a loss rather than following a win, thus influencing the

athlete's focus and their perceived value of the debriefing process.

> although it is within the framework of the team, it is also individual you could have a team, I might just say for example my under 16's win every game but only four of them get scholarships, well that hasn't been successful, although they have won every game we have had to release ten players whereas if they lose every game but we keep… ten of them get scholarships well that is being successful because ten of them have got jobs so it is how you perceive it. Club Two Lead Youth Development

> what we would like to do is sort of individual feedback sessions so I am not saying every player, every week, say there is a few particular issues the coaches have noticed, again that is something that happened in pre-season when everyone has a bit more time but once you get in to the week to week it just… as much as you try and you know that it might happen not happen due to a lack of time…
> Club One: Academy Analyst

> Post-match, there is probably 10 players that will come every six weeks and ask for a review of that six week period so when they sit down with the coaches they want to have well here is some of the good things they have done, here is some of the bad things, this is where I think they have come so they know that that system is in place for them to come and sort of analyse their own progress… Club Three Academy Analyst

PA was seen as being not only important in the development and setting of individual and

team targets, but in helping players understand their roles and positions, in most clubs at

multiple levels. Physical data were seen as giving an indicator of how close players were to

the distance covered and work output exhibited by the first team players. It was felt that

physical data were really important in managing the over and under training of players which

subsequently impacted on player technical and tactical development. In many clubs video

evidence was used to establish a database over a number of years, which was seen as a

critical tool in tracking the development of players over a prolonged period of time. This

information also provided a useful timeline for a player's long term development and was

often used to make comparisons between first team and developing players. It was often

found that PA was used for developmental purpose at first team level to work with players to

identify specific individual errors or mistakes. Often the coaches and analysts would work

with players on a one on one or small group basis with PA video and stats when needed, this

was often as a follow up to team briefings. A number of issues have been identified to

undermine the use of team briefings. Preceding research has identified some team athletes

indicated preferring to have feedback one-to-one in the hope of minimising embarrassment

or public humiliation (McArdle *et al,* 2010). The performance evaluation component of

debriefing in sports can change the nature and dynamics of group briefings and result in

being perceived to be extremely negative for players on the receiving end of criticism

(McArdle *et al,* 2010). This also further supports the point that most athletes were reluctant

to speak out honestly in front of their peer and coaches, and thus preferred some informal

individual feedback.

 There seemed to be a mixture of approaches across clubs and coaches and levels and this

was largely influenced by the extent to which the coach felt first team players still had the

capacity to learn and develop, or not. Some coaches / analysts has a strong tendency

towards seeing players as the 'finished article' and as a result were either able to execute the

plans of the coach or not, while others felt they were able to develop and mould players. This

has an impact on how approaches to PA are implemented within these clubs.

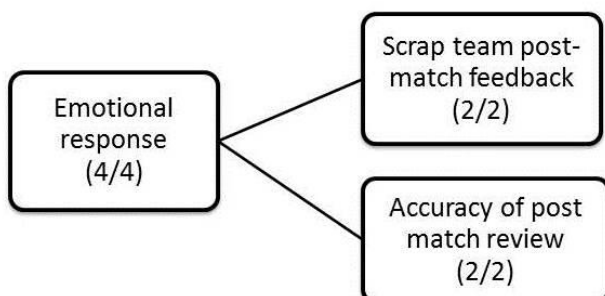**4.51: Emotional response of the coach and implications for timing of their engagement with PA**

Figure 4.18: Higher order themes relating to roles and responsibilities: emotional response.

A substantial amount of coaches identified that they were unable to view the game immediately post-match. Most preferred not to look at the footage until a few days after when they were 'less emotionally attached to the game'. This raised an important concept; if they are 'emotional charged' during the game, to what extent are they able to objectively view the game and make effective decisions? Preceding research already supported the importance of PA in addressing the subjective nature of coaching, but no attempts have been made to consider the extent to which the emotional response during live competitive games impacts on their observational capacity. Although due to the scope of this study we did not further explore the emotional aspects associated with coach observation this might warrant further consideration. As with performers, there is a certain level of arousal and a changing Zone of Optimal Function (Rodgers & Tajet-Foxell, 2011) which coaches must maintain to ensure effective observational strategies.

> Yeah it does, it does. I use it when I can and I think it helps and I think sometimes when you've watched the game and you've won, you've never done as well as you think, I find when you've lost you've never done as bad as you think, that's what I've found from watching the videos, to be fair they didn't do that well, they've won three but they didn't do really well, and well they've lost six but, I know they've lost six and the score line looks bad but looking at it on video it's not as bad as I really thought with the emotions on a Saturday, you know what I mean, it takes the emotion out of it doesn't it. Club Two: Head Coach Professional Development Phase Coach

> I mean sometimes you can come away from a game like maybe a bit over emotional, you write the match report then you watch the DVD and realise you were wrong, it has happened to me a good few times to be honest. Club Two Academy Coach

> No I like to leave it a day really if I can and let the emotion get out and then analyse and look at it. Club One: U18 Lead Coach

> In terms of do I use it enough? Half time I don't like watching anything, after a game not interested, really important that it is on offer to you? No. I want to look at it emotionless, so because what happens is again manipulation of any tool, I watch after the game and I am angry, disappointed, feel I have seen something then I will manipulate that round to not given an objective opinion so if I feel the centre half is at fault for the goal because he was over covering and actually it was the right back whose distance wasn't good enough, there is some way around when my emotions are high and I have said something or I have seen it, but I will manipulate that round… human nature, why? Because you don't want to be proved wrong, day after, two days after when I actually sit and watch it, it is objective why? Because I have got no emotions, because that anger, disappointment, frustration is removed therefore I can actually say the full back is at fault there, so that is my own personal preference on how I use it to my advantage. Club One: Elite Development Phase Coach

4.52: Need to see the whole game

A number of coaches at academy level felt it was essential for their team to consistently watch the whole game, ball in play, as part of their post-match routine. Coaches at Clubs One and Two strongly advocated the importance of players understanding the implication of their behaviour on the whole team. The coaches from Club Two highlighted it was also important for players to understand the contextual information surrounding key events. This same coach felt strongly that clips were 'a waste of time' as they missed important contextual information and especially off the ball action. However a key concern for the analyst involved with this coach was that 'ball in play' feedback sessions tended to be very autocratic and instructionally heavy. This often resulted in long sessions, up to 60 minutes in length, with a huge amount of instruction being directed at the players.

> Every Thursday, game Monday, Thursday we watch ball in play….I try and keep it to 60 minutes which means I don't watch a full game because I try not to stop it but at times I have to stop it to highlight depending on how I feel the group are grasping what I am asking, so every Thursday we do that. Club One Elite Development Phase Coach

> I think if you're putting their own clips on I think is a waste of time. I think you need to sit and watch the whole game to be honest and get a feel of it. Club Two: Assistant Professional Development Coach

4.53: Used to support the opinion of the coach

A common theme across the Academy use of PA was the perception from analysts that coaches primarily use PA to 'prove I am right, and you are wrong'. It was felt that video and stats were primarily used in some cases to support the subjective thoughts of the coach, rather than for the primary focus of player development or informing training or deliberate practice. As a result in these cases analysts often felt that the use of PA required by the coach was very superficial thus not maximising its impact. It was also evident from the analysts and the coaches themselves that PA was largely used to support their intuition; often

coaches valued their gut instincts highly and then saw PA as a mechanism to validate their approach. Evidence suggests that many coaches still base their performance evaluation on 'hunch' or 'gut instinct', thus their decision making process is being driven by tacit rather than declarative knowledge (Nash & Collins, 2006). The 'gut instincts' of the coach will be based on their substantial playing and coaching experience so such tacit knowledge is unavoidable especially in a coaching context (Abraham & Collins, 2011). However evidence has also suggested it is important coaches attempt to gain an explicit awareness of their decisions, which is where possibly PA evidence might enhance their critical reflection after the event, as scaffolding of declarative knowledge is still key in ensuring effective decision making (Abraham & Collins, 2011). However such an approach is not common across all clubs and these factors are often associated with 'buy-in'. In clubs where 'buy-in' existed PA was often fundamental to planning training and decision making processes. In the example described above, although PA was integrated and used in some instances, it was evident that this was limited by the coach possibly possessing a closed mindset to the use of PA and valuing other approaches more strongly i.e. 'more pitch time'.

There was a feeling amongst most of the analysts that they felt the coaches did not value the PA as much as pitch time (this was strongest at Club Two at the academy phase). Although most coaches commented positively on the use of PA in player development, most coaches were concerned about how PA was difficult to fit in due to time restrictions placed upon them. Most seemed to indicate that pitch time was the most important aspect of player development, with the exception of one coach who identified that video was just as important (this was within the same club).

> I think there is time there but I think other things are prioritised over analysis, not by myself obviously but by the coaches so I am… I mean in pre-season there is lots of videos like best

practice and so the players come and watch some examples of good pressing or good playing out from the back, around philosophy, and you know we would use more motivational videos and things like that but as the season is going on I find it more and more difficult to get through to the coaches that they should be using the video more you know a lot more and they are kind of not so keen which is difficult really. Club Two: Lead Professional Development Analyst

I think so, I think they would rather… if they could have another 20 minutes out training they would rather do that than do 20 minutes video work, I think that is basically it. Club Two: Lead Professional Development Phase Analyst

Yes and I think they prefer to improve the players on the pitch, thinking that while they value you that is the best method and rather than them viewing video, so I think that is our job to educate the coaches on how it has been proved that performance analysis does develop players but yes they are very keen, that credit to them, that they do always watch the video and they always want to see the stats so I think they use it as a tool to help themselves inform their opinions and back up their views and then maybe that is passed on to the players. Club Two: Academy Analyst

At the academy level within clubs One, Two, Four and Five this mentality was not shared as video analysis was consistently integrated within the player development, despite any time pressures which might exist. At academy level and the U16's age group, where players were not full time or had to fit it into their other activities, this sometimes caused some conflicts. Clubs often attempted to get around this by the use of flexible one on ones, setting homework analysis tasks, self-reflection logs and using online platforms to make whole games and clips available to players. In many cases the resource of an online platform allowed for analysis and review processes to be completed away from the club.
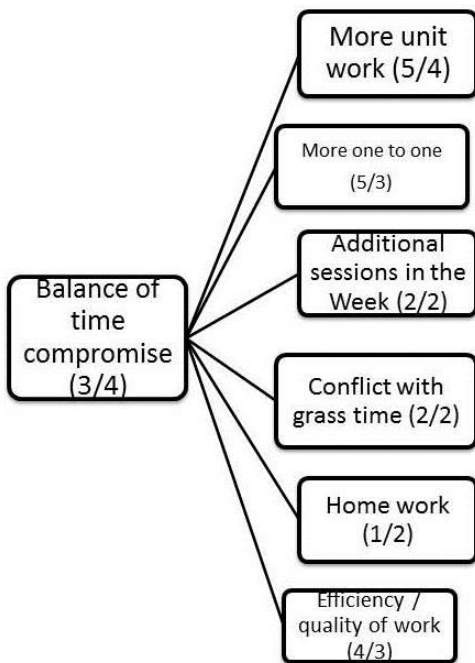
Figure 4.19: Higher order themes relating to roles and responsibilities: associated constraints.

4.54: Control of information: Restricted access to players

In the majority of clubs, video and data were made available to players in order to enhance their learning and reflection when required (four out of five clubs and at every level). The mechanisms for this were either via online platform, individual review with the coach, or by request from the analyst. The use of video was not restricted as a number of technological developments have made it easy to share and make information available in more flexible formats, which was highlighted by a number of coaches and analysts. The key exception from this was how video was used within Club One at first team and 21's level, as the control of video was restricted at first team and 21's to only when coaches were present. This is as a result of concerns that making videos, clips and stats freely available might cause conflicting views and opinions which might be formed around the video. It was acknowledged that players would often view their clips with family members who might influence their views which in turn was likely to conflict with the key messages which the coaching team were trying

241

to instil. This is a valid concern as player interpretation is likely to be influenced by their personal and parents' agendas. However research has suggested players parent's play an important role in helping assist their reflective process away from the club environment (Holland et al., 2010). The coach seems to highlight that the use of video in the past had resulted in a blame culture, thus providing other players to blame, rather than acknowledging themselves as being at fault. This is a difficult situation as the context in which video is shared with players has to be carefully managed to establish an environment where players perceive it as assisting and non-threatening. Clearly the development of a trusting environment takes time to nurture. PA has been seen as an effective medium to highlight performance and role requirements (Groom *et al.,* 2011). As a result PA can be very beneficial in helping the coaching team provide clearer performance expectations. However, Cassidy *et al.,* (2009) has highlighted that coaches need to be aware of the power-dominated nature of the coach-athlete relationship as this can impact on the trust, respect and confidence of the athletes and these aspects are key to a positive learning environment. However in this situation it seems that having the control of information is a way for the coach to further reinforce his power dominance and subsequently potentially harm the coach-player relationship and the player's opportunities for learning.

Unfortunately a by-product of controlling information in such a manner, as described above in club one, might result in players missing out on the effective self-reflection processes, many of which are well established at academy level (in the same club). Such self-reflection processes are key learning and teaching opportunities employed by the academy coaches. In most organisations, like this one, the coach no longer represents the exclusive control of resources and information across the entire club (Burke, 2010:100). It has been proposed that such institutional authority is not conducive with forging respect and developing an

athletes autonomy (McArdle *et al.,* 2010). As such, authority can result in a power struggle

and can compromise the quality of the coach-athlete relationship, its effectiveness, and can

sometimes result in conflict and the 'withdrawal of best efforts' from athletes (Purdy et al.,

2008; Jowett 2003, Jowett & Cockerill, 2003)

> They don't have any one on one sessions, which I think would be useful, they have one long session which can sometimes be too long, it is a lot of information to take in, we usually get through about 45 minutes, an hour and a half, maybe… Club One: Lead Elite Development Phase Analyst

> So from under 21, games and clips do not go on there, they never have the opportunity to watch it unsupervised, really important that. It causes debate because the FA, the Football Squad, the Premier League, everybody feels let the kids see it, one thing it does, creates a blame culture, also football is about teaching, educating and if I want to teach and educate then I want to be able to show them and explain why that is not right or that is right. When Jonny watches it with his Dad; 'not your fault son, not your fault'. Then I come and say well when this happened Jonny, 'my Dad doesn't think that' because he sees it different, because that is what makes football fantastic, it is about opinions and when you have conflicting opinions, especially with young players that you're trying to form, then a) they want to blame someone else because more often than not it is constructive criticism that they don't agree with and b) they are going to believe their Dad more then they believe you… Club One: Elite Development Phase Coach

Such a top-down approach to controlling information seems a little out-dated when

information in most other contexts is widely accessible from a range of media sources.

Possibly the open and free access to information might prove threatening to some football

coaches. If players are able to obtain video and game statistics from other sources including

social media, coaches might perceive this as a loss of control over important information. It

was evident that coaches were concerned with such access without the presence of a coach

largely because they thought players might misinterpret information or not interpret

information as the coach wishes. Coaches still tend to see football as a 'game of opinions'

thus leaving the interpretation of what constitutes effective or less effective performances in

a specific situation open to interpretation (Anderson & Sally, 2014; Kuper & Szymanski,

2012).

4.55: Interaction with players

An important feature of the coaches' use of PA was the level of interaction which the manager was able to create during the video sessions. A number of methods were employed to get the players actively engaged during the video session. A number of activities were designed by the coach and analysts, which were anticipated to facilitate player self-analysis/ reflection skills and subsequently enhance engagement and learning, examples included: players leading parts of the feedback session, open discussion and questioning and attempts to get the players to identify errors and solutions themselves. A common exercise was also self-analysis where players would watch their clips and mark on a pitch template key performance variables such at pass completion, tackles, attempts on goal etc. Examples of pockets of these practices were identified across three of the five clubs at academy and age group level, on a consistent basis. However the commitment to such approaches also varied as a result of inconsistent use at different age groups and at different times of the season at some clubs. Teaching games for understanding approaches have endorsed the player engagement via questions and player led decision making. Such approaches are central in enhancing learning and retention (Collins, 2012; Ford *et al.*, 2010; Hodges & Franks, 2008). As identified above, if employed effectively, PA can be a useful tool to facilitate a number of player focused self-analysis and reflection opportunities. Interaction between players and coaches within elite football environments have been associated as being instructional and authoritative in nature (Groom *et al.,* 2012, Parrington & Cushion *et al.,* 2013). This further emphasise the power imbalance within the coach athlete relationship as highlighted in preceding coaching literature. Although a 'teaching games for understanding' approach might have been successfully used in other sports to enhance athlete learning and create more athlete focused learning opportunities, the predominant approach as highlighted amongst football coaches

might cause a reluctance to change or an inability to give more autonomy to players within their learning opportunities.
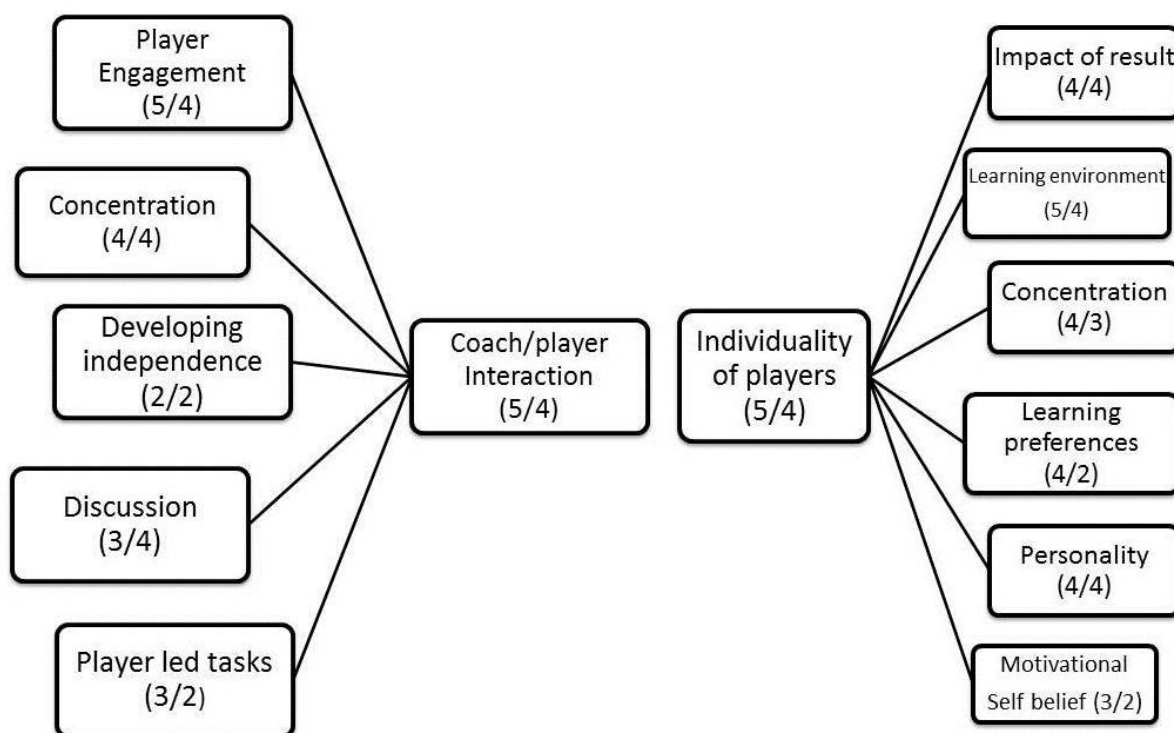

Figure 4.20: Higher order themes relating to feedback process: coach /player interaction and player individuality.

The coaches and analysts employed the use of self-analysis tasks to further engage players in their own analysis at most levels. This was successfully received by the players and analysts but a key concern was that players in some cases need assistance in detecting errors. The analysts recalled it was common for players to be watching their clips in the analysis room but not picking up aspects which the coach would identify as needing attention. Skill acquisition literature has promoted the use of bandwidth feedback to draw the attention of players to specific error detection and correction (Hodges & Franks, 2008). In these situations the absence of guidance for drawing attention to important performance features will ultimately limit a players learning and the effectiveness of reviewing such clips. Coaches

exhibited an understanding of individual player needs and learning preferences and they tried to establish a balance between constructive, positive and negative feedback. Although most staff emphasise the importance of individual development, some coaches still identify the importance of team based feedback and focus and also saw this as being important in player development, as players had to appreciate that their own performance and actions would impact on their team mates. Such a public group-based feedback might help coaches establish shared mental models by exploring generalisations of situations and events identified in the video (Wade & Trudel, 2013), with the desired outcome of enhancing decision making and game behaviour. However it is accepted that this might only be possible when players can establish the link between the outlined mental model, critical reflection and deliberate practice tasks prescribed by the coach (Gilbert & Trudel, 2013). Use of positive and negative feedback by the coach did seem to highlight limited insight into managing the provision of effective and less effective feedback. It has been previously reported that coaches have exhibited a limited understanding of different feedback approaches available to them and very rarely would give consideration to feedback approaches within their planning of a session (Abraham *et al.*, 2006). Despite this the below quotes provide evidence to suggest that some coaches and analysts give careful consideration and value the importance of engaging their players during the different feedback mechanisms which are employed.

> But in terms of a session individually we are trying to bring it in, we have done maybe three or four of the outfield players, maybe get units in so say we get two strikers in and they have commented on each other's performances and it worked quite well. We gave one lad sort of a form, sort of made it friendly like easy questions and whatever, five points he did good, five points he did bad, after he played really well, give him that and he made a comparison of when he was Under 9, from a DVD that he had got given and from that weekend, like what he has improved on over the year, and he is only nine years old and it was quite good really. Club Two: Academy Analyst

> another thing I would like to touch on is I am keen to see analysis from the other side and have players feeding back to coaches and making it more of a discussion rather than… I think that is maybe why I don't view it as effective because it probably is too directed from the coach to the player

but I think the analysis will be much more valuable here if it was more of a discussion or allowing the players to have their say rather than it being so one sided. Club Two: Academy Analyst

Yeah we find them very engaging when it's just one to one with the coach and the boy, i.e. individual clips and what we're trying to bring in is like kind of rather than it being coach led all the time, the player has more input, one: on his targets for his next review and two: on the individual clips, and ask him sometimes; well what was the problem there? Or what do you need to do better there? You know and let him come up with the answers. I think one of the problems in this country at times certainly in football it's always been coach led, everything's been coach led, I think, well we're trying to do more player led if they can, and them taking ownership of their development a little bit and talking and having a look at their own clips. Club Two: Professional Development Lead Analyst

Yeah we watch the DVD and then we probably ask open questions you know there's a lot of emphasis on the boys to come up with their own answers rather than be given the answers by the coach, so you know there is a little bit of discussion around it and you know we will ask boys just to test their knowledge and understanding as well. Club Two: Academy Analyst One

4.56: Link between PA and the impact on planning, training and deliberate practice
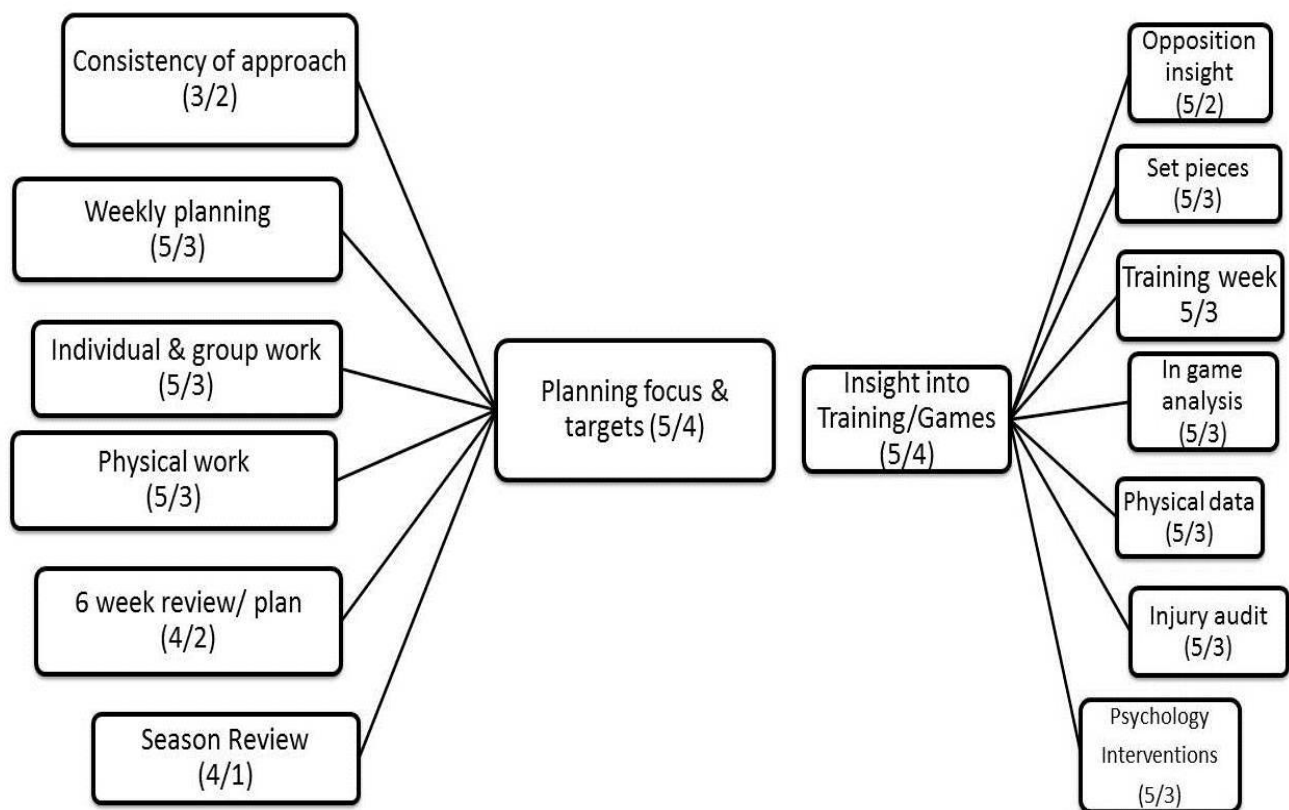

Figure 4.21: Higher order themes relating to the impact of PA: planning focus, game and training insight.

Figure 4.22: Higher order themes relating to the impact of PA: general insight and behaviour change

Sufficient evidence was provided for the impact that PA can have on daily and weekly training. An important aspect of this was the direct impact which PA had on the planning and implementation of specific practices. PA seems to be well established within the coaching process and their daily way of working in a number of clubs. A number of clubs at multiple levels identified that their week would begin by reviewing the evidence from the previous match which would often stimulate discussion based on either post-match (how they just performed) or pre-match analysis (in preparation for a specific opposition). There seems to be consistency to some extent in most clubs in their daily use of PA processes, for instance: post-match reviews, discussions around how analysis might influence the training week, setting individual and team targets and individual player reviews.

> Definitely, so just say for arguments sake this week the theme is finishing from wide areas, so it is crossing and finishing basically but patterns of play, that is what we will work on this week but so say we have got them for two and a half hours for an hour we will work on things that were wrong in the game and things that were right in the game so we will do, we will split half of the session so half the session will be based on the theme of crossing and finishing and finishing from wide areas but the other half of the session will be based around the game on Saturday and what we feel it is we can become better and also the players can improve individually, so what we are saying is there is no good doing crossing and finishing and finishing from wide areas if our centre halves are no good in one v one defending so you have got to try and find that balance. Club Two: Lead Youth Coach

Open discussion seems to generate the sharing of ideas regarding interpretation of the previous performance and which themes or sessions should be prioritised in the training week. Due to such a well-established and consistent way of working in some clubs, (win, lose or draw) the analyst seems to clearly understand his role within the process and was extremely motivated as a result of PA being integral within the coaching process. The coach seemed to highlight the importance of giving the analyst and sports scientist autonomy once he had established confidence in their competence and the quality of their work. Again this supports the importance of role clarity and understanding in relation to professional boundaries when integrating an interdisciplinary approach (Collins & Collins, 2011). However in the absence of a performance manager the workload which this can create can be considerable, especially if they only have a limited appreciation of exactly what each discipline is, or is not, capable of. As a result in the situations where PA was inconsistently used, this often caused frustration for the analyst as they perceived the coach to devalue their role.

I like their input because for a number of reasons they are very good at it, if they weren't good at it then I would probably change my view on it and no doubt that would happen throughout, you know if there is somebody… you know I'm not sure you're probably better off doing certain things yourself and I have been in that situation before. I am very much… I like… he will probably disagree with me but I quite like to say to xx analyst what do you think? Can you find some of this for me? And I will go with him because I trust him and I am happy to do that. I certainly like to listen to his opinion; he might say 'what about this?' OK good and again if I felt that yes I like it or actually no I will just say, and it is exactly the same with sports science. I will speak to the analyst every day, what do you think? What is it you want to do? OK yes how we can do that within the football? And then I might throw my opinion to him, he might throw his opinion to me and then we will agree with whatever but I am very, very open and I am… I would quite… if they are good I will give them lots of leeway because I think… if they are good at what they do then use them. Club Three: Elite Development Squad Coach

last year it was… we agreed we'd do this, this and this and we looked only at that, that was just basic training on shooting, crossing and set plays, goal keeper distribution, goals scored and conceded. This year because of the new software that we have got we have expanded and we have tried to take it forward more, so instead of going and doing multiple areas we have focused on, for example, what I showed you was shooting analysis which was we wanted to get it right and see how far we could develop that instead of doing little bits of everything and not getting the one nailed because once you've got that one right we can then always get it right going forward for the other elements and it is pretty much… we set it out, this is what we're going to do, I sat down with the coaching

staff and said what do you want for… if we do a shooting analysis of our team, what are the key things that you would like to see in that? So they have had you know quite a big input on shaping what they would like, so a matrix we have got of that and then for myself it is more like more trending stuff that I know we can database, we can look back. We can make comparisons and again how I then make it more coach friendly instead of it just being endless amounts of numbers, can we make it straight forward to go through categories or interactive with being able to pull video and then making the numbers, not just be a number. Club Three: Lead 21s / 18s Analyst.

Yes, yes they do but I think the programme for the training is, I think it's 50 percent is rigid to what they have to stick to and then the other 50 percent is quite malleable so they obviously have their own aspects that they want to bring into the programme but again like you say if there's something that really does need working on that's showing up in the video or if we point out to the coaches that we've noticed then they have got that option to take a few sessions out and work specifically with that or with specific players or units. Club Two: Academy Analyst

I think it should be more consistent than it is now, I think otherwise people get in to the mind-set 'oh well we have got beat so we're not going to watch the video' and 'we have won, we will watch it this week' and I think you end up missing valuable information which in the long run as footballers if that is what we are trying to make professional footballers they are going to experience winning and losing every single week so I think we have structures in place and we have weekly plans, monthly plans, schedules that you work to, that shouldn't change for analysis in my opinion. I mean the length might change if you get beat heavily and the coach has a lot that he wants to focus on we might do team feedback for an hour but if it is just touching on some points that is positive from the weekend, it might be 15 minutes but I think it should always be there, it should always be done. Club Two: Lead Academy Analyst

4.57: Key concepts for PA to thrive within a football club

Based on these key findings there are a number of key features which should be considered in ensuring that PA thrives within a football club. However it is important to remember that these approaches are dependent on the idiosyncratic values and practices of the performance team. It is also worth noting that many of these approaches might take time to implement effectively and as a result have a more long term focus for the development of PA approach and coach-analyst interactions. It is also important to concede that in some instance a club might have to follow a more short term reactive approach as a result of the situations they might find themselves in.

Mind-set of the coaches and wider organisation: The importance of the mind-set was a key constraint in regards to the coach, manager and wider organisation's openness to PA. In order for effective implementation of PA it is important the coach has an open mind-set to the perceived usefulness of PA as a tool to enhance their personal analysis of performance which, in turn, might enhance the quality and objectivity of their analysis and reflection on performance. Coaches have to buy-in to PA as playing an important mechanism in

supplementing the quality and accuracy of feedback to players, especially in relation to reinforcing coach expectation, philosophy, strategies and tactics. It is important that coaches understand that PA information can supplement and enhance their own analysis and that it is not seen as a threat to the knowledge or expertise of the coach or manager. It is important that coaches have confidence that PA information or the role that an analyst plays is not there to highlight any of their own potential short comings or aspects of performance which they have missed or not considered, but that PA can be an extremely effective 'ally' and tool if integrated and engaged with fully. In order to develop this openness to PA the analyst team must work with the coaches to emphasise the potential benefits, but also coaches should receive coach development which focuses on the content and process of PA and how they might get the most out of it based on their needs (refer Study Three Part A and B).

PA as a developmental tool / enhance learning: Fundamentally PA approaches have a useful application when utilised as developmental tools for learning, despite the level they are employed at. Effective systems have to be established to make relevant material available (with flexible access), but also systems and opportunities for players to discuss and review performance at regular opportunities with support staff outside, in addition to any group feedback opportunities.   Evidence has started to emerge that PA can be instrumental in reinforcing surveillance approaches, however evidence in this thesis would suggest it should be used from more of a developmental perspective in order to maximise learning, even in first team environments. PA should not be perceived as a means to punish individuals or just to identify their deficiencies but used in a team setting feedback should encourage open discussion regarding performance. If this is not feasible due to time constraints, a more direct approach will have to be adopted but it is important the

coaching and analysis team consider specific pedagogical implications and reason for this. Group sessions should be supplemented with additional individual and unit feedback / reviews at regular opportunities. Video analysis should play a key focus in creating opportunities for players to develop self-reflection and receive specific performance reviews. However it is important structured opportunities are provided by the club to facilitate the key meta skills required to develop self-reflective players, for example self-awareness, critical analysis and realistic performance evaluation.

Consistent of use and integration into the club's way of working: The coaching team have to be willing to integrate systematic analysis as a central part of their coaching process and working week. For instance the start of the working week ensures the whole performance team have the opportunity watch the whole game together (if appropriate), observe and reappraise critical incidents or clips together as a team. Similarly any review of supporting performance data should take place at the same time, thus providing a stimulating discussion on performance using a combination of personal / professional judgments, video evidence and supporting performance information. This opportunity for discussion allows the whole coaching and support team to get a better understanding of what the coaches and managers value and are trying to achieve. This should be used as a starting point to assess progress with performance and set goals for the coming training week in the build-up to the next game. Following this initial review, opportunities to feedback to the team as a whole and/or to individuals / functional units should follow. All players should be given the opportunity to review performance with a member of the coaching and support staff to reinforce the extent to which they are accountable in terms of their meeting performance or learning objectives. All information should be made available for the players to review in their own time a head of returning to the training ground.

Processes should be implemented to support and encourage players to engage in their own self-analysis and self-reflection.

Transfer of information in practice / on the training pitch: Following the group review of performance, this opportunity should also be used to establish the focus of the following training week**.** The identification of team or individual areas of improvement should be based on information collected from the previous performance. The most relevant example should be used to reinforce key messages to players. Discussions and decisions on the focus of training should be made based on the post-match information reviewed and possibly a combination of pre-match information in order to look at the forthcoming opposition. Discussion between the coach and analyst should take place to decide what to show players during the feedback sessions. Feedback should highlight specific aspects which will inform the focus of the subsequent training week providing a direct link to on-pitch training activities. Areas of strength, areas of improvement and possibly areas of weakness in the opposition that could be exploited should be highlighted in the video and supplemented with deliberate practice on the training pitch. Player should also have more input to the analysis process. As the coach and analysts attempt to facilitate a sense of ownership within player to complete their own opposition analysis, so they are actively analysing their own and their forthcoming opponents.

Internal / external focus: Focus should be on the review and analysis of factors within the control of the team and central to the club's philosophy, strategy and tactics. Depending on the level, it might be appropriate to employ elements of opposition analysis (if time and resources allow this) but the focus of the opposition analysis should be on how a team

might play to their strengths against a specific opposition or how their style of play might be able to exploit weakness in the opposition.

Team briefing discussions vs. more direct approach: Wherever possible the coaching team should try to encourage an environment of open debate, where debriefings are used to encourage discussion around performance. If a coach does feel the need to use a more directive approach it is important that they give careful consideration to the pedagogical issues associated with such approaches. If more directive approaches are employed additional opportunities for more open discussion should be provided by the medium of individual and unit feedback. It is important coaches are able to detach themselves from using video feedback sessions as a mechanism for 'coach catharsis' but as a valuable player development opportunity.

Duration and frequency of feedback: Although the duration and intensity of group and individual feedback might vary depending on the time of the season, fixture congestions, current form and the most recent result, some level of consistency must be maintained once an effective analysis process is established.

4.58: Limitations and Considerations Relating to Chapters Three and Four

The complexity and depth of the responses provided during the player interviews was not as detailed as the coach and analyst responses. As a result more complex thematic coding was developed to represent the emerging themes identified within the coach and analyst interview transcriptions. Although evidence of positive and negative comments were made by the coaches and analysts these tended to occur in a number of varied issues and sub-themes relating to either the coach-analyst interaction or the practices which they employ within their practices. As a result it was not felt necessary to establish higher order codes to identify in isolation coach and analyst positive and negative responses. The evidence suggests that the nature and complexity of each coach-analyst relationship is very context specific and not necessarily replicable across teams. It would have been extremely problematic due to the detailed and diverse nature of the material explored within the transcriptions and subsequent coding structures to provide numerical evidence to support the higher and lower order themes (this will be further explored below).

Interaction and opportunity for interactions between the coaches and analysts emerged as an important feature relating to the implementation of PA. These opportunities were key in allowing the analyst to understand what the coach might want in terms of their analysis of performance and what they valued. Although specific relationship factors were not coded and so could not feature as higher order codes within the hierarchical content analysis tables, relationship factors could be seen as secondary factors which potentially might be prominent during these interactions, thus evident within a number of the lower order themes. The importance of interaction when discussing performance was identified as being key in helping analysts establish what the coaches wanted, but it was also key in helping the analyst develop the coach's understanding of what was possible and how PA could be effectively implemented, thus developing the coach's appreciation of PA content and process. As a

result a future analysis should possibly focus on identifying specific interpersonal factors in order to further explore the basis of key interactions.

Patton (1990) highlighted that imposing a variance theory mental model on research undercuts the main strengths of qualitative research (variance theory deals with variables and the correlations amongst them (Maxwell, 2010)). As a new qualitative researcher being more accustomed to thinking of research from a variance and positivistic perspective, there was a reluctance to mix approaches. Preceding literature has highlighted some criticism where attempts have been made to use qualitative research in a more scientific way by imposing quantitative standards and ways of thinking (Maxwell, 2010). As a result it was never the intention to set up the content analysis as an indicator to show the frequency of the themes reported. Based on the work conducted in previous chapters the author was keen to move away from more traditional positivistic approaches in order to consider the discipline from a different research perspective. As the research questions evolved it was necessary to employ more interpretive approaches if the researcher was going to be able to investigate the context and constraints which surround the implementation of PA. As a result it was felt more detailed accounts of the specific issues impacting on the application of PA *in context* were important. During the initial analysis it became apparent common themes did emerge and provide important insight into some of the more general issues influencing the approaches associated with PA. However it was also apparent that similar approaches might be employed for varied reasons. Consequently reasoning for the application of PA could vary greatly from one club to the next and even within the same club from one level to the next (i.e. the difference between first team to the academy). By providing quantitative representations of prevalent factors, it has been proposed there can be a tendency for bias towards seeking uniformity and overlooking the diversity of key findings (Maxwell, 2010:479).

As a result a representation of the frequency of themes occurring might present the findings too simplistically. It is possible to provide some numerical value to the themes established, but this might also be a little misleading if consideration for the specific nuances and differences which affect the implementation of PA at different clubs and also the difference which exists within the same club is not given. Preceding research has identified the problems of employing number to represent and support themes emerging in qualitative research data (Krane *et al.,* 1997). In order to provide a solution to these issues and to further to illustrate these differences it was appropriate to provide specific case studies for the use of PA at club level. However by presenting the construct tables (refer to Figures 4.4 to 4.13) to support the case studies it had anticipated that the reader might establish some feel of the prevalence of key constructs (i.e. how often PA informed training) while at the same time still being able to identify these issues at a club by club level, thus ensuring meaning for the specific context and constraints impacting on the use of PA.

CHAPTER FIVE

Concluding points and conceptual model generation

5.1: Synthesis of conclusions

The use of PA in both an academic and applied setting has evolved dramatically over the last 10 years, not only in relation to the range and depth of academic research being published but also in the amount of PA related roles utilising PA technologies and approaches within high performance settings. Many of these issues have been highlighted in the initial studies presented within this thesis. By conducting a study more associated with traditional PA analysis approaches it allowed for deeper contemplation of how and why PA analysis research could be employed. Extending these ideas, the studies presented in the latter parts of this thesis have demonstrated that PA is central to many daily and weekly elements of the coaching and performance processes integrated within the elite football clubs observed. Notably findings suggest that the use of PA showed significant variation across different clubs and at specific levels within each club and perhaps unsurprisingly, this was due in part to interpersonal factors. The implementation of PA was largely influenced by key decision makers at each level i.e. first team coaches and lead coaches for the developmental stages used. The extent to which 'buy-in' was established with these decision makers was crucial to the consistency of the implementation of PA. 'Buy-in' was an important concept relating to the implementation of PA which, in turn, impacted on the congruence between the coach and analyst at each phase. Central to developing this 'buy-in' was the ability of the analyst to establish trust and rapport between themselves and the coach they directly worked with and the wider coaching team. Another important aspect of the 'buy-in' related to the appreciation and understanding of PA processes and content by the coaches. A number of complex constraining factors would often play a role in the extent to which coaches would or would not engage with PA. Similarly important constraining factors also impacted on the

extent of the congruence between the coach and analyst. In summary strong evidence has been provided for the impact which PA has within elite football clubs, however an array of complex factors have been identified as surrounding the practical application of PA. Key mediating factors impacting on the successful implementation of PA consistently included: trust/rapport; congruence; and role clarity (refer to figure 5.1 below).

5.2: Constructing the model: Part one

As identified previously (study one), some criticism within the research has been directed towards the presentation of oversimplified idealistic models to represent the coaching and performance cycle. The anticipated goal of this chapter was to provide a conceptual model representing key themes emerging from the thesis, while also illustrating the multitude of factors which impact on coach and analyst interactions when implementing PA approaches. This model also proposes to present factors constraining the use of the practical application of PA in the football clubs investigated within this thesis (refer to Figure 5.1 below).
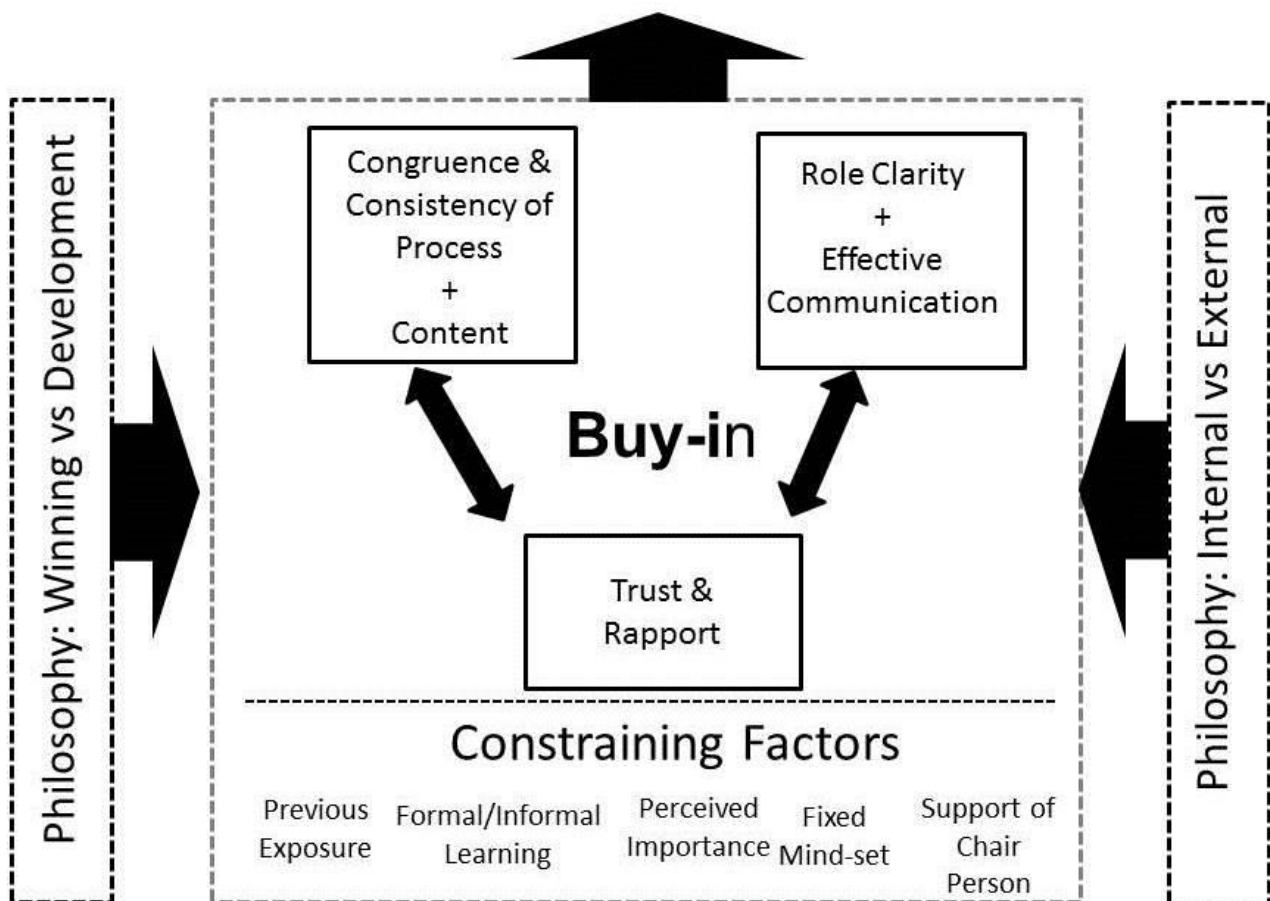
Figure 5.1: Part one, conceptual model for the implementation of PA within elite football.

One of the fundamental aspects for the implementation of PA was the ability of the analyst to develop trust and rapport (interpersonal factors) with the coach they directly worked with in the first instance, but also the wider coaching team (evidence can be in Table 4.7: Advantage of buy-in). These aspects were central to the extent to which 'buy-in' was established and, subsequently, the perceived value of PA to the coach and their coaching process. The extent of 'buy-in' was often mediated by interpersonal relationships; central to this was the understanding of PA processes by the coach, PA content, role clarity and effective communication (for evidence refer to Table 4.4: lack of direction; Table 4.2: requirement of analyst, role clarity). These factors often impacted on the congruence between coach and analyst in relation to the consistency of the application of PA (refer to Table 4.10: consistency

of approach). Analysts who were able to establish effective personal relationships with a coach were able to develop the coach's appreciation of the PA processes and content which surrounds its use. Coaches who had a strong comprehension of the PA processes and content (i.e. what it was capable of) often tended to 'buy-in' and had a perceived high value of its use (refer to Table 4.7: coach/ analyst buy-in).

A number of constraining factors (refer to Table 4.12: changing context & constraints) often limited the extent to which coaches would either 'buy-in' or not 'buy-in' to the use of PA, and these in turn also impacted on the congruence of the coach/analyst relationship and the consistency of PA use. An important feature resulting in 'buy-in' was the extent to which role clarity and effective communication was implemented between the coach and analyst, between members in each phase (i.e. first team, under 18's s etc.) and/or between phases within each club (i.e. across the whole club). For additional evidence please refer to Table 4.2: congruence: communication method; Table 4.8: interaction between the analysts; Table 4.4: lack of direction/clarification.

Some key constraining factors which warrant further attention included: perceived importance of formal / informal learning, previous experience and fixed mindset exhibited by the coaches (Table 4.7: open/closed mindset). The formal / informal learning of the coach was often very different to the performance analyst, with the coach largely progressing from a playing background and the analyst from an academic education (Table 4.8: previous experiences). This might further explain why analysts found it difficult to develop any sort of affinity with some of the coaches they worked with and vice versa. Also this formal and informal learning might mean that the previous exposure to PA for the coach was limited to a small element of their UEFA coach education programme or exposure from other coaches. Some coaches seemed to be very fixed in terms of their mindset, i.e. not willing to engage in how PA might

further develop their ability to analyse and assess performance. Many coaches still valued the 'gut instinct' and their intuition to read and evaluate the game. Some might have even seen PA as a threat to their knowledge and understanding of the game developed over their years of coaching and playing.

In addition to these interpersonal and knowledge factors, the focus of the analysis and the consistency of its implementation was also influenced by the coach / club playing philosophy; specifically the extent to which it was either internally or externally focused and either winning or developmental orientated. Interestingly, this philosophical approach to coaching and strategy was not closely related to level in all clubs (i.e. winning vs developmental and internal vs. external, for further evidence refer to Table 4.6: winning based focus). For example, some clubs at first team level still exhibited a commitment to a development focus, while others seemed to engage in a more winning oriented focus at U21's and U18's, which largely influenced the use of PA (Refer to Figure 5.1: model development stage). As a result their focus would be more internal, in terms of their own development, strengths and weaknesses. Rather than placing further emphasis on the opposition and investing more time to explore the external performance, for instance a focus on how the opposition might play and what they might do.

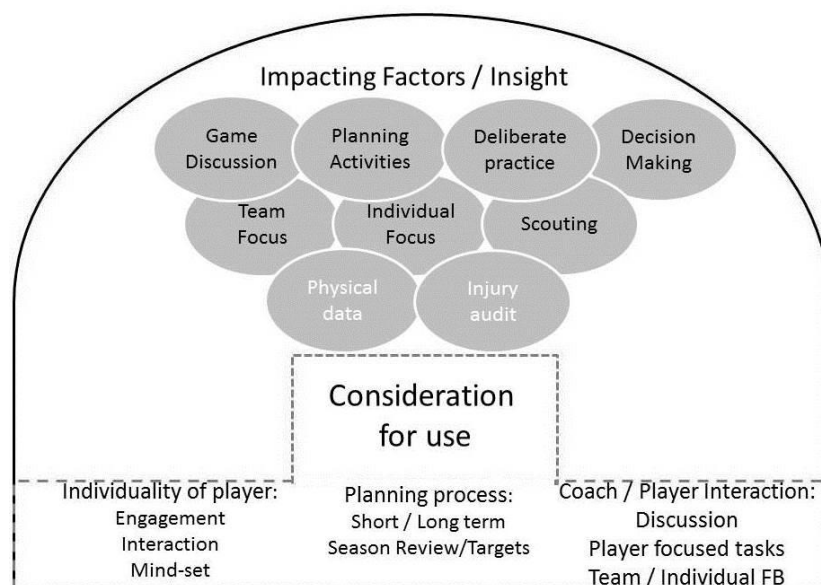## 5.3: Constructing the model: Part two

Figure 5.2: Part two, conceptual consideration for the implementation of and the factors impacting on PA

Within each club the situation specific mix of factors affecting PA implementation seemed to be an important driver for many coach and analyst dyads. Coaches and analysts would give careful consideration to the use of PA depending on the level of which it was being used and the focus for its uses i.e. winning/developmental and internal/ external (Study Three Part A). As additional considerations, this often revolved around the individuality of players, planning processes and player interactions (Study Two and Study Three Part B), specific evidence refer to Table 4.10: planning focus and target; coach player interaction; Tables 5.11: Individuality of player; one on one feedback). PA tended to impact and provide insight into the four primary factors identified at the top of Figure 5.2; Game Discussion, Planning Activity, Deliberate Practice and Decision Making. These factors were consistently prevalent across clubs and phases which consistently and effectively implemented PA. Importantly, but to a lesser extent than the primary factors, the secondary factors played an important role in the

potential impact and insight which PA might have; Team Focus, Individual Focus and Scouting (refer to Table 4.6: individual's development, individual & group work; Table 4.11: scouting/opposition analysis). There was also strong evidence of Physical Data and Injury Audits (study eight, also refer to table 4.10: injury audit), albeit to a lesser extent, in terms of the impact and insight they provided. In these last two factors, the PA process was often employed to supplement wider sports science processes. Deliberate practice in this instance referred to the process of taking PA analysis information and directly informing a specific practice or activities on the training ground.
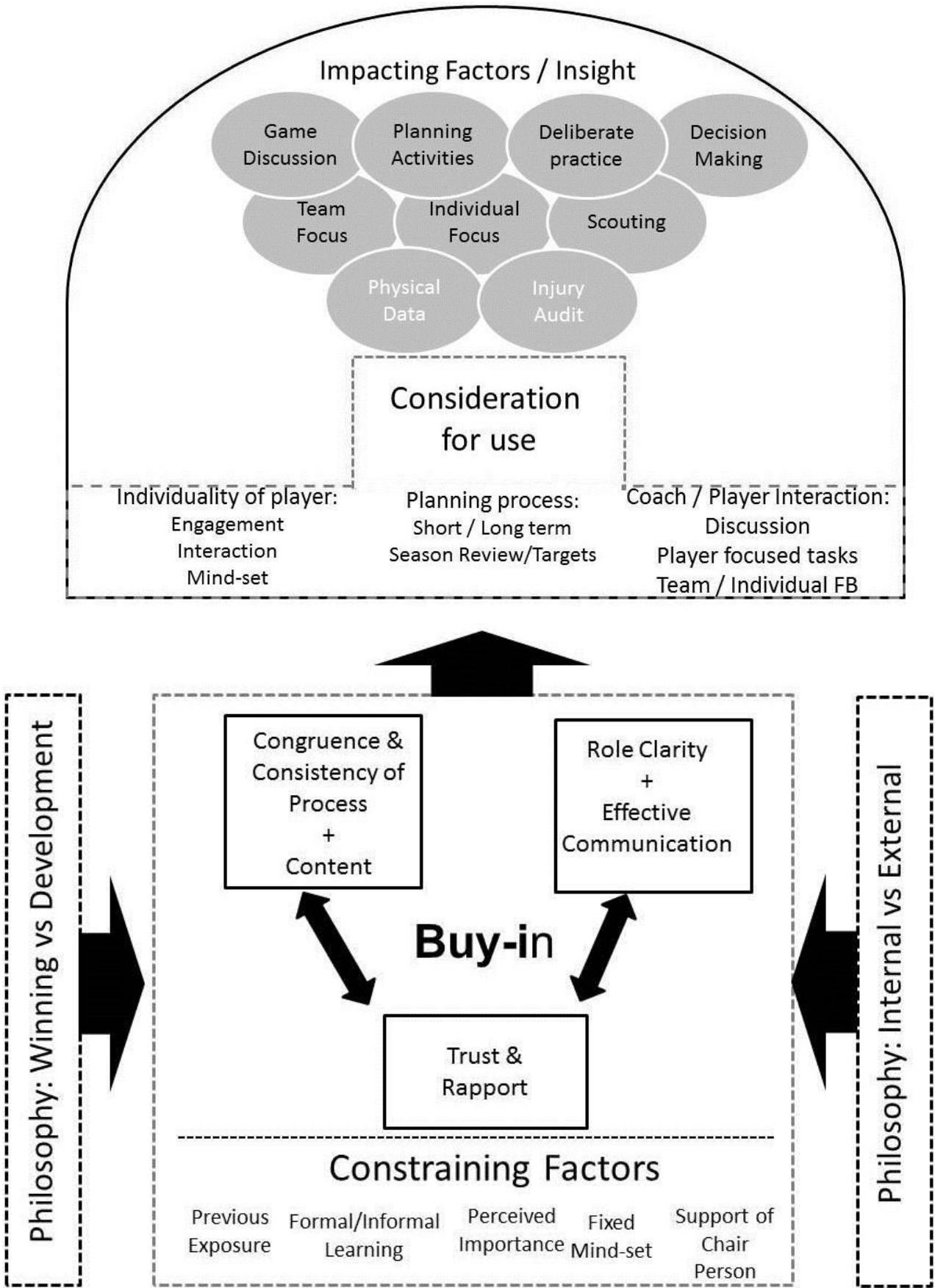
Figure 5.3: Conceptual model for the implementation of PA within elite football.

The above model has been proposed to illustrate the most prevalent, complex and constraining factors impacting on the implementation of PA within elite football at a variety of clubs, levels and phases.

5.4: Limitations of the thesis

By employing qualitative approaches as seen in the hierarchical content analysis, presentation of quotes to illustrate key themes and specific detailed case studies, a rich account of the use of PA has been provided. Although a detailed investigation of the implementation of PA has been provided within these specific clubs, an ethnographic approach might have allowed further insight into the implementation of PA over a period of time throughout the season. By employing ethnographic approaches which employ careful observations of the participants' live behaviour and practices, a deeper understanding of the coach and analyst role might be possible. This is also potentially a very powerful approach as it would allow the researchers to further establish if coach and analyst values and beliefs relating to their philosophical and ideological use of PA align consistently with their actual behaviours. As a result an even deeper insight into each individual approach could possibly be established, however this would be at the cost of the range and scope of insight provided in this thesis. To truly employ an ethnographic approach the researcher would have to establish a position which allows 'full cultural integration' within the club. This would be a major challenge considering the secretive and closed nature of elite football clubs. However even if a 'full on' ethnographical approach was not feasible additional observation of the implementation of the PA processes in practice throughout the training week and season would provide a useful illustration of PA's practical implementation and how it collaborates with their everyday processes, thus possibly providing further evidence for alignment of coach and analyst ideological beliefs and their actual behaviours. Possible further opportunity to

reflect on the informal meetings and discussions the analysts are engaged with might also have provided additional understanding of their weekly activities and constraints. Further access to coaches and analysts throughout the season and across multiple seasons would provide an even more vivid lived account, this would be important in reflecting the consistency of which PA is used over the long term, thus illustrating the reactive responses as results peaks and dip throughout the season. In summary, although strong evidence has been provided for the pedagogical considerations for the implementation of PA, only minimal consideration within the findings related to the wider social constructs for which PA is employed within each club environment. Emerging issues tended to focus around the practical application and practical constraints which coaches and analysts face. Approaches which further observed coaches and analysts in more 'natural settings' would further enhance the current body of research due to the ability to provide further insight into how values and beliefs informed everyday behaviour.

5.5: Practical applications

One of the fundamental aspects emerging from this thesis appears to be the importance of the coach analyst relationship as being central to the effective implementation of PA. It appears that a number of interpersonal factors impact on the effectiveness of this relationship. Some of these interpersonal factors were in the control of the analyst, and as a result it is important that the analysts are aware of these issues and consider how some of these 'softer skills' can be developed in order to allow them to deal with the potentially challenging situations which might hinder congruence within the coach analyst relationship. The willingness of the analyst to adapt and be flexible to the working process of the coaching team was key, thus being able to find a balance where they are 'not just imposing the analyst's views', but similarly not 'just supporting the coach's views'. Awareness of the

boundaries of their role and not 'over-stepping the mark' was also highlighted, as some coaches were conscious of analysts 'interfering too much with the football side of things' but at the same time the analysts have to be a little more 'forthright in their opinions' when supported by evidence. Substantially more factors are in the control of the coach, thus it is important they give further consideration as to how they might enhance their effectiveness while working with the analysts. A key aspect included their ability to agree appropriate working parameters and requirements. The ability and willingness of the coach to articulate their analysis requirements; how they view, observe and assess performance was also critical. A recurring theme was the willingness of the coach to invest time with the analyst while attempting to articulate their coaching philosophy, strategy and tactics, thus creating opportunities for critical dialogue and interaction. These aspects can only be developed if the coach is willing and open to discussing these matters with the analyst. One final aspect was the level of open mindedness and willingness of the coach to listen to other ideas and ways of working. In some instances coaches have seen performance analysts and the roles they play as a threat to their own knowledge and expertise rather than a tool to supplement what they do and how they work. Previous coach education and analyst training has focused on the technical competencies of PA, it is important future personal and professional development focus on these aspects identified above.

An important practical application of the evidence highlighted within this thesis was the importance of the analyst's role in establishing 'buy-in' from potential sceptical coaches. Central to this 'buy-in' was the ability of the analyst and the coach to develop between them an enhanced comprehension of the content and processes surrounding their club's specific use of PA. This has important implications for the effective use of the analysts' time and the quality and meaningfulness of the work which can be produced. By coaches developing an

268

understanding of what was possible in terms of the PA analysis content and process, what analysts produce could be much more specific and bespoke to individual players, thus enhancing the efficiency and effectiveness of the finished product. This in turn would increase is transferability into training and training preparation.

'Buy-in' facilitated via understanding of the PA process and content can be inherently dependent on the context, environment and constraints each individual club face. As a result standard guidelines for the use of PA focusing on technical competencies and implementation will possibly not enhance the ability of coach and analyst to meet the demands and challenges of working within these environments. What is key is some professional development to enhance coaches' and analysts' knowledge and understanding of key factors impacting on the effective and less effective implementation of PA as identified throughout the thesis. Potentially a personal development package should assist in developing an understanding of the key areas identified above, specifically development of interpersonal factors and 'buy-in' as mediated by an understanding of content and process.

5.6: Direction for future research

As a body of academic inquiry PA research is relatively young when compared to more well established areas of coaching science/ pedagogy, sports physiology and sports psychology. Within PA literature there is currently very little interpretive qualitative research, similarly within this body of literature very few case studies have been presented regarding PA processes employed across any sport, let alone elite football clubs. Further case study approaches will provide additional insight into specific constraints and issues faced by football clubs. Such interpretive case study approaches might provide a deeper understanding of the impact which PA and sports science might have in a real applied context and might also allow

269

the consideration of a longitudinal look at performance throughout a complete or multiple seasons. This is likely to illustrate important evidence such as how the introduction of new coaches with different playing and coaching philosophies might in turn impact on current structures within the club and their utilisation of existing PA staff and resources. Based on evidence of analysts reflecting back on changes of coach such periods are key in the formation of PA provision, but similarly, these periods have proven to be the most difficult to access coaching and support staff due to the uncertainly of roles and future direction of the club caused by the transition period. A further understanding of how new coaches establish their coaching philosophy, playing philosophy and player strategy/tactics could be potentially critical for the effective implementation of PA. Also an understanding of such a period is essential when considering the transient /short-termism nature of coaches and analysts in elite football environments, thus warrants careful consideration.

Strong evidence has been presented for PA having an impact on a number of daily and weekly activities within elite football clubs at numerous levels, within this thesis. Preceding research has identified the challenges associated with observing the specific impact and effect PA might have on performance, when research has employed positivistic and reductive approaches. As a result it has been extremely difficult to establish a direct link between PA provisions and performance enhancement (when only employing positivistic approaches). By employing interpretive research approaches, mixed methods and action research approaches, further ecologically valid information could potentially illustrate the impact PA might have for a specific coach or club. By employing such approaches important insight could be provided into the following areas, thus exemplifying the impact of PA. These might include:

- Tracking, learning and development of players, specifically game understanding, decision making and role understanding.

- The transfer of information from analysis into training and into game preparation.

- The impact of PA within the review process and the extent to which it enhances the quality of coaches' recall, discussion and reflection post-match.

Findings from this research alluded to the importance of epistemological chains (the sharing of values and philosophies between coaches and analysts) in relation to, not only the formation of knowledge and understanding in the coach and analyst, but also the social constructs impacting and influencing their values, beliefs, philosophies and therefore their practice. Although it was not the intention of this study to primarily explore these key sociological and cultural aspects, they did appear to have an important impact on the findings. Further explanation of these aspects is warranted as it is anticipated that social constructs and epistemological chains might explain the differences and even disconnect that may exist between some coaches and analysts. The reasons for such differences could be typified in the significantly different formative progression routes for professional football coaches (informal playing background) and the expected progression routes for analysts (formal educational background).

The proposed model (Figure 5.3) would be open for further validation work. It has been put forward with the intention to create debate in relation to its application and validity within the elite football coaching process and environments. It would be interesting to see if this represents the use of PA in other sports where it is common that assistant coaches and even coaches themselves play a significant role in the analysis which is employed. For instance

within rugby league, field hockey and basketball coaches conduct and review PA and sports science information to fully integrate it within their practices.

5.7: Final conclusion

The vast majority of PA research has focused on quantitative and reductive approaches in attempts to establish performance variables associated with success. As a result preceding research has generally failed to provide a representation of the fluid and dynamic nature of football. Similarly, there has been a lack of interpretive research which has considered the complexities and confounding factors which impact on and mediate the implementation of PA within elite football. The evolution of the work presented in this thesis has developed from a quantitative model used to present KPIs associated with success into a deliberate attempt to consider PA from a wider holistic perspective by employing interpretative, pragmatic and lastly case study research methodologies. As a result this thesis considers how PA is implemented within elite football clubs and how PA approaches and technologies impact on key elements of weekly and daily activities within elite football clubs. A critical feature of the research was establishing the varied and stark difference in how PA was employed from one club to the next and also in illustrating huge variations of how it was employed within the same club across levels. Emanating from the data collected, original research has been presented in an attempt to provide a deeper understanding of how PA is integrated within the elite football coaching process, which was also largely influenced by coach preferences and previous exposure. Key to the implementation of PA was establishing the analysis focus of the coach and how they wanted to use PA to measure performance variables they valued. The complexities of the coach/analyst relationship and the transfer of information between coach and analyst and then coach to players have been illustrated extensively. A range of constraining factors has been presented to highlight the complex and fluid nature of

implementing PA within the elite football environment. A unique insight has been provided into the importance of the coach/analyst relationship in mediating the use of PA. Central to this project has been the clear presentation of evidence that PA has a direct and significant impact on the elite football clubs included in this investigation.

REFERENCES

Abraham, A., Collins, D., Martindale, R. (2006). The coaching schematic: validation through expert coach consensus. *Journal of Sports Science.* 24,549-564.

Abraham, A., & Collins, D. (2011). Effective skill development-how should athletes' skills be developed. In D. Collins, A. Button & H. Richards (Eds.), *Performance psychology: a practitioner's guide*. pp. 207–230 . Oxford, England: Elsevier.

Allen, J. B., & Hodge, K. (2006). Fostering a learning environment: Coaches and the Motivational climate. *International Journal of Sports Science and Coaching*, 1(3), 261–277.

Altman, D.G. (1991). *Practical statistics for medical research.* London: Chapman & Hall.

Alvarez, G. & Cavanagh, P. (2004) The capacity of visual short-term memory is set both by visual information load and by number of objects, *Psychological Science,* 15, 2, 106-111.

Anderson, C. (2013). Football Analytics.The MIT Sloan Sports Analytics Conference Boston, Accessed March 2013. Available on line at: http://www.youtube.com/watch?v=2YemvV9ELI

Anderson, C. & Sally, D. (2014). *The numbers Game: Why everything you know about soccer is wrong*. Penguin Books: New York.

Armatas, V., Ampatis, D., & Yiannakos, A. (2005). Comparison of the effectiveness between counter-attacks and organized offences in Champions League2002-03. **1st** *International Scientific Congress in Soccer*, April, Trikala: Greece. 8-10.

Armatas, V., Yiannakos, A., Papadopoulou, S., & Galazoulas, Ch. (2007). Analysis of the set-plays in the 18th football world cup in Germany. *Physical Training*, October.

Athens, L. H. (1984) Scientific criteria for evaluating qualitative studies. *Studies in Symbolic Interaction*, 5, 259-268.

Baghust, T & Parish, A. (2011). Case Studies in Coaching: Dilemmas and Ethics in Competitive School Sports. *The Sport Psychologist*, 25, 398-399

Bangsbo, J. & Peitersen, B. (2000). *Football systems and strategies*. Human Kinetics:Champaign, IL.

Bartlett, R. (2001). Performance analysis: can bringing together biomechanics and notational analysis benefit coaches? *International Journal of Performance Analysis of Sport.* (1), 1,122-126.

Bate, R. (1988). Football chance: Tactics and Strategy. In T. Reilly, A. Lees, K. Davids, & W Murphy (Eds.), *Science and Football*. E & FN Spon. London. 293–301.

Bell-Walker, J., McRobert, A., Ford, P., & Williams, M.A. (2006). Quantitative analysis of successful teams at the 2006 World Cup Finals. *Insight – The F.A.* Coaches Association Journal. Autumn / Winter, (6), 37-43.

Bishop, D. (2003). What is performance analysis and how can it be integrated within the coaching process to benefit performance. *Peak Performance, April*, 4-7.

Bishop, D. (2008). An applied research model for the sports sciences. *Sports Medicine*, 38(3), 253-263.

Blaze, A., Atkinson. O., Flarwood. C. and Cale, A. (2004). Prevalence and Perceptions of Performance Analysis in the English Premier Association Football League, in: Hughes, M., ed., *Performance Analysis of Sport V, Centre for Performance Analysis*, University of Wales Institute, Cardiff,79-83.

Borrie, A., Jonsson, K., & Magnusson, S. (2002). Temporal pattern analysis and its applicability in sport: An explanation and exemplar data. *Journal of Sports Sciences*. 20,845-852.

Bourne, M. (2012).The role of Performance analysis within ECB. Sports Analytic Conference: The Sports Office November 2012. Manchester University Business School. Accessed on 16/02/2012. Available online at: http://www.youtube.com/watch?v=b91_VB7bPMg

Bower, M., Cavanagh, M., Moloney, R. and Dao, M. (2011) Developing communication competence using an online Video Reflection system: pre-service teachers' experiences. *Asia-Pacific Journal of Teacher Education*, 39, 4, 311-326.

Bowes, I. & Jones, R.L. (2006). Working at the edge of chaos: Understanding coaching as a complex, interpersonal system. *The Sport Psychologist*, 20(2), 235-245.

Breen, A., Iga, J., Ford, P. & Williams, M. (2006). World Cup 2006 – Germany: A quantitative analysis of goals scored. *Insight – The F.A. Coaching Association Journal*, Autumn/Winter, (6),45-53

Bridgewater, S. (2012) 2011 – 2012 Season Statistics: LMA Football Manager Statistics. Accessed 24/05/12. available on-line at: http://www.leaguemanagers.com/media/lmaseasonstats.pdf

Brown, D. & Hughes, M. (1995). The effectiveness of quantitative and qualitative feedback on performance in squash. In T. Reilly, M. Hughes and A. Lees (eds), *Science and Rackets* Sport (pp.232-7). London: E and FN Spon.

Bryant, A. (2009). Grounded theory and pragmatism: The curious case of Anselm Strauss. *Forum: Qualitative Social Research*. 10(3), 2.

Brustad, R. J. (1997) A critical-postmodern perspective on knowledge development in human movement (pp. 87-98). In: J. M. Fernandez-Balboa (Ed.) *Critical postmodernism in human movement, physical education, and sport.* State University of New York, Albany, NY.

Bunce, D. M., Flens, E. A. and Neiles, K. Y. (2010) How long can students pay attention in class? A study of student attention decline using clickers. *Journal of Chemical Education*, 87, 12, 1438-1443.

Burgess, D. & Drust, B. (2013). Developing a physiology-based sports science support strategy in the processional game. In M. Williams (Eds.), *Science and Soccer: Developing elite performers (third edition).* Routledge:Oxon, 372-390.

Burke, V. (2011). Organising for excellence. In D. Collins, A. Button, H. Richards (Eds.), *Performance psychology a practitioner's guide.* Churchill Livingstone Elsevier, London. 2011, 99-121
121

Burns, R. & Dobson, C. (2012) *Experimental Psychology: Research Methods and Statistics*, Springer Science & Business Media: Liverpool.
Butterworth, A., O'Donoghue, P. & Cropley, B. (2013). Performance profiling in sports coaching: a review. *International Journal of Performance Analysis of Sport*, 13,572-593.

Carling, C. (2009). Analysis of physical activity profiles when running with the ball in a professional soccer team. *Journal of Sports Sciences.* 28,(3), 319–326

Carling, C. (2010). Analysis of physical activity profiles when running with the ball in a professional football team. *Journal of Sports Sciences,* 28, 319-328.

Carling, C. (2011). Influence of opposition team formation on physical and skill related performance in a professional soccer team. *European Journal of Sports Science.* 11 (3): 155-164.

Carling, C. (2012). The role of a contemporary performance analyst. Institute of Coaching and Performance, Guest Seminar. University of Central Lancashire. Preston. 5th December, 2012.

Carling, C. (2014). interpreting physical performance in professional soccer match-play: should we be more pragmatic in our approach? *Sports Medicine.* 43,8,655-663.

Carling, C., Williams, M.A. & Reilly, T. (2005). *Handbook of football match analysis. Routledge*: London.

Carling, C., Reilly, T. & Williams. M. (2009). *Performance Assessment for Field Sports.* Routledge: London

Carling, C., & Bloomfield, J. (2010). The effect of an early dismissal on player work-rate in a professional soccer match. *Journal of Science & Medicine in Sport.* 13, 126-128.

Carling C, Gall, F.L & Reilly, T. (2010). Effects of physical efforts on injury in elite football. *International Journal Sports Medicine.* 31(3):180-5.

Carling, C. & Dupont, G. (2011). Are declines in physical performance associated with a reduction in skill-related performance during professional football match-play? *Journal of Sports Sciences.* 29 (1):63-71.

Carling, C., Wright, C., Nelson, L., Bradley. P. (2014a) Comment on 'Performance analysis in football: A critical review and implications for future research'. *Journal of Sports Sciences.* 32, (1), 1-7

Carling, C., Gall, F., McCall, A., Nédélec, M. & Dupont, G. (2014b). Squad management, injury and match performance in a professional soccer team over a championship-winning season. *European Journal of Sports Science.* 12:1-10.

Carling, C., Wells, S., & Lawlor, J. (In Press). Performance analysis in the professional football club environment. In W. Gregson & M. Littlewood (Eds.), *Science in Football: Translating Theory into Practice.* Bloomsbury. Publishing.

Carroll, R. (2012). An Expert Guide to Performance Analysis E-book. Thevideoanalyst.com. Accessed on 18/11/2013. Available online at: http://thevideoanalyst.com/

Cassidy, T., Jones, R.L. & Potrac, P. (2004). *Understanding Sports Coaching: The Social, Cultural and Pedagogical Foundations of Coaching Practice.* Routledge, London.

Cassidy, T., Stanley, S. & Bartlett, R. (2006). Reflecting on Video Feedback as a Tool for Learning Skilled Movement. *International Journal of Sports Science & Coaching,* (1), 3, 279-288.

Chase, M. (2010). Should coaches believe in innate ability? The importance of leadership mind-set. *Quest,* 62, 296-307.

Collins, D. (2011). Practical dimensions of providing for excellence: view form the performer's panel. In D. Collins, A. Button, H. Richards (Eds.), *Performance psychology a practitioner's guide.* Churchill Livingstone Elsevier, London. 2011, 161-175.

Collins, D. & Collins, J. (2011). Putting them together: skill packages to optimise team/group performance. In D. Collins, A. Button, H. Richards (Eds.), *Performance psychology a practitioner's guide.* Churchill Livingstone Elsevier, London. 2011, 361-381.

Collins, D. (2012). Useful Tool of Swiss Army Knife. Sports Analytic Conference: The Sports Office November 2012. Manchester University Business School. Accessed on   16/02/2012. Available online at: bv   vcvx http://www.youtube.com/watch?v=CipqiigPw40

Corbin, J. & Strauss, A. (2008). *Basics of Qualitative Research: Techniques and procedures for developing grounded theory*. Los Angeles, CA: Sage.

Côté, J., Salmela, J. H., Trudel, P., Baria, A., & Russell, S. (1995). The coaching model: A grounded theory assessment of expert gymnastic coaches' knowledge. *The Journal of Sport & Exercise Psychology, 17, 1-17.*

Court, M. (2004). Perceptions of performance analysis. *Insight-FA*, Winter, 8-11.

Cropley, B., Miles, A. & Peel, J. (2012). Reflective Practice: Value of, Issues, and Development within Sports Coaching. Sports Coach UK Research Project (Mach 2012). Available online at: http://www.sportscoachuk.org/sites/default/files/Reflective-Practice-Report_0.pdf

Cruickshank, A., Collins, D. & Minten, S. (2013). Culture Change in a Professional Sports Team: Shaping Environment Contexts and Regulating Power. *International Journal of Sports Science and Coaching,* 8,(2), 271-290.

Cruickshank, A., Collins, D. & Minten, S. (2014). Driving and Sustaining Culture Change in Olympic Sport Performance Teams: A Frist Exploration and Grounded Theory. *Journal of Sport and Exercise Psychology*, 36, 107-120.

Curzon-Hobson, A., Thomson, R. W. & Turner, N. (2003). Coaching a critical stance. *Journal of Philosophy of Sport,* 30(1), 68–83.

Cushion, C. (2007). Modelling the complexity of the coaching process. *International Journal of Sports Science and Coaching.* 2 (4),395-401.

Cushion, C. J., Armour, K., & Jones, R. L. (2006). Locating the coaching process in practice: Models "for" and "of" coaching. *Physical Education and Sport Pedagogy*. 11, 83–99.

Cushion, C. J. & Jones, R. L. (2006) Power, discourse, and symbolic violence in professional youth soccer: the case of Albion Football Club, *Sociology of Sport Journal,* 23, 142161.

Cushion, C., Nelson, L., Armour, K., Lyle, J., Jones, R.,Sandford, R. & O'Callaghan, C. (2010). Coach learning and development: A review of literature. Leeds: Sports Coach UK

Davenport , T. & Harris, J. (2007). *Competing on analytics the new science of winning*. Harvard business School: USA.

Davis, C. (2011). Assessing the Game at Swansea City. Chris Davies Head of Analysis explains how Match Analysis works at Swansea City and how it plays an important part for the team (Accessed 2010/2011). Available online at: http://www.youtube.com/watch?v=9_1Dx3wgCP8

Delfosse, A. (2014). The Data Revolution. L'equipe explore. (Accessed 05/12/14). Available online at:
http://www.lequipe.fr/explore/la-data-revolution/

Denison, J. (2010). Planning, practice and performance: The discursive formation coaches' knowledge. *Sport, Education and Society*, 15(4) 461–478.

Denzin, N., & Lincoln, Y. (2008). Strategies of Qualitative Inquiry (3rd ed.). Los Angeles: Sage.

Dorwick, P.W. (1991). Practical guide to using video in the behavioural sciences: In Science and Football III. Reilly, T., Hughes, J. & Hughes, M. 267-278. London: E & FN Spon.

Drust, B. (2010). Editorial: Performance analysis research: Meeting the challenge. *Journal of Sports Sciences*. July, 28(9): 921–922

Drust, B. & Green, M. (2013). Science and football: evaluating the influence of science on performance. *Journal of Sports Sciences,* 31,(13), 1377-182.

Duckett, J. (2012). Objectivity in Analysis: Performance Analysis of Football. The Football Association. Available on line at:
http://www.thefa.com/st-georges-park/discover/coaching/licensed-coaches-club/latest-from- the-lcc/more-news/objectivity-in-analysis

Dufour, W. (1993). Computer-assisted scouting in soccer. In T. Reilly, J. Clarys, & A. Stibbe (Eds.), *Science and Football II.*160-166. London: E&F Spon.

Dweck, C. (2006). Mindset: The new psychology of success, how we can learn to fulfil our potential. Ballantine Books: New York.

Edgar, S. (2013a). Interview: Sam Allardyce Talks Performance Analysis. Prozone Sports Ltd. Accessed 10/12/2013. Available online at:
http://www.youtube.com/watch?v=dgVhQlmfwXM&feature=c4-overview&list=UUgUO4NVP3chJTuHk5IwJx9w

Edgar, S. (2013b). Interview: Roberto Martinez Talks Performance Analysis. Prozone Sports Ltd. Accessed 10/12/2013. Available online at:
http://www.youtube.com/watch?v=XxGaqLPyL_I

Ensum, J., Pollard, R. & Taylor, S. (2004). Applications of logistic regression to shots on goal in association football: Calculation of shot probabilities, quantification of factors and   player/team. *Journal of Sports Sciences*, 22, 504.

Evans, J. & Light, R. (2008). Coaching development through collaborative action research: a rugby coach's implementation of game sense pedagogy. *Asian Journal of Exercise & Sports Science*, 5, (1), 31-37.

Fleig, G (2011). Football Analytics. The MIT Sloan Sports Analytics Conference. Boston, July 2013. Available on line at:
http://www.sloansportsconference.com/?p=626

Ford, P., Yates, I. & Williams. (2010). An analysis of practice activities and instructional behaviours used by youth soccer coaches during practice: exploring the link between science and application. *Journal of Sports Sciences,* 28 (5): 483–495.

Francis, J. & Jones, G. (2014) Elite Rugby Union Players Perceptions of Performance Analysis. *International Journal of Performance Analysis in Sport,* 14, 188-207.

Franks, I. (1993). The effects of experience on the detection and location of performance differences in a gymnastic technique. *Research Quarterly for Exercise and Sport,* (64), 2, 227-231

Franks, I. & Miller, G. (1986) Eyewitness testimony in sport. *Journal of sport behaviour,(*9),39-45.

Fritz, O. (2012). UEFA Euro 2012: Scouting for the German team. 21/06/12. Available on line at: http://www.dw.de/scouting-for-the-german-team/a-16040814

Fruge, C. W. & Ropers-Huilman, R. (2008) Epistemological Congruence in Community College Classrooms. *College Teaching*, 56, 121-127.

Garcia-Gonzales, L., Moreno, M.P., Moreno, A., Gil, A. & del Villar, F. (2013) Effectiveness of a Video-Feedback and Questioning Programme to Develop Cognitive Expertise in Sport. *Expertise in Sport,* 8, 12, 2- 12

Garganta, J. (2009) Trends and tactical performance analysis in team sports: bridging the gap between research, training and competition. *RevistaPortugesa de Ciencias do Desporto,* (9),1.

Gerisch, G. & Reichelt, M. (1993). Computer and video aided analysis of football games. In T. Reilly, J. Clarys and A. Stibbe (eds), *Science and Football II.* London: E&FN Spon. 167-174.

Giacobbi, P., Poczwardowski, A. & Hager, P. (2005). A pragmatic research philosophy for applied sport psychology. *The Sport Psychologist*, 19, 18–31. *Exercise Psychology,* 17, 1–17.

Giges, B. & Van Raalte, J. (2012). Special Issues of the sport psychologist case studies in sports psychology, Sports Psychologist, 26,4, 624-643.

Gilbert,W. & Trudel, P. (2004). Analysis of coaching science research published from 1970–2001. *Research Quarterly for Exercise and Sport*, 75(4), 388–399.

Gilbert, W. & Trudel, P. (2005). Learning to coach through experience: Conditions that influence reflection. *Physical Educator,* 62, 32-44.

Glazier, P.S. (2010). Game, set and match? Substantive issues and future directions in performance analysis. *Sports Medicine.* 40, 625-634.

Goldsmith, W. (2000). Bridging the gap? How there is a gap in the bridge! *ASCA* Newsletter.3:4.

Gómez, MA., Lago-Peñas, C. & Pollard, R. (2013). Situational Variables. In T. McGarry, P. O'Donoghue & J. Sampaio (Eds), *Routledge Handbook of Sports Performance Analysis.* Routledge: Oxon, 259-269

Gratton, C & Jones, I. (2010). *Research Methods for sports studies.* Routledge; New York.

Grecic, D. & Collins, D. (2013). The epistemological chain: practical applications in sports. *Quest*, 65, 2, 151-168.

Groom, R. & Cushion, C. J. (2004).Coaches perceptions of the use of video analysis: A case study. *Insight.* 7, 56-58.

Groom, R. & Cushion, C. (2005). Using of Video Based Coaching With Players: A Case Study. *International Journal of Performance Analysis in Sport,* 5, 3, 40-46.

Groom, R., Cushion, C. J. & Nelson, L. J. (2011). The delivery of video-based performance analysis by England youth football coaches: towards a grounded theory. *Journal of Applied Sport Psychology.* 23, 16 – 32.

Groom, R., Cushion, C. J. & Nelson, L. J. (2012). Analysing coach-athlete 'talking in interaction' within the delivery of video-based performance feedback in elite youth soccer. *Qualitative Research in Sport, Exercise and Health*. 4,3,439-458.

Guba, E. & Lincoln, Y. (1989). *Fourth generation evaluating.* London: Sage.

Gurpinar-Morgan, W. (2012). West Bromwich Albion vs Liverpool: passing network analysis. 2+2=11 A football blog revolving around numbers: Focus often on Liverpool F.C. 15/08/2012. Available on-line at: http://2plus2equals11.wordpress.com/2012/08/21/west-bromwich-albion-vs-liverpool-passing-network-analysis/

Harrop, K. & Nevill, A. (2014). Performance indicators that predict success in an English professional League One soccer team. *International Journal of Performance Analysis in Sport.* 14:907-920.

Harvey, S., Cushion, C. & Massa-Gonzalez, A. (2010). Learning a new method: teaching games for understanding in the coaches' eyes. *Physical Education Sport Pedagogy.* 15 (4): 361–382.

Harwood, C., Drew, A. & Knight, C. (2010). Parental stressors in professional youth football academies: A qualitative investigation of specialising stage parents. *Qualitative Research in Sport, Exercise and Health*, 2: 39-55.

Harwood, C. & Steptoe, K. (2012). The integration of Single Case Designs in Coaching Contexts. *Applied Sports Psychologists*, 25:1, 167-174.

Hattie, J. & Yates, G. (2014). Visible Learning and the Science of How we Learn. Oxon: Routledge.

Hatton,L.(2013). An interview with Prestidge is the Head of Performance Analysis at Bolton Wanderers. SB Nation: Fanpost. Available online at: http://lionofviennasuite.sbnation.com/2013/6/10/4414800/data-analysis-shaping-football-and-bolton-as-they-enter-new-territory

Hayes, M. (1997).Notational analysis – the right of reply. *BASES Newsletter*, 7(8),

4–5.

Hemmings, B. & Holder, T. (2009). *Applied Sport Psychology. A Case – Based Approach.* Chichester: Wiley-Blackwell.

Hockey Coaching UK (2008). 1Sst4sport Qualifications: Level 3 Certificate in Coaching Hockey Candidate Pack Part One. Leeds: Coachwise Ltd.

Hodges, N.J. & Frank, I.M. The provision of Information (2008). In M. Hughes & I. Franks (Eds.), *The essentials of Performance Analysis An Introduction.* London: Routledge, 21-39.

Hogg, J. M. (2002). Debriefing: A means to increasing recovery and subsequent performance. In M. Kellmann (Ed.), Enhancing recovery: Preventing underperformance in athletes (pp. 181–198). Champaign, IL: Human Kinetics.

Holland, J., Woodcook, J. & Duda, J. (2009). Mental qualities and employed mental techniques of young elite team sports athletes. *Journal of Clinical Sports Psychology,* 4,19-38.

Huggan, R., Nelson, L. & Potrac, P. (2015). Developing micropolitical literacy in professional soccer: a performance analyst's tale. *Qualitative Research in Sport Exercise and Health.* 7,4,504-520.

Hughes , M. (2004). Performance analysis – a 2004 perspective. *International Journal of Performance Analysis in Sport.* 4,(1),103-109.

Hughes, M., Robertson, K. & Nicholson, A. (1988). Comparison of patterns of play of successful and unsuccessful team. In T. Reilly, A. Lees, K. Davids, & W. Murphy (Eds.), *Science and Football* (pp. 373-376). London: E&F Spon.

Hughes, M., Dawkins, N. & Langridge, C. (2000). 'Perturbation not leading to shots in football'. In M. Hughes (Ed), *Notational Analysis of Sport III,* Cardiff: CPA, UWIC. 108-16.

Hughes, M. & Bartlett, R. (2002). 'The use of performance indicators in performance analysis. *Journal of Sports Science.* 20:739-54.

Hughes, M. & Franks, I. (2004). From analysis to coaching: In M. Hughes & I. Franks (Eds.), *Notational analysis of sport,* 257-270, London: E&FN Spon.

Hughes, M. & Franks, I., (2005). Analysis of passing sequences, shots and goals in football. *Journal of Sports Sciences*, 23, 509-514.

Hughes, M. & Franks, I. (2008). *The essentials of Performance Analysis: An Introduction.* London: Routledge.

Hughes, M., Caudrelier, T., James, N., Redwood-Brown, A., Donnelly, I., Kirkbride, A. & Duschesne, C. (2012). Moneyball and Soccer – an analysis of the key performance indicators of elite male soccer players by position. *Journal of Human*

Sports & Exercise, 7,(2),402-412.

James, N. (2006). The Role of Notational Analysis in Soccer Coaching. *International Journal of Sports Science and Coaching, 1,2.185-198.*

James, N., Taylor, J. & Stanley, S. (2007). Reliability procedures for categorical data in performance analysis. *International Journal of International of Performance Analysis in Sport, 7*, 1-11

James, N. (2009). Notational analysis in soccer: past, present and future. International Journal of Performance Analysis of Sport. 9,2, 188-209.

Jenkins, R., Morgan, L. & O'Donoghue, P. (2007). 'A case study into the effectiveness of computerised match analysis and motivational videos within the coaching of a league netball team. *International Journal of Performance Analysis of Sport,* 7 (2):59-80.

Jenkins, S. (2014). Book review: The ethics of Coaching Sport: Moral, Social and Legal Issues. *International Journal of Sports Science and Coaching*, 9,1, 244-253.

Jinshan, X., Xiakone, C., Yamanaka, K., & Matsumoto, M. (1993). Analysis of the goals in the 14th World Cup. In T. Reilly, J. Clarys, & A. Stibbe (Eds.), *Science and Football II* (pp.203-205). London: E&F Spon, London.

Jones, R. L. (2000) Toward a sociology of coaching. In: Jones, R.L. and Armour, framework for social analysis. *Quest*, 54, 34–48.

Jones, R. L., Armour, K. M. & Potrac, P. (2002). Understanding the coaching process: a K.M. (Eds.) *The sociology of sport: theory and practice.* Addison Wesley Longman, London.

Jones, P., James, N. & Mellalieu, S.D. (2004a). Possession as a Performance Indicator in Football. *International Journal of Performance Analysis in Sport* 4(1), 98-102.

Jones, R., Armour, K. & Potrac, P. (2004b) *Sports coaching cultures: from practice to theory.* London: Routledge.

Jones, R.L. & Wallace, M. (2005). Another bad day at the training ground: Coping with ambiguity in the coaching context. *Sport, Education & Society*, 10(1), 119-134.

Jones, B. (2011). UKCC Level 4 Postgraduate Diploma in Elite Coaching Practice, Pentagon (Talent Development): Student Handbook. School of Sport, Tourism & The Outdoors: Preston. Unpublished.

Jones, W. (2013). Performance Analysis Employment: Prozone Analysis. The Video Analyst.com. Available online at:
http://thevideoanalyst.com/performance-analysis-employment-will-jones/

Jowett, S. (2003) When the 'Honeymoon' is over: a case study of a coach-athlete dyad in Crisis. *The Sport Psychologist*, 17, 444-460.

Jowett, S. & Cockerill, I. M. (2003) Olympic medallists' perspective of the athlete-coach relationship, *Psychology of Sport and Exercise*, 4, 313-331.

Keegan, R.J, Harwood, C. G., Spray, C.M. & Lavallee, D. (2009). A qualitative investigation exploring the motivational climate in early career sports participants: coach, parent and peer influences on sport motivation. *Psychology of Sport and Exercise*, 10 (2009), 361-372

Keegan, R.J., Spray, C.M., Harwood, C.G. & Lavallee, D. (2014). A qualitative investigation of the motivational climate in elite sport. *Psychology of Sport and Exercise*, 15 (2014), 97-107.

Kidman, L. & Hanrahan, S. (2011). *The Coaching Process: practical guide to becoming an effective sports coach*. Routledge: London.

Kiely, J. (2011). Planning for physical performance: the individual perspective. In D. Collins, A, Button, H. Richards (Eds.), *Performance psychology a practitioner's guide*. Churchill Livingstone Elsevier, London, 140-159.

Kothari, C. (2006). *Research Methodology: Methods & Techniques.* New Age International Publishers: India.

Krane, V., Andersen, M. & Strean, W. (1997). Issues of Qualitative Research Methods and Presentation. Journal of Sport and Exercise Psychology, 19,213-218.

Kuper, S. (2012). Football Analytics: The Money Ball of Football, an outsiders perspective. Sports Analytic Conference: The Sports Office November 2012. Manchester University Business School. Accessed on 16/02/2012. Available online at: http://www.youtube.com/watch?v=YaTALIjKvAQ

Kuper, S. & Szymanski, S. (2012). *Soccernomics*. HarperSport:London.

Lawless, M. (2013). EXCLUSIVE: Big Sam is 100 not out… and we reveal how life at West Ham is a numbers game under Allardyce. The MainOnline. Available at: http://www.dailymail.co.uk/sport/football/article-2430369/Sam-Allardyce-100th-West-Ham-match-Sportsmail-reveals-life-Hammers-numbers-game-Big-Sam.html

Lago, C. (2007). Are winners different from losers? Performance and chance in the FIFA World Cup Germany 2006. *International Journal of Performance Analysis in Sport*, *12*, 36-47.

Lago, C. & Martin, R. (2007). Determinants of possession of the ball in soccer. Journal of Sports Sciences. 25, 9, 969-974.

Lago, C. (2009). The influence of match location, quality of opposition, and match status on possession strategies in professional association football. *Journal of Sports Sciences,* 27: 1463-1469.

Lago, C., Casais, L., Dominguez, E., Sampaio, J. (2010). The effects of situational variables on distance covered at various speeds in elite soccer. *European Journal of Sports Science,* 10: 103-109.

Lago-Peñas, C., Lago-Ballesteros, J., Alexandre, D., Gómez, M. (2010) Game related statistics that discriminated winning, drawing and losing team from the Spanish football league. *Journal of Sports Science and Medicine,* (9), 288-293.

Laird, P. Waters, L. (2008) Eyewitness Recollection of Sports Coaches. *International Journal of Performance Analysis,* (8), 1, 76-84.

Lancashire Football Association, (2014). Coach Education. Accessed on 23/12/14. Available online at: http://www.lancashirefa.com/coaches

Lawrence, G., Kingston, K. and Gottwaid, V. (2013) Skill acquisition for coaches (pp. 30-45). In: Jones, R. and Kingston, K. (Eds.) *An introduction to sports coaching: Connecting theory to practice.* Routledge, Abingdon

Light R. (2008). Complex learning theory, its epistemology and its assumptions about learning: implications for physical education. *Journal Teach Physical Education.* 27: 21–37.

Light, R. & Roberts, J. (2010). The impact of Game Sense pedagogy on Australian rugby coaches' practice: a question of pedagogy. *Physical Education and Sports Pedagogy*, (15),2, 103-115.

Lyle, J.W.B. (1999) The coaching process: an overview (pp. 3-24). In: Cross, N. and Lyle, J. (Eds.) *The coaching process: principles and practice for sport.* Butterworth-Heinemann, Oxford.

Lyle, J. (2002). Sports coaching concepts: A framework for coaches' behaviour. London: Routledge.

Lincoln, Y., Lynham, S., & Guba, E. (2011). Paradigmatic controversies, contradictions, and emerging confluences, revisited. In N.Denzin & Y. Lincoln (Eds.), The SAGE Handbook of Qualitative Research. (4th ed.) (pp 97-128), London: Sage

Lorimer, R., & Jowett, S. (2013). Empathic understanding and accuracy in the coach-athlete relationship. In P. Potrac, W. Gilbert & J. Denison (Eds.), *Routledge handbook of sports coaching*, 321-332. London: Routledge.

Mackenzie, R., & Cushion, C. (2012).Performance analysis in football: A critical review and implications for future research. *Journal of Sports Sciences*, 31, 639-76.

Mackenzie, S. & Kerr, H. (2012). Head-mounted cameras and stimulated recall in qualitative sport research. *Qualitative Research in Sport, Exercise and Health*. 4,1,51-61.

MacNamara, A., Button, A. & Collins, D. (2010). The role of psychological

characteristics in facilitating the pathway to elite performance Part 1: Identifying mental skills and behaviours. *The Sport Psychologist*, 24,52-73.

Madeiros, J (2014). The winning formula: data analytics has become the latest   tool keeping football teams one step ahead. Wired Magazine. January. Available one line at: http://www.wired.co.uk/magazine/archive/2014/01/features/the-winning-formula

Mageau, G. & Vallerand, R. (2003). The coach-athlete relationship: a motivational model. *Journal of Sports Sciences.* 21, 883-904

Martin, D., Cassidy, D. & O'Donoghue, P. (2004). The effectiveness of performance analysis in elite Gaelic football, World Congress of Performance Analysis of Sport 6, June.

Martindale, A. & Collins, D. (2007). Enhancing the evaluation of effectiveness with professional judgement and decision making. *The Sports Psychologist,* 9, 458-474.

Martindale, R. & Nash, C. (2013). Sports science relevance and application: Perceptions of UK coaches. *Journal of Sports Sciences*, 31,8,807-819.

Mascarenhas, D. & Smith, N. Developing the performance brain: decision making under pressure. In D. Collins, A. Button, H. Richards (Eds.), *Performance psychology a practitioner's guide*. Churchill Livingstone Elsevier, London. 2011, 245-269.

Maslovat, D. & Frank, I.M. The need for feedback. In M. Hughes & I. Franks (Eds.), *The essentials of Performance Analysis An Introduction.* London: Routledge, 2008, 1-8.

Maxwell, J. (2010). Using Numbers in Qualitative Research. *Qualitative Inquiry*, 16,6, 475-482.

Maynard, M. Hughes and T. Reilly (eds), *Science and Racket Sports 2*, pp.235-40. London: E & FN Spon.

McArdle, S., Martin, D., Lennon, A. & Moore., P. (2010). *Exploring debriefing in sports: a qualitative perspective*. 22:3, 320-332.

Mills, A., Butt, J., Maynard, I. & Harwood, C. (2012). Identifying factors perceived to influence the development of elite youth football academy players. *Journal of Sports Sciences.* 30 (15), 1593-1604.

Morgan, D.L. (2007). Paradigms lost and pragmatism regained: Methodological implications of combining qualitative and quantitative methods. *Journal of Mixed Methods Research*,1, 48–76.

Murray, S., Mayor,D. & Hughes, M. (1998). A preliminary investigation into the provisions of computerised analysis feedback to elite squash players. In A. Lees, I.

Nash, C. & Collins, D. (2006). Tacit Knowledge in Expert Coaching: Science or Art? *Quest,* (58), 465-477.

Nash, C., Martindale, R., Collins, D. & Martindale, A. (2012). Parameterising expertise in coaching: Past, Present and future, *Journal of Sports Sciences*, 30:10,985-994.

Nelson, L., Potrac, P. & Groom, R. (2011). Receiving video-based feedback in elite ice-hockey: a player's perspective. *Sport, Education and Society.*1-22,iFrist.

Nevill, A., Atkinson, G., Hughes, M. & Cooper, S. (2002). Statistical methods for analysing discrete and categorical data recorded in performance analysis. Journal of Sports Science, 20:829-844.

O'Donoghue, P. (2006). The use of feedback videos in sport. *International Journal of Performance Analysis in Sport.* 6, (2), 1-13.

O'Donoghue, P. (2009). Interacting Performances Theory. *International Journal of Performance Analysis of Sport.* (9), 26-46.

O'Donoghue, P.G. (2010). *Research methods for sports performance analysis*. Routledge: London

O'Donoghue, P. (2013). Editorial: The Use of Intern Analysts & Volunteers. *International Journal of Performance Analysis of Sport*,13,(1), 1-3.

Ollis, S. & Sproule, J. (2007). Constructivist coaching and expertise development as action research. *International Journal of Sports Science and Coaching*, 2(1), 1–14.

Olsen, E. (1981). Football tactics. Unpublished work. In Tenga, A. (2009). Reliability and Validity of Match Performance Analysis in Soccer. PhD Dissertation for the Norwegian school of Sports Sciences. Available online at: http://brage.bibsys.no/xmlui/bitstream/handle/11250/171287/Tenga%202009.pdf?sequence =1

Olsen, E. (1988). An analysis of goal scoring strategies in the World Championships in Mexico. In T. Reilly, A. Lees, K. Davids, & W. Murphy (Eds.). *Science and Football.* 373-376. London: E&F Spon.

Olsen, E. & Larsen, O. (1997). Use of match analysis by coaches. In T. Reilly, J. Bangsbo & M. Hughes (eds). *Science and Football III.* 209-220. London: E&F Spon.

Pain, M.A. & Harwood, C.G. (2004). Knowledge and perceptions of sports psychology within English soccer. *Journal of Sports Sciences*, 22,813-826.

Partington, M. & Cushion, C. (2013). An investigation of the practice activities and coaching behaviour of professional top-level youth soccer coaches. *Scandinavian Journal of Medicine & Science in Sports,* 23, 372-382.

Pashler, H., McDaniel, M., Rohrer, D., & Bjork, R. (2008). Learning Styles. *Concepts and Evidence Psychological Science in the Public Interest*, 9 (3), 105-119

Patton, M. Q. (2002). *Qualitative research & evaluation measures*. London: Sage

Peduzzi, P., J. Concato, E. Kemper, T. R. Holford. & A. Feinstein (1996). A simulation of the number of events per variable in logistic regression analysis. *Journal of Clinical Epidemiology,* 99: 1373-1379.

Pollard, R. & Reep, C. (1997). Measuring the effectiveness of playing strategies at soccer. *The Statistician,* 46, 541–550.

Pollard, R. (2002). Charles Reep (1904-2002): pioneer of notational and performance analysis in football. *Journal of Sports Sciences*, 20, 853-855.

Pope, C., & Mays, N. (2006). *Qualitative Research in Health Care*. Oxford: Blackwell Pub

Potrac, P., Brewer, C. & Jones, R. L. (2000). Toward a holistic understanding of the coaching process. *Quest*, 52, 186–199.

Potrac, P., Jones, R. L. & Amour, K. A. (2002) It's all about getting respect: the coaching behaviors of an expert English soccer coach. *Sport, Education and Society.* 7, 183202.

Potrac., P. & Cassidy ,T. (2006). The coach as a 'more capable other'. In: Jones RL, ed. *The sports coach as educator: reconceptualising sports coaching.* London: Routledge. 2–13.

Potrac, P., Jones, R., and Cushion, C., 2007. Understanding power and the coach's role in professional English soccer: a preliminary investigation. *Soccer and society*, 8,1, 33–49.

Potrac, P. & Jones, R. (2009) Micro-political workings in semi-professional football Coaching. *Sociology of Sport Journal.* 26, 557577.

Premier League 2011/12. WhoScored.com: Revolutionising Football Statistics. 14/05/13.available on-line at: http://www.whoscored.com/Regions/252/Tournaments/2/Seasons/2935/Stages/5476/TeamS_tatistics/England-Premier-League-2011-2012

Prestidge, B. (2014). Performance Analysis Webinar Brian Prestidge. The Video Analyst. Accessed 05.05.2014. available online at: http://thevideoanalyst.com/performance-analysis-bolton

Prozone (2011). Prozone Analysis: Effective Attacking Play: Leeds, 2/11/ 2011. Available on line at: http://www.prozonesports.com/news.html

Purdy, L., Potrac, P. & Jones, R. (2008) Power, consent and resistance: an autoethnography of competitive rowing, *Sport, Education and Society*, 13,3, 319-336.

Raab, M., Masters, R. & Maxwell, J. (2005). Improving the 'how' and 'what' decisions of elite table tennis players. *Human Movement Science,* 24, 3, 326-344.

Rasmussen, L. (2015). Learning Styles Are appealing But Misleading: Global Cognition. 19/10/15. available on-line at: http://www.globalcognition.org/head-smart/learning-styles-appealing-misleading/

Reep, C. & Benjamin, B. (1968). Skill and chance in association Football. *Journal of the Royal Statistical Society*, 131, 581-585.

Reeves, M.J. & Roberts, S.J. (2013) Perceptions of Performance Analysis in Elite Youth Football. *International Journal of Performance Analysis in Sport,* 13, 200-211.

Reilly, T. & Williams, A. M. (2005). Preparation and training for soccer. *Journal of Sports Sciences*, 23(6), 559–658.

Reilly, T. (2007). *Science and training: Soccer.* London: Routledge.

Richards, P., Mascarenhas, D. & Collins, D. (2009). Implementing reflective practice approaches with elite team athletes: parameters of success. *Reflective Practice: International and Multidisciplinary Perspective*, 11, 353-363.

Riener, C & Willingham, D. (2010). The myth of learning styles, *Change*, September/October, 32-35.

Roberts, S. (2011). Teaching games for understanding: the difficulties and challenges experienced by participation cricket coaches. *Physical Education and Sport Pedagogy.* 16,1, 33-48.

Rogers, S. & Tajet-Foxell, B. (2011). Emotional issues of peak performance: managing mood. In D. Collins, A. Button, H. Richards
(Eds.), *Performance psychology a practitioner's guide.* Churchill Livingstone Elsevier, London, 301-318.

Roxburgh, A. (2005). Jose Mourinho talks about this coaching philosophies: 11 What trends do you see at the top level of the game? League Managers Association. 30/01/2005. Available on line at:
http://www.leaguemanagers.com/lmatv/interview-4882.html

Rugby Football League UK (2011). 1Sst4sport Qualifications: *Level 3 Certificate in Rugby Football League Candidate Pack Part One.* Leeds: Coachwise Ltd.

Smith, J. K. (1989). *The nature of social and educational inquiry: empiricism versus interpretation.* Ablex, Norwood, NJ.

Smith, B. & Sparkes, A. (2005) Men, sport, spinal cord injury, and narratives of hope. *Social Science and Medicine.* 61, 1095-1105.

Sotiropoulos, A. Mitrotasios, M. & Traulos, A. (2005). Comparison in goal scoring patterns between Greek professional and amateur teams.   *1st International Scientific Congress in Soccer,* 8-10 April, Trikala, Greece.

Sparkes, A. (1992). *Research in Physical Education & Sport: Exploring Alternative*

Vision. The Falmor Press: London.

Sparkes, A. (1998). Validity in qualitative inquiry and the problem of criteria: Implications for sport psychology. *The Sport Psychologist*, 12: 363-386.

Sparkes, A. & Smith, B. (2014). *Qualitative Research Methods in Sport, Exercise and Health: from process to product.* Routledge:Oxon.

Stanhope, J. (2001). An investigation into possession with respect to time in the Football World Cup 1994. In M. Hughes, (Ed.), *Notational analysis of sport III. Cardiff:* UWIC. 155-162.

Stratton, G., Reilly, T., Williams, A. M. & Richardson, D. (2004) *Youth soccer: from science to performance* London, Routledge.

Stringer, E.T. (2007). Action Research (3rd ed.). Thousand Oaks, CA: Sage.
Strudwick, A.J. (2013). Contemporary issues in the physical preparation of elite players. In M. Williams (Ed.), *Science and Football: Developing elite performers.* Routledge: London, 335-372.

Swinnen, S. (1996). Information feedback for motor learning, In: M. Hughes & I. Franks (2004), Notational analysis of sport.18-40. London: E&FN Spon.

Swinnen, S., Schmidt, R., Nicholson, D. & Shapiro, D. (1990). Information feedback for skills acquisition: Instantaneous knowledge of results degrades learning, In: M. Hughes & I. Franks (2004), *Notational analysis of sport*, 18-40. London: E&FN Spon.

Taylor, J.B., Mellalieu, S.D., James, N. & Shearer, D. (2008). The influence of match location, quality of opposition and match status on technical performance in professional association football. *Journal of Sports Sciences,* 26, 885-895.

Tenga, A. (2009). Reliability and Validity of Match Performance Analysis in Soccer. PhD Dissertation for the Norwegian school of Sports Sciences. Available online at: http://brage.bibsys.no/xmlui/bitstream/handle/11250/171287/Tenga%202009.pdf?sequence =1

Tenga, A., Holme, I., Ronglan, L. T. & Bahr, R. (2010). Effect of playing tactics on achieving score-box possessions in a random series of team possessions from Norwegian professional football matches. *Journal of Sports Sciences*, 28(3), 245-255.

Tetlock, P. Expert political judgement: How good is it? How can we know?. Princeton University Press, NJ.
Thelwell, K. (2005) Forward. In Carling, C & Williams, A. & Reilly, T. (2007). *Handbook of soccer match analysis: a systematic approach to improving performance.*XVII, London: Routledge.

Tonn, E. & Harmison, R.J. (2004). Thrown to the wolves: A student's account of her practicum experience. *The Sport Psychologist,* 18, 324–340.

Vallerand, R.J. (1997). Toward a hierarchical model of intrinsic and extrinsic motivation. *Advances in Experimental Social Psychology*, 29, 271–360.

Vander Linden, D., Cauraugh, J. & Greene, T. (1993). The provision of Information. In M. Hughes & Franks, M (Eds.). *The essentials of performance analysis an introduction.* Routledge, 2008, 21-39.

Vickers, J. Skill acquisition: designing optimal learning environments. In D. Collins, A. Button, H. Richards (Eds.), Performance psychology a practitioner's guide. Churchill Livingstone Elsevier, London, 140-159.

Wade, G. & Trudel, P. (2013). The Role of Deliberate Practice in Becoming an Expert Coach: Part 1 – Defining Coaching Expertise. *Olympic Coach*, 23, (2), 19-26.

Weaver, P. (2007). One second thoughts... Egil Olsen. Talking sport: The Guardian. Accessed 10/07/2014. Available on-line at:
http://www.theguardian.com/sport/blog/2007/apr/04/onsecondthoughtsegilolsen

Whitmore, J. (2009). Coaching for performance (fourth edition). Nicholas Brealey publishing: London.

Williams, A,M. & Hodges N. Practice. (2010). Instruction and skill acquisition in soccer: challenging tradition. *Journal Sports Sciences*, 23 (6): 637–650.

Williams, S.J. & Lawrence, K. (2007). Perceptions of elite coaches and sports scientists of the research needs for elite coaching practice. *Journal of Sports Sciences,* 25,14:1577-1586

Wiltshire, H. (2013). Sports performance analysis for high performance managers. In T. McGarry, P. O'Donoghue & J. Sampaio (Eds), *Routledge Handbook of Sports Performance Analysis.* Routledge: Oxon, 176-187.

Wooster, B. (2013). Football Analytics.The MIT Sloan Sports Analytics Conference. Boston, March 2013. Available on line at:
http://www.youtube.com/watch?v=2Ye mvV9ELI

Wright, C., Atkins, S., Polman, R., Jones, B. & Sargeson, L. (2011). Goal Scoring Opportunities in Professional Football. *International Journal of Performance Analysis in Sport.* 11,438-449.

Wright, C. Atkins, S. & Jones, B. (2012). An analysis of elite coaches' engagement with performance analysis services (match, notational analysis and technique analysis). *International Journal of Performance Analysis of Sport,* (16), 436-451.

Wright, C., Atkins, S., Jones, B. & Todd, J. (2013).The role of an elite match analysts within football. *International Journal of Performance Analysis,* 22, 240-261.

Wright, C., Collins, D., Carling, C. (2014). The wider context of performance analysis

and its application in the football coaching process. *International Journal of Performance Analysis of Sport, 14, (3), 709-733*

Youth Development Rules. (2012). The Primer League: The Elite Player Performance Plan (EPPP). Available online at: file:///C:/Users/cmwright1/Downloads/youth-development-rules.pdf

Yiannakos, A. & Armatas, V. (2006). Evaluation of goal scoring patterns in the European Championship in Portugal 2004. *International Journal of Performance Analysis in Sport, (*6), 178-188.

Table 3.1: Delivery of feedback of PA information to players, perceived positive and negative aspects

General Dimension	Higher Order Themes	Lower Themes
Positive: Discussion	Player contribution and interaction	Coach is always open to discussion If players are not engaged during feedback it is not effective Important players put their side across Debate is healthy Players must give as much as the manager otherwise it does not work Coach asks questions how players could improve The player's point of view is important, it might affect what the coach says
	Player must feel comfortable sharing opinion within the group	All players should contribute Provides a different perspective on the game Enhances shared team understanding Players voice their opinions in a non-confrontational manner
	Team briefings are packed with discussion	Group discussions have a positive effect on team spirit Given opportunity to answer questions in group and individual setting Group interaction enhances learning Players learn more via questioning
Mixed consideration open debate	Limitations	Feedback sessions are very much open, Pre-match opposition presentations are often more structured with less opportunity to contribute Team feedback sessions are very open Individual clips don't have specific sessions set aside to discuss with the manager Players require permission to make a point to avoid chaos Players feel they can influence the coaches to see it from their perspective.

Table 3.1: Delivery of feedback of PA information to players, perceived positive and negative aspects

General Dimension	Higher Order Themes	Lower Themes
Negative: Discussion	No discussion and interaction during the sessions	Just listen and take in, no engagement No opportunity to voice opinion If player gives their opinion its often disagreed with One way communication Staff direct all information / instructions
Structure of feedback session	Sessions are structured to promote discussion	Focus on positive and negative aspects of performance Coach tries to encourage players to see what they did well Discussion is often centred around areas of weakness Pre -match feedback sessions can differ in structure from post-match Limited opportunity to contribute during pre-match feedback

Table 3.2: Perceived impact of individual feedback opportunities and implications for self-analysis / reflection

General Dimension	Higher Order Themes	Lower Themes
Use of Individual clips	Preference towards individual clips	Access to computers and footage to use it to its maximum Provides an indicator of personal development Increases self-awareness Players often miss or forget important aspects from the match Watching clips allows you to learn from mistakes. Review important aspects of the game Enhance evaluation of decision making
	Viewing of individual clips	In a team we discuss, but left to look at individual clips on our own More useful if with manager/ coach to feedback on performance Sometimes discuss performance with coach on a one to one basis. Prefer to go through it with coach.
Assessment of performance	Use of clips, whole game and stats	Players completed self-reflection sheet Allows players to compare against weekly training objectives and individual role objectives. Analyse performance against individual positions/what coach wants Analyse performance against individual strengths and weakness Awareness of personal strengths and weaknesses Performance should be analysed against the game plan more Analyse performance against my opposite number Analyse performance against what manager asks for Look at what coach wants to improve
	Role in games understanding	Enhance role clarity / positional understanding and team shape Develop ability to interpret and read the game Training reinforces analysis work Assess: pass completion, shots on target, how many goals, through balls, switch play, blocked shots, set pieces
	Completion of individual analysis	Amount of individual analysis is dependent on available time Preference to be out on the pitch More likely to analyse performance after a win
	Different learning environment	Enjoy the variation from pitch sessions Prefer to be out on the pitch
	Difficulties analysing individual performance	Find it difficult to analyse performance Need help of the coach / analyst to do this Rather analysts do all the stats sheets and analyse, I learn more that way. Watch clips with fellow team mates in own time often useful to get a different perspective on each other's performance

Table 3.3: Preference for team vs. individual feedback approaches

General Dimension	Higher Order Themes	Lower Themes
	Preference one on one / small group session	Individual sessions more relevant Helps achieve my personal goals Good to sit down with manager, Identify on good and bad Coach highlights positives, it gives a bit of a high Team video feedback sessions are a little long
Improvements: Team and Individual feedback	Value of watching the whole game	Lack of relevance to most people in the session Pointless watching the whole game, does not apply to me Only see one or two bits which are relevant to you Don't have time in current schedule, fixture crowding Would not want to watch the whole game Can take a DVD but I don't bother, I find it too long and boring.
	Amount of analysis dedicated to opposition	Prefer to focus on our own game Opposition's analysis only has short term impact Sometimes opposition's analysis is too much, prefer to focus on own game. Don't get enough analysis on our game and the opposition. Learn better out on the pitch Opposition's analysis is too much
	Ownership of analysis	Analysis is for the benefit of the coach Players get no stats, unlike the coach staff
Positives: Use of individual and team analysis	Identify mistakes in game	Impact on context of training activities
	Prefer individual clips	Players also understand the importance of seeing the whole game.
	Feedback sessions give clearer understanding of expectations	Provides clarity to what coach is telling us

Table 3.4: Pre and post-match considerations

General Dimension	Higher Order Themes	Lower Themes
Improvements	Preference for feedback the day after the game	Post-match straight after the game, still fresh in your mind. Would prefer the clips the day after the game. Video sessions are a little long, should be 10-15minutes. Important to focus on next game as soon as possible, due to limited time till the next game Pre-match is correct time, 2 days before a game Because of mid-week games, focus on next game as quickly as possible
	Balance of video and stats	Any more information would result in over load, stop taking it in Prefer more information to be spread throughout the week Important to watch whole game, especially when played bad
	Opposition's analysis is important	Opposition's analysis important to understand how they line up so we can exploit their weakness Identify how to exploit opposition
	Level of analysis	Do more analysis after a defeat
Behavioural change	Analysis into action	If something's good you get told, if bad you discuss it and then put into practice on pitch in training Analysis is useful, but has to be implemented in training to get a deeper understanding of the game. Video needs to be supported with work on the training field, otherwise any improvements will be short term Can identify weakness but I don't think he's ever told me what the weakness is on the training pitch. I think video will improve unforced error and enhance better decision making. Video helps me understand what the coach is telling me. Useful when identifying mistakes in the game, then address next day in training Need to look at mistakes if we are going to learn. It makes you improve; focus what to work on in training so don't make same mistakes.

Table 3.5: Delivery of feedback of PA information to players, perceived positive and negative aspects

General Dimension	Higher Order Themes	Lower Themes
First team / reserves	Winning orientated focus	Complications of mid-week games make feedback difficult Opposition critical to winning games Too much opposition analysis Team feedback, would prefer individual feedback Feedback provides clear picture of positives and negatives I like to see my stats Use a lot at first team, but less with Academy Development players At first team level you must be able to analyse own performance.
Academy u16 & u18 phase	Developmental focus	Pre-match look at areas doing well and post-match look at strengths and weaknesses in that performance Football's about how you develop yourself If I am going to make it at first team it's about my development, not the team's success

Table 4.2: Congruence between the coach and analyst

General Dimension	High Order Themes	Lower Order Themes
Requirements of the analyst and role clarity	Requirements of the analyst and role clarity	• Coach / manager outlines specific requirements • Work schedule of 45 items to be completed from completion of one game to the preparation of the next • A structure is provided based on what questions the coach will ask, but also analysts have to be proactive in providing the information • Must be proactive in terms of anticipating what the coach will ask for • Can change week to week • The analysis / clips must correspond with that coach wants • It's not me imposing my view of things, it's not me just supporting his views • Key role is to facilitate what the coach wants and facilitate what they are working towards • Based on the analysis the analyst will present their opinion, this is used to spark ideas • During the game, mainly during half time, there is an opportunity to have an opinion • If we thought we were not being successful in our approach the manager would expect us to say so, it's then up to the manager to make the final decision
Communication methods	Open Communication	• Staff/ coach meeting every morning, team briefings / daily communication • Overall staff meeting / head of departments meet every week • Analysts share an office with sports science and share key information • Open door policy, everyone should feel they can come and ask anything • Use sport session plans, so everyone has their input, all departments update their info • In my 5 years as an analyst I've always had a good relationship with the coach • When we travel the analyst and the coach will talk through the analysis and footage • Straight after the game the analyst will discuss with the coach which players did well or not, we also spend 15minutes discussing the week ahead • As first team coach I must touch base with every one, manager, assistant manager, players, analyst, sports science, medical staff • As first team coach I spend 10 minutes with everyone and feedback to the manager • Manager will tell me what he wants on the day, as coach I will implement it on the training pitch • The manager would expect the analysts to be honest with him • As opposition analyst I must watch training, if the manager has missed a point or not reinforced some key aspects I will have a quiet word • Central to the communication process is listening to what coaches have to say • It's a two way communication, the manager will take on board suggestions • The coach will give the analyst feedback on our performance • I am confident if I provided important information the coach will act upon it

Table 4.2: Continued congruence between the coach and analyst

General Dimension	High Order Themes	Lower Order Themes
Communication methods	Open objective information	• If there is a conjecture between the team I will provide supporting evidence to support or refute • The staff get on quite well, but still able to have frank / open discussions • I am open to analysts making suggestions, but they have to provide the evidence to support it
Initial weekly planning meeting	Present opposition analysis	• In initial weekly meetings the opposition analyst will present key information • As opposition analyst I present to them what I think about the next opposition • We will talk about the opposition's strengths and weaknesses and how we can hurt them • As part of the pre-match / week review we will discuss the opposition's playing formation and propose our formation
	Game review	• We will discuss team selection and I will propose drills to do in training week • The coaches' and analysts' game review is one of the first things on the weekly schedule, this will dictate when the team and individual player reviews will take place
	Discuss training week	• The coach will identify the training objective for the week, they are often influenced by what was covered in the video session • As the coach I will give the analyst four key topics to prepare to feedback to the players • Coach and analyst will discuss their perspective of the game, identify some good practice and plan when to present back to the players
Club and coach philosophy	Development of philosophy	• As part of the EPPP we created a club philosophy which is appropriate for each age group • An analysis philosophy / approach was developed also alongside the club philosophy, everyone contributed
	Evidence of philosophy	• Stats and video are collected to illustrate and reinforce examples of performance which are related to the philosophy • Use stats and video evidence to support philosophy when teaching across all age groups

Table 4.3: Congruence within the club

General Dimension	High Order Themes	Lower Order Themes
Transition between levels	Understand 1st team requirements	• Pre-match analysis for 21's will educate the players in the focus at first team level • Players who play up with the 21's have to show an understanding of the philosophy, style of play and the roles and responsibilities which is shared by the first team • The first team manager expects that all the 21's selected to play up to know the roles and responsibilities of each position • All the staff at first team and reserves are on the same page, I can drop into coach the reserves and we will implement the same tactics, strategies and approaches
	Development targets	• It's important that players who are hitting their development targets get an opportunity to play upwards
	Logistics	• We share the same site, so if the 18's are doing well they can drop down a pitch and join the 21's , • There is a lot of interaction between departments at all levels
Progressive use of analysis	Mirror 1st team approach	• We reflect the use of analysis at first team level to focus on the opposition's strengths and weaknesses • We follow the first team approach so the players are comfortable when they step into the first team • We follow the first team approach to analyse 90% pre-match analysis and 10% post-match analysis • 21's model ourselves on the first team opposition meetings, focusing on shape, individuals and then how we can hurt them
	Shared templates	• We provide constructive criticism in the team feedback session while commenting on ball in play, players have to feel comfortable being criticised in front of their peers, as they will at first team level • We follow generic set play routines so when players step up they know the basic template • Share coding templates across age groups • We have a set number of feedback sessions we want to deliver for each age group per season
Interaction	Interaction between the analysts	• First team have regular interaction with 21's, they help out on match day with the first team analysts • I have a relationship with the youth department, as they are a good sounding board if you want to discuss, thus it's important to develop personal relationships with them • It's good to have people who you can bounce ideas off that are not directly involved with the first team • Head of analytics takes a lead on coordinating all the information collected, analysis and sports science across the club

Table 4.4: Lack of congruence between the coach and analyst

General Dimension	High Order Themes	Lower Order Themes
Ineffective use	Coach awareness of PA	• He's very much: it's my way, I don't think he fully understands how analysis can be used • Post-match is limited to ball in play commentary which last 60 minutes, no specific clips, no analysis, it does not seem effective, too much info to take in • No real discussion before the team briefing as to what we are going to include in the clips, sometimes 2 or 3 minutes before hand • The coach does not really understand how long it takes to complete the analysis and how problems are caused by scouting opposition at 21 level, i.e. teams are so inconsistent • Often what coach has identified as their philosophy, sometimes is uneducated and unstructured, which is difficult as everything we do in sports science is planned and periodised
	Varied philosophy	• Me as assistant and the head coach often have a difference of opinion about football, but it's the manager's job to make the decision and I will back that decision • We are meant to follow the same philosophy but it's quite different across coaches and phases • I have worked under a manager who hasn't had his own clear philosophy, this was the worst time at the club • When the coach has no clear philosophy it's difficult because you're trying to measure performance without clear guidance • The philosophy has to be adapted for the younger age groups • As you get to the higher end of the academy there is an emphasis on your club approach and qualities, this is what we do and how we do it, the club DNA becomes clearer

Table 4.4: Continued lack of congruence between the coach and analyst

General Dimension	High Order Themes	Lower Order Themes
Value	Perceived importance	• Clips are a waste of time as they get clipped every time they touch the ball • It's just as important what they do out of possession, so it's important to watch the whole game back or ball in play • A lot of video can be time consuming, it can eat into your time • Can be time consuming feeding back to 20 players individually • Its finding a balance, when you have done really well and won three nil you don't need the video, just get them on the pitch
Lack of direction	Clarification	• We sat down to discuss the analysis approach, but it was not totally clear • I have never seen a coach explain the team style and what he wants the analyst to look for and do in terms of their analysis • At no point has a coach has sat down and explained the KPI's they are looking for or what he believes is important • As the season progressed things changed and, although the coach thinks these were pointed out, they never were • The coaches tend not to give specific direction, it's up to you to structure your own department as you see fit, you tend to deal with coaches' requests as and when they crop up
	Ineffective use	• Often used as an extra cameraman, filming 10 hours of training which never gets used • The coach is interested in the number of crosses into the box, but they have never been interested in tracking stats over the course of the season

Table 4.5: Key performance indicators used to assess performances which are associated with the club's philosophy

General Dimension	High Order Themes	Lower Order Themes
Evaluation of KPIs associated with CP	PA role in assessing CP	• The code input window represents key aspects of your academy coaching philosophy • We collect stats on KPIs associated with philosophy and team tactics, some coaches are interested in viewing it, others are just happy to know it's there. • All our analysis, evaluation of performance relates back to our philosophy, we use good practice to illustrate how we want to play • Stats and videos can be used to justify and highlight examples of the club's philosophy if required • We can look to key aspects in the analysis which are representing the team's approach i.e. how many times your centre back split and got on the ball, how many time your full back got the ball, who was your best receiver • Always analysing post-match and referring back to our ability to implement philosophy
	Measure of success	• The analysis is more focused on outcome i.e. completion and conversion rate i.e. shots per goal • We want our club's way of playing to be recognisable • We want our way of playing to be creative, fast, quick and dynamic and offensive minded
	Creation of philosophy	• My role is to create the academy prospectus which sets out our club philosophy and style of play, this is disseminated to all coaches, staff and players • All departments fed into this club prospectus, it was developed alongside the first team manager's vision for success • As part of the EPPP you had to clearly state your club philosophy, vision, coaching philosophy, thus club lives and breathes it

Key: CP = Coaching process

Table 4.5: Continued key performance indicators used to assess performances which are associated with the club's philosophy

General Dimension	High Order Themes	Lower Order Themes
Specific KPIs	Individuality KPIs	• KPIs are position based • Wider players looked for crosses made, the position crosses are coming from, entries into the final third, possession count • Defending in one verse one situations • How many times can centre halves win headers • How many times can the midfield players link with the strikers • How many times can we play out wide, based on these factors I will set specific targets for each player • The coach has a specific tactical way of playing and philosophy, the player must know their own roles within this, the coach knows these inside out • Within training the 21's key focus is on tactical aspects rather than technical
	Possession and Transition	• The previous coach was really interested in possession analysis • With the under 18s we are really interested in transitions in play and the period immediately after winning and losing the ball • Central to the club's philosophy is possessions based play, playing through the thirds, identifying specific movement patterns to allow this, creating space, exploiting space and creating overloads in different areas of the pitch • Be able to express themselves in possession, play fluent football, out of possession win the ball back as early as possible • Post-match mostly cover everything, bit of key trend stats from the game, might focus on passing relationships • Minutes played, goals scored, goals conceded, how many touches, how many passes in the build-up for goals scored and goals conceded • Our philosophy is central to our formation, the way we play, the way each position plays, at first team level we also have to consider what the opposition are likely to do
	Generic KPIs	• Goal location for scored and conceded, timing of goals scored, shot location • Set piece and attacking free kick, break downs based on outcomes • We will database analysis for all u18's games and provided seven game reviews on basic KIP's for the coach: penalty area entries, crosses in the box • Will feedback stats to coach to identify season trends in a presentation • Previously we just looked at shooting, crossing, set plays, goal keeper distribution, goals scored and conceded

Table 4.5: Continued key performance indicators used to assess performances which are associated with the club's philosophy

General Dimension	High Order Themes	Lower Order Themes
Specific KPIs	Player intangibles	• The analysis is focused on work ethics, good attitude, want to improve, this will take them a long way • Attitude off the ball is important, desire, commitment, being competitive
	Physical analysis	• We use physical data to back up our opinions • Look at Prozone data, total distances covered, high intensity percentages, high percentage distance You might have 4-6 players over 10% high intensity work who tend to do well in the game, some players won't hit this, you just let the manager know so he can adapt training accordingly
Flexibility in KPIs / philosophy	Games Style Vs. Philosophy	• Having multiple managers has an impact on our ability to implement a clear philosophy, we tend to use a wider spectrum of performance measures • Your philosophy has to be fluid as you're never really in line as you're always trying to get players in and players out • It takes time to get young lads who have progressed to understand the specific template you are trying to follow • You might not have the player you want to employ your philosophy, thus it's difficult to analyse it • Sometimes it's difficult to stick to your approach due to opposition's tactics • Team has to be more flexible in their approach to games • Your approach and philosophy has be flexible, sometimes you can't play the way you want, you just have to find a way to win • You might only be recognisable in parts • Sometimes it's difficult to bring your philosophy in due to high pressure / demands of the games

Table 4.5: Continued key performance indicators used to assess performances which are associated with the club's philosophy

General Dimension	High Order Themes	Lower Order Themes
Limitations of stats based approach to KPIs	Evidence of philosophy in play	• Success for us is finding evidence associated with our playing philosophy rather than statistics from the game • More interested in examples of us employing our philosophy as opposed to wanting statistics from the game • Coaches are not as interested in the stats as looking for patterns in play • Looking for specific movement i.e. wide men coming in to receive the ball, winger overlapping, midfielders always attempting to get behind the ball, these are more important to us
	Evidence of review	• In the review sessions, the coaches are picking out patterns in play which they want the lads to learn
	Assessment specific KPIs	• The coach was interested in how many repossessions we had, but he's never been interested in how it changes from week to week • Interested in showing and looking for patterns associated with transitions in play, look at movement and reactions of players following a transition, always clipped so we can look back at it over the last seven or so games
	Lack of insight	• At academy level we have a development focus so we are not as interested in stats • A player could make 50 passes in a game but if he's not quick enough or doesn't read the game he will not make it • A player might be the top passer but his completion rate is five out of 10 so it's sort of a false measure of success
Use of trends	Trends providing insight	• Following a dip in performance we would discuss it and consider how to approach, did we under train or did the team just have an off day • We carefully look at the previous season's data and identify KPIs from that, i.e. what do we need to achieve, identify how much running players need to cover, how much high intensity • Use previous season's data to help establish how much recovery is required, establish what training to do and what type of repeated sprint work they might need to do

Table 4.6: Development and elite focus

General Dimension	High Order Themes	Lower Order Themes
	Oppositions focus	• We have not been giving too much post-match with the 21's because we are currently focusing on opposition's reports, this is taking up most of our time • At first team there is 90% focus on pre-match and 10% on post-match, at 21s level we also follow this approach
	Limited post-match focus	• When we find more time we will do more post-match with the 21's, when I get quicker we will do more post-match • Post-match we just have to watch the ball in play with the coach commentating over it but there is no real analysis / no break down • Approach at 21's should be more balance 50/50 in terms of pre and post-match, the current approach seems a little result based
In contradiction of development philosophy	Winning based focus	• It feels very result based, I am not sure this should be the focus at 21's level • It's important to have success and win in order for the player to have belief in the coach • If they're winning they're much more likely to take on board what you're telling them • We are developing players' understanding and exposure to what it's like at first team level • Even at development phase the players have to learn how to find a way to win, develop a winning mentality • A some point the players have to understand the pressure at first team level to win and not to make mistakes which could result in costing the team the game
	No clips	• Players don't receive any clips at 21's and first team level • Players don't watch any footage unsupervised as it can cause a blame culture • I've stopped the analyst giving the players their clips as I want them to interpret them the way I do • Videos can cause conflicting opinions especially amongst young developing players, they often want to blame someone else for their mistakes • Young players often to fail to understand it is constructive criticism and so they fail to agree • You hope if your player understands the coaching and club's philosophy, they would be able to look at their own clips and video and focus on the key aspects without being influenced by parents or significant others
	Lack of individual focus	• At 21's we should make more of an effort to track short term, medium term and long term progress as it's central to the EPPP

Table 4.6: Continued development and elite focus

General Dimension	High Order Themes	Lower Order Themes
In contradiction of elite philosophy	Development focus	• At first team level clubs could use video more to develop players, but most of the time at pro level the focus is on winning the game no matter what
In support of development philosophy	Player education	• At academy level it is about development, any opposition analysis should be done purely for educational benefits to develop player understanding • With the first team and development squad we try and create a mind-set where players know the analysis is used to help them, not to criticise or to be negative • We pull players aside to show the video to do some corrective work, this can then shape what you do out on the pitch and develop a little practice around the point
	Individual's development	• The academy manager is not interested in the result • If a player has a technical or tactical deficiency we ask ourselves the questions what have we done for him, have we given him a specific programme • We judge success on improvement, we look at individual as much as team performance • We would judge success on players being able to learn the role and positions required at first team level • We need to be producing effective players not effective teams • A key factor associated with success is their ability to work through specific learning outcomes
	Freedom to play	• At youth level you are giving them the guidance, shape and structure when they on the pitch, giving them the freedom to express themselves • Focus in the game is based on the team's ability to implement the tactical and technical focus of training that week and subsequently the game plan
	Pressure to win	• Pressure comes from yourself and your own pride to win • You don't want to be on a team letting the side down, which looks like you don't know what you're doing, you want to be at least competitive • We do want to install a winning mentality • It does not matter how many games we win but how many plays progress to the next phase
In support of elite philosophy	Winning focus	• At first team level it's about winning • Everything we do is geared towards 3 points, other successes are minor • Any new equipment or analysis approach will be geared towards winning

Table 4.7: Coach and analyst buy-in

General Dimension	High Order Themes	Lower Order Themes
Open /Closed Mind set	Coach knows best	• Some of the coaches think they know best rather than looking at the video and analysis • Initially the coach was sceptical, but he soon realised we were not there to prove him wrong • Coaches find it difficult because of the analysts' ages, they see us as spring chickens • The coach always wants to see the stats as they use them as a tool to inform their opinions and back up their views • I think subconsciously some coaches think they did not have it as a player and still made a living without it, so why would I take them off the grass to show them the video
	Perceived value	• There are no real constraints to its use, there is enough time, it just depends on how much you value it • If it's important to the head coach's philosophy you will use it effectively
	Central to CP	• The 18's and 21's coach will spend between 6-7 hours in our room looking at stuff • The video and analysis is at the start of their working week, the working week is directly informed by this • The analysis has a big influence on the coach's working week • Analysts have to adapt to fit with the coach's process • The coach is always at the forefront of the analysis we do
	Coach personal development	• I use the analysis to make me better and develop myself, the more I develop my own performance analysis skills and understanding I become less reliant on others • I like to be able to put the power point presentation together myself
	Coach reinforcement	• The analysis and video helps identify situations / mistakes which you might normally miss • We give feedback through our own opinion, through video evidence, stats and technical, tactical and physical data and evidence • I might think there is a problem so the analyst helps me review and either vindicates what I thought or helps me identify when I might have made a mistake • If a player has been lying you can back it up with the video and the GPS data • When there is a disagreement the analyst can tell us if we are right or wrong • Having played for 16 years you do soon realise you don't know the game as well as you think you do

Table 4.7: Continued coach and analyst buy-in

General Dimension	High Order Themes	Lower Order Themes
	Advantage of buy-in	• When you have the buy-in its much easier to communicate and develop respect, developing trust is key in developing a relationship • Once you have developed trust within the relationship it makes your working day better and work as a two way relationship
Open /Closed Mind set	Open to PA	• Throughout the age groups all the coaches are respective to the video feedback sessions • It's not used to embarrass people, it's a really good effective learning tool • I will give the analyst lots of leeway because he's good at what he does. • He's been here as a coach for 25 years but he's really open to it and uses it really well to do his debriefs, he is also open to learning how far he can take the analysis side further • It's new to the coach, but he's open to whatever the analyst can offer • They come up with some good work and we let them know it's valued • The game and the environment is changing, players are growing up with it • More coaches are forward thinking and understand that to progress their personal careers they have to engage with sports science and analysis • When I first came to the club the coach buy-in was not there, but now their mind set has changed, but you have to drip feed it • I've seen it when sports science was used in the early days it was seen as not really being important
	Closed to PA	• I think it's changed a lot but some managers/coaches are still a bit set in their ways • Some coaches think there are the only ones with the right answer • Some people have great knowledge and experience but are not very good at listening to other people
	Respect of PA and analyst	• As a coach I try not to step on the analyst's toes • As a coach I appreciate what they do and what performance analysis can offer • There has to be respect for what everyone's department can offer. • I have belief that they can do their job well, so I let them get on • The coaches and analysts are on same page, thus try to stimulate ideas off each other • It's important the analysts feel valued, they need to feel they can bring something up without being knocked back

Table 4.8: Role and responsibilities

General Dimension	High Order Themes	Lower Order Themes
Specific roles and tasks	Analysts lead	• I am wary of just giving the analyst orders • I will say what I have seen, ask the analyst what they have seen and ask them to bring me what jumps out at them • I will ask the analyst to bring what they feel is relevant, I want them to bring what they feel is important to the table • Sometimes we dish out too many orders, where instead we should give a bit of guidance/ framework and see what they come up with • I have been given free range /licence • Some key tasks which come direct from the manager based on what he is looking for, other than that we do our own thing • It's good and bad but no manager has come in and sort of said this is what you need to do and when • A clear marker of what the analyst's responsibility is should be established
	On the pitch	• As opposition analyst it is important you find a balance between being inside and getting out to see how the analysis effects training • Must ensure set pieces analysis is translated correctly
	Boundaries	• If a player comes to an analyst for stats or video we send them straight to the coach • As analysts it's important we don't develop relationships with players, we need be objective when providing information on who should and should not play • Analyst is in a positions of authority, you're not the players' friend • The manager taught me that's it's an analyst coach/relationship nothing else matters
	EPPP requirements	• As part of EPPP we are required to ensure all players from 9's to 21's will get their individual clips

Table 4.8: Continued role and responsibilities

General Dimension	High Order Themes	Lower Order Themes
Demands and demanding	Coach lacks understanding	• The coach does not understand how long the process takes • You have to manage the coach's expectations of things and how long it takes to complete the analysis • Things can change last minute and four or five hours of work might not even leave the computer, easy to get disheartened when this happens
	Pressures	• There's a lot of pressure at first team level as it's results based • The work has to be done as good as it can as you're dealing with a different professional team every week • There is a bigger demand on the analysis team as we are now mirroring the first team • You have to be thick skinned as you can't worry about stepping on people toes • Football is a religion, you have to be dedicated to it • I have seen interns who think they are mates with the manager and when they get sort of told / called in to get there work done they don't understand how to take it
	Character required	• There are a lot of characters, alpha males and prima donna's you have to deal with, you have to be able to adapt • You have to understand the type of people you are dealing with, people with big egos • Have to be able to adapt to how I work, it takes a certain personality
	Coaches' high standards	• It can be a tough environment to cope with the way I am, but you have to understand you are my support team and you impact on my ability to do my job • I have high standards and I am going to squeeze pips out of you • As my knowledge and understanding of the analyst department gets stronger, then my ability to make demands becomes strong, thus setting high standards

Table 4.8: Continued role and responsibilities

General Dimension	High Order Themes	Lower Order Themes
Demands and demanding	Work load	- X is going to try and take Wednesdays off but during the season we find it difficult to take days off - With the 21's its every day 18's are in every day with only Sunday off, but on Sundays we have all the school boys games to do - I have one designated day off in the week, but it depends on how the fixtures fall - The last 3 days I have been in from half eight till half seven, its long days at the moment - Its long days partly because I am not as quick at this as I could be, but when I get quicker I will start doing extra stuff - At 12 O'clock the coach asked me if I could do full possession stats for both teams tomorrow am, this would mean counting every pass for both teams, it can take a full day - When its Saturday to Saturday there's more time to take stock of things, its difficult when there's a midweek game - We work 5 days a week and 2 off, but I will still do a few hours on my days off if something needs doing - What you do with the development squad is the same as the first team there's just less pressure - I have tried to balance my work load better this season, I was probably close to 50-60 hours a week, six days out of seven - The quality of the analysis work was not as good as I was trying to do too much - The work load is much better managed with the help of 3 interns from x university - It's not like a normal working environment, 37 hour working week does not exist, its closer to 70-80 - In an ideal world we would get out and watch training sessions, this might only happen during the pre-season
Changing context and constraints	Influence of significant others	- You're dependent on the environment you're working in and the manager you're working under - Your role is solely dependent on the decision maker at the top - I think coaches and chairpersons at the clubs know it is a key role, it's just some people don't utilise effectively

Table 4.8: Continued role and responsibilities

General Dimension	High Order Themes	Lower Order Themes
	Playing career	• Played at non-league level until 36 and while I was at university • 20 years playing as a professional before going into coaching • Playing as you get older you pick ideas up from coaches and managers • Playing professional football from age of 16 to 32, coaches I have worked with have shaped my coach career as you take things from all of them • They probably don't know the game as good as they think but playing gives you an eye that you can spot some different situations and why you think players are making mistakes • I did not have the analysis as a player but I think it would have definitely helped me • Played professionally for 16 years
Previous experiences and influences of analysis	Formal education / training	• Degree in sports management, Diploma in sports psychology, this gives a wider perspective • Did sports science degree and a masters at x and a physiotherapy degree at Salford and currently doing a PhD at X • Through education I was exposed to different perspectives and different ways of seeing things and different experiences, this shapes how you see and analyse the game • By studying science you understand the importance of questioning your practice • As part of my degree I really enjoyed the coaching theory relating to the coaching process, I could relate to it as I was putting it into practice every day
	Wider experiences	• The experience of developing on the streets was brilliant and being a professional you develop a professional work ethic • A strong depth of knowledge has come from what I have done in football and the experiences I have been exposed to • Often learning from trial and error as you go along and the experience you get
	Manager influence	• Previous experience as a scout gives you an insight into what the manager wants/is looking for • I had two different managers in the last two years, both have very different attitudes to analysis, this allowed me to pick up different things, made me very astute to understanding what they want

Table 4.8: Continued role and responsibilities

General Dimension	High	General Dimension
Analysis focus duties	Oppositions /Pre match analysis	• We look at the opposition want to show what their about but are careful not to over emphasise their strengths • You have to consider at least the opposition's previous 3 games, this can be time consuming • With the first team oppositions analysis is complicated, you look at a team's weakness but the teams the opposition played might not play like we do • Although we show the video of the opposition, whoever they are playing at the time might not play or line up like us
	Balance of pre and post-match	• You spent the majority of the week looking at the opposition, but we always balance this with looking at yourself and how we can hurt the opposition • Focus 50/50 post-match looking at ourselves and pre-match looking at the opposition • You need to look at not so much weakness but areas you can develop, it's important you look at where you haven't done so well • With 21's and 18's teams its 90% post-match, because of what is available, the first team do a lot more opposition so it would be more of an even split roughly 50/50 • Moved away from strengths and weakness and gone with weakness we can exploit • We are consistent win, lose or draw in our approach to the analysis, feedback and debriefing
	Use of post-match	• There have been times where for different reasons we thought should we give it a miss when emotions are high, but we still do it • Despite the result we always do the video debriefing, it sort of boxes it off / puts closure on the performance • Even after a bad loss they have to see it, but it does not have to be a rollicking • If the good totally outweighs the bad you don't even touch on the bad. • Although we are not currently winning games, the coach can see in the post-match analysis that the players are implementing the patterns and movement patterns they have been working on during the preseason, so the coach is happy with this progress
	Recruitment analysis	• Analysis is a useful tool for recruitment but getting inside information about the character of the individual is also important • Some players look great in terms of the data but they can't produce, sometimes data alone can be misleading

Table 4.9: Player ability to learn

General Dimension	Higher Order Theme	Lower Order Themes
Development and improvement	Set learning objectives	• The coaches are constantly on the computers using the analysis to set player learning objectives • EPPP is pushing a more individual focus to learning and analysis
	Decision making	• We hope the video sessions can develop the players' decision making, giving them ownership to identify how to respond accordingly during matches • When I was a player I was unsure about how much difference a coach could have • At 30 you would expect a player should know that technical/tactical aspect, but maybe they have never been shown
	Coach role in development	• Players change themselves and coaches change them, the analysis is a tool that assists this • The players who you can't work with are the ones who aren't willing to adapt or push themselves
	Player willingness	• With analysis and sports science we try and improve players but this comes down to the character
	Player development	• Every player is developing even at first team level • At first team if we are not happy with our performance the focus will be on how we can improve • 21's should be a combination of pre and post-match as they still have an opportunity to learn and improve
	Player: the finished article	• We look for players who are not polished • No player is the finished article, the best players are always trying to adapt • We are trying to educate players who have been at the club for a few years • At first team level I don't think the players are learning any more, I think their opportunity to learn has gone • If the player doesn't do something that is required then they are not the right player for this club and they will be transferred or loaned and our recruitment needs to be better

Table 4.9: Continued player ability to learn

General Dimension	Higher Order Theme	Lower Order Themes
Self-analysis, reflection and recall	Independent and proactive	• Players really take the self-reflection sessions seriously, we encourage them to critique their clips • Self-evaluation is priceless we want players to work it out for themselves, we don't just want robots • We want players to ask questions • One to one work is really important in terms of bettering players to understanding their roles and responsibilities • The self-evaluation techniques definitely help in improving the players' game understanding • We have to develop players as independent learners, so they can analyse their own performance • Players have to be proactive and take ownership of their own learning and their development • We are assessing ourselves and the players constantly, coaching has evolved certainly over the last few years • Players prefer to look at their highlights, but you are going to learn from your mistakes • You have got to make mistakes so you can learn and get better • If players improve they will be successful in progressing to the next age group • It's important the lads take part in some self-reflection in their own time having watched the DVD and their clips • Video and clips have been quite effective for some players to improve their game understanding, some will self-evaluate away from the academy • Going to try and implement more self-reflection in their own time having watched their DVD

Table 4.9: Continued player ability to learn

General Dimension	Higher Order Theme	Lower Order Themes
Self-analysis, reflection and recall	Need guidance	• I watch the players looking at their clips and I see aspects which the coach would be unhappy with but they don't pick up on it • Self-evaluation is important, I've seen it work, but some players and some coaches are not good at identifying what can be improved
	Development reports and targets	• There is often limited focus on how we could do better and improve • Players look at their individual clips following the game on Football Squad, then they complete their development reports • Players make comments on their development report relating to targets they set for that week • Players identify what they did badly and how they need to improve in their player logs • We complete individual self-reflection work first thing on a Monday as part of their education programme
	Self-reflection task	• We get some players to tally their possession stats, number of shots on target, how many crosses, things like that, the players loved it • We will set the players a reflective task i.e. 5 factors which were good/ bad • We get players to review some footage from this year and the previous year to show their improvement • A lot of them do self-reflect, they are not conscious of putting it down on paper • I am sure all the lads after training while getting changed are thinking of how they just performed

Table 4.10: The impact of PA

General Dimension	Higher Order Theme	Lower Order Themes
Specific analysis project	Measurement of performance	• Whenever we introduce new practice or innovation we collect a range of performance data to measure it before and after to see if there has been a change to establish if it's had a positive or negative impact • Everything we do we evaluate it to establish if it is effective • We receive information from 50,000 data points a week • We collect subjective information, well-being questionnaires, following therapy sessions • How many passing drills are completed in each session • We collect GPS data from each session to establish training load • How players feel following physio treatment • Close assessment of strength and conditioning sessions, are they getting stronger
	Coach initiated	• Key analysis project or based on the initial communication of subjective expertise which might direct some analysis • Complete mini projects as raised by any of the sports science department relating to how we might improve performance, training and recovery
Pre and post-match analysis	Opposition analysis	• Look at oppositions analysis to see how we could set up differently to exploit weaknesses during set pieces • Anticipate what the opposition do for the first and second corner • Exploit the shape and space based on how the opposition sets up • Players think ahead to players they have played against previously and request video to help them get an edge
	Internal focus	• At 21's training focus is largely based on areas identified in the video and analysis which we need to improve on or further develop • We will have a training session, come in and watch the video for 5 minutes from the game, highlighting what we are trying to achieve, then go out and train again • After each game we will complete and review the analysis and video and set the player specific targets for that week • We have established a system where on feedback sessions, reviews of targets or aims and plans for training weeks are not written until the coach watches the full game

Table 4.10: Continued the impact of PA

General Dimension	Higher Order Theme	Lower Order Themes
Insight into training and game	Opposition insight	• First team opposition analysis will provide objective thoughts which directly impacts on training i.e. these are the runs we need to make, these are the drills we need to use to prepare for the game • The oppositions analyst is actually having an direct impact on training and match preparation • Oppositions analyst will check analysis is put into practice effectively and is having an impact • With the 21's the oppositions analysis will directly determine and dictate my set up from a tactical point of view • Just scouting the penalty takers and set pieces can make a difference
	Set pieces	• Our set piece analysis has seen us implementing better set pieces which has seen an upturn in goals, but it's difficult to establish a direct correlation • Set pieces are definitely affected by what we interpret from the analysis
	Training week	• You see evidence that the coach's training objectives are influenced by post-match analysis which is delivered at the start of the week • Players' individual objectives will reflect what was touched on in the post-match analysis at the start of the week • It's important the analysis work is translated onto the training ground • We identify scenarios from the video and analysis and put them into practice on the training ground • As oppositions analyst I spend a lot of time outside watching training to ensure analysis has been interpreted and implemented effectively • Any work we do on the training pitch we support with pictures and videos, it's really powerful as the pictures don't lie

Table 4.10: Continued the impact of PA

General Dimension	Higher Order Theme	Lower Order Themes
	In game analysis	• Due to facilities we might show three or four clips at half time, identify positives from the game so far • Use live coding during the game, I am in direct contact with the coach, if there is something which jumps I'll code it and show it either at half time or after the game
	Physical data	• Look at the balance of training load during intense periods of the season • We have a live feed from GPS during training, so we can identify when someone might need some extra work or if someone needs pulling from the session
Insight into training and game	Injury audit	• Complete a number of mini projects which look at how we can improve injury rehab • A player's Achilles snapped, this should have been prevented from tracking game sprint data • We identify when players are on a downward spiral and susceptible to injury • Identify specific periods when we can significantly increase the intensity of training and when we need to drop it off • Trends will start to establish over a season and information can be used to benchmark for the following season • The coaches are great, if I say they shouldn't train because they need a rest, they don't train • Look at the likelihood of certain types of injuries and different age groups and identify if we can alter training to bring the likelihood of injury down • Consider that intense periods during the year can have implications for injuries
	Psychology Interventions	• Use the video analysis to do some psychological work to enhance a player's concentration during games to stop him switching off • Motivational videos have been used and resulted in an upturn in performance, this is usually short term • We have used motivational DVDs before a game, you can see a player exhibiting a physical display of increased confidence

Table 4.10: Continued the impact of PA

General Dimension	Higher Order Theme	Lower Order Themes
	Coach's own reflection	• I think it helps the coaching process as there have been times where the coach has watched it back and said I should have done this or changed that • The analysis and video has a big impact in influencing decisions at the end of the season about who will progress to the 18's or who will be released • The stats have to give actual insight which is not obvious in the first instance, additional contextual information is important
General insight	Trend analysis	• We've completed stats on the KPIs over the course of the season, this gives an effective way of measuring how effective each player is in position within our specific formation • We worked with the coaches to develop a shooting analysis to identify trends using a database • We made the shooting analysis interactive for the coach so the stats were linked to videos • My role is to look at a lot more long and medium term stuff, things around game spread • We monitor each player's KPIs over the course of the season and establish a benchmark for their averages • We have technical video of lads which joined us at u9 and we can see their progress at U13, this is extremely useful for the players to see
	Difficult to establish impact	• It's hard to establish the impact of performance analysis as they are doing so much other work also
Planning focus and targets	Consistency of approach	• The approach to review the game after a win, loss or draw should be consistent, otherwise you miss important information • The post-game review might be closer to an hour if you have been beat as you need to address a number of weaknesses • The review might only be 15 minutes if you've had a good win and just need to pick up on a few positives
	Weekly planning	• The message we want to get across is that training week will be identified in the post-match briefing and this will influence the choice of drills and activities • No feedback sessions, reviews, targets or planning for the training week can happen until the coach and team have watched the game and discussed the analysis • The post-match analysis is a large part in planning the coming week • The analysis and video is used to ensure the training week is based on an accurate assessment of the previous week

Table 4.10: Continued the impact of PA

General Dimension	Higher Order Theme	Lower Order Themes
Planning focus and targets	Individual and group work	• When the video highlights specific areas which need improving we will discuss it with the coach and they will take out specific individuals or units for a few sessions based on their specific need • On a daily and weekly basis we will use video and personal/team clips to back up individual targets for that week • Video is key in helping players understand the point you are trying to get across, before each game there is a learning objective and outcomes we want the players to achieve, these are reviewed after the game
	Physical work	• If the coach is planning to do a fitness session with small sided games, we will discuss how many games to use and how many rest intervals are needed as we closely monitor physical load • Some planning is much more long term i.e. the development of a player's physical presence • The physical data might be right down one game, so we will get round the table with all the departments and consider if we are over training or under training
	6 week reviews /plan	• All sessions and six week reviews, medical info, education, welfare and psychologists information feed into the sessions planner • We will try and give feedback weekly and daily, mainly the 6 week review will focus on what they need to be better at and what they have done really well • As part of the first part of the week we review team performance and this feeds into individual and team targets for the week, this aligns with the six week reviews • We get a balance between the planned 6 week block of activity and what happened in the game • The players follow a coaching syllabus to develop their all-round technique rather than just their weaknesses identified from the game
	Season review	• We will have an end of season review which will look at all teams' performances and establish how many points are required to get promoted • The end of season review will also consider what other KPIs each team is hitting, this will be used for planning at the start of the season

324

Table 4.10: Continued the impact of PA

General Dimension	Higher Order Theme	Lower Order Themes
Behaviour change	Individual errors	• The most obvious examples are normally around individual error when error has been picked up on the video and players have changed or improved their performance on the pitch
	Game sense /Decision making	• Has a big impact on a player's positional sense during a game • I have seen examples where players have acted on pre-match information and adapted their positioning without being told • Having seen players adjust to how the oppositions are set up, when awareness has been raised via the analysis work • The video is really important in developing the player's on pitch decision making, it's a key area they have to improve as more often than not the best players make the best decisions on the ball
	Change body language	• We have used the video to raise player awareness of their body language and reaction to losing possession, he's fantastic in possession but we needed to improve his contribution off the ball
	Adaptability	• Despite being constantly made aware of their weaknesses, some players are not able to change • There are a few players who have really taken on board feedback and improved, having spoken to them about what we have shown them they have said they have been able to help them to improve

Table 4.11: The whole feedback process in action

General Dimension	Higher Order Theme	Lower Order Themes
Post-match approach	Post-match analysis	• After the game main events will be posted online in Football Squad • Online the coach will watch this and the ball in play footage and we will feedback to the team at the start of the week • The coaches don't want to see anything immediately after the match in the heat of the moment, if the manager wants to see a few bits on the Sunday or Monday he will give me a call • On the Monday after the match the goal keepers will always sit down and review their performance • Post-match the video is converted, I liaise with the coach regarding what he wants clipping / wants to see • Will get the coding done, check the coach is happy with the clips and identify what we are going to be showing in the feedback session • We do a lot of post-match as we don't believe in pre-match at the 18's stage • We will always have a post-match review normally with video and clips
	Post-match discussion	• First thing Monday morning I will have a brief chat with the coaches about the games at the weekend • Will identify what to include in the feedback sessions and develop an outline of the training plan for that week, follow same process for 18's, 16's, 15's and 14's • I'll speak with the analyst and discuss the theme for the week, so he can identify some specific analysis and examples from the game we have just played • Me and the coach will have a two way discussion about key feedback to be highlighted from the game I have a big say on what should be included during the post-match feedback, but the coach will always lead it • We have two team debriefs a week, the coaches will come with their opinions and I'll give mine and we will discuss what to put together in the presentations.

Table 4.11: Continued the whole feedback process in action

General Dimension	Higher Order Theme	Lower Order Themes
Post-match approach	Post-match feedback	• Post-game briefing is Monday and takes between 20 and 30 minutes, we also have individual sessions which are about 15 minutes • With first team we have a team post-match briefing and have some individual work with specific individuals • The individual work with the first team is adhoc as and when it's needed, it's more structured with the development squad • The coach will lead the feedback sessions, it's our role to pick out key aspects they might want to show within the presentation, the analysts will take a lead with the age group coaches as they're not full time • We try to mirror the first team so as well as post-match we will have a pre-game presentation the morning of the game • Post-match might change as it could be as a team or unit presentations • Mimic first team and have a pre-game presentation on opposition, 12 minutes most, clips with little talking, set pieces and to reinforce what we have worked on • I voiced over a DVD and gave my personal opinion as I watched the game, simple and basic instructions over the 90 minutes
	One on one feedback	• We will do one to ones on Monday following Saturday game still in recovery mode • We will sit down with all the players and have a one to one • At first team level we will just pull players aside when required • At first team level they do seem to appreciate it more in a one to one or small group • Players receive individual clips weekly but it's done on an adhoc basis • Through the video feedback players receive specific individual coaching, they might not get this as often on the pitch • Can split players up into smaller groups with a coach and give some really specific feedback

Table 4.11: Continued the whole feedback process in action

General Dimension	Higher Order Theme	Lower Order Themes
Pre-match approach	Scouting / opposition analysis	• I provide the opposition analysts with a report on the upcoming opposition purely based on data, he will utilise this, the video and scout reports • The opposition analyst will communicate with the coaches to put together a match winning report • Pre-match analysis will be based on the oppositions last 3 games, more in depth break down of their most recent game • Our pre-match tends to come through coach and player general knowledge of the opposition, some information from scout reports, then consider how we can apply our game plan to this information • We will alter what we do to exploit them at set plays • Sometimes with the under 18's we do some pre-match for the youth cup, but it's difficult to base too much on the footage as there is lot of chops and changes. • Problems with u21's team are difficult to predict • We always look at what shape the opposition play, this informs our team selection • Monday morning I will present to all the first team staff what I think about the opposition
	Pre-match discussion	• We will talk about the opposition's strengths and weaknesses and how we can hurt them and how they are going to hurt us • We will discuss the best team and the type of strategy / type of runs we want certain players to make • Will have daily meetings so Monday, Tuesday and Thursday with the coaching team, the day before the game is very relaxed, we will do a brief 12 minutes per game opposition presentation
	Pre-match team and player feedback	• Opposition presentation broken down into three sections, in possession, set pieces and then how we can hurt them • Feedback will be on a Monday or Tuesday, nothing after Wednesday • Don't want to provide pre-match too close to the game build up, it clouds the players' heads • If we play well, on Monday we will show aspects which we are constantly working on • Simple stuff like defending against set plays, that could be the Sunday before the game
	Working week	• 21's game Monday, Tuesday scouting the opposition, Wednesday is preparing the video, also the ball in play from the game just played • Show ball in play on a Thursday following a Monday game, Friday off, Saturday help out with first team game then Sunday show the pre-match for Monday's game

Table 4.11: Continued the whole feedback process in action

General Dimension	Higher Order Theme	Lower Order Themes
Feedback process	Understanding of feedback process	• It's important that analysts and coaches have some understanding surrounding neurology of the brain and how communication works • Coaches need to understand how players might misunderstand and misinterpret information • Must understand how to deal with different types of people • The use of PA analysis tools requires the understanding of a number of disciplines
	Consistency of approach	• Some coaches are very good, their feedback sessions are the same and their feedback is the same every single week whether they get beat or won six nil • If we have a good performance I might decide to give the feedback sessions a miss and get out on the pitch instead
	Coach intuition	• Because they are learning sometimes you can over indulge on the DVD, players can be too critical of themselves so we dip in and dip out • The video is evaluated but the coach goes from his experience, 'I am right listen to me' approach
	Objectivity	• There's a good balance here as staff members are quite honest in their appraisals of the players' strengths and weaknesses
	Player's attention span	• Our sessions are 30 minutes tops, no longer than that, we only use at the maximum 12 minutes worth of footage and normally that is no more than 12 to 14 clips. • I try not to overload the players but its trial and error really

Table 4.11: Continued the whole feedback process in action

General Dimension	Higher Order Theme	Lower Order Themes
Individuality of the players	Impact of result	• If we have a bad performance some players are more keen to view the video, other are less keen it depends on personality
	Concentration	• At x the players had different characteristics, they had a very good concentration and attention span, our 21 minute meeting could be full of really precise details • Because of players' concentration spans, we show less precise detail and more general comments and break everything down, only have 12 minute oppositions presentation the day before the game
	Learning preferences	• Many of the players will be visual learners so its important to use the video to reinforce what the coach is saying • The more specific detail seems to stick in their heads better • Verbal feedback is a key one, I will speak to a couple of players a day, it's not structured, it comes off how I feel • The youth modules we complete highlight the importance of understanding players' different learning styles • It's important to understand that players will misinterpret things and analysts must use the most appropriate tool for the player in order to develop their understanding
	Personality	• Each year we have to remember that each group of players have different personalities and characters, we have to manage that differently • We try to be constructive with the advice we give to them • With some players you have to pick your words carefully and maybe put your arms around them more than others • When an individual is not doing so well we will just pull him aside • Be aware that some players are tired of being pulled in 3 or 4 times, you have to find the right balance
	Motivation / Self-belief	• It's about self-belief you have to motivate yourself, when you're not playing well and your confidence is low nobody else is going to help you out • There are some players which will really respond to the motivational videos, some players will prepare differently, but we have a database of different motivational videos • We are straight forward with them, if they are right we will give them a pat on the back, if it is wrong we give them constructive criticism • Feedback is key as kids always want a seal of approval • We use the analysis to be as positive at possible, especially with the younger age groups

Table 4.11: Continued the whole feedback process in action

General Dimension	Higher Order Theme	Lower Order Themes
Individuality of the players	Learning environment	• We try and create a positive environment • Some players won't want to say the wrong thing in front of their peers • We do a lot of individual and peer work, we get more out of them • In the group sessions many of the development squad are a little shy to speak up, fear of saying the wrong thing • The team feedback sessions are not about isolating certain individuals • When you tell player they are due to have a one to one sometimes their first response is what have I done wrong, they think they are going to get told off • You need to try and establish the trust within the group, try and make it relaxed • Use feedback sandwich, positive, bit of negative and bit of positive • You have to build an understanding with the players that the feedback is there to assist their development and not just a bollocking • The growth of telecommunications and twitter has changed our approach to feedback greatly in the last 10 years • The criticism and banter that went on years ago doesn't happen as much more, kid gloves approach • You have to understand the character of the player • Very rarely will you get the hairdryer treatment, it will be specific to you and diluted
Individuality of the players	Players engagement	• You can see the ones which are engaged and the ones which aren't • The players are really engaging in the one to ones • The players don't like it when you pick them out even more • They don't have player one on one feedback which I think would be useful • The same few players will come in early Monday and ask for their stats and clips, we will have a meeting and discuss them with them • It's all open, we give the players whatever they want • Every week I offer to watch each player's clips with them, a lot do but a few of them don't, we don't make them it's their choice
	Concentration	• The post-match is too long for the lads to sit when they have been training in the morning, they have gym sessions afterwards, it's mentally draining • Players seem most engaged as the sessions don't go on for a huge amount of time • Odd instance where a meeting may have gone on for 45minutes, we can see some players starting to fidget • They sit through the ball in play which is 45 minutes to 60 minutes, which is a lot of information to take in

Table 4.11: Continued the whole feedback process in action

General Dimension	Higher Order Theme	Lower Order Themes
Individuality of the players	Developing independence	• We are trying to make players more independent learners really rather than just purely coach commands sort of authoritative style • Players seem keen to access their clips and stats via football squad • With the u9 and u10 you have got to get them talking otherwise after 10 minutes they just sit there and start shouting and commentating at the screen • In the feedback sessions we try and let the players come up with the answers
	Discuss	• We watch the DVD while giving a lot of open questions, there is a lot of emphasis on the boys to come up with their own answers • We use more discussions to test the players' knowledge and understanding • The lads will come in and watch the clips and ask why there have been clips when they did not touch the ball, they might have not realised that positionally they are out of position • Because players are working together every day on the training ground they are frightened of actually voicing their opinions within the group
Coach and player interaction	Player led tasks	• They can voice their opinions it's always two way • We try and make it more player led, the coaches will ask the players what the problem is in the video or what do you need to do better • As the analysts are in the same room we can communicate the context around some of the clips when its required • Use interactive white board to create interaction and discussion, players come up and draw things on the board • Will split the players into units and ask them to feedback • In Thursday post-match, we have tried letting the players lead the first 15 minutes • When we set the task for the players to lead the sessions it really brought the players closer, got them talking about the game more than just general conversation, players are starting to pick at each other but not in a negative way • We will give the players their videos and get them to draw their passing maps / passing distribution • The analysis task we set requires them to view the clips effectively

Table 4.12: Approach changing contexts and constraints

General Dimension	Higher Order Theme	Lower Order Themes
Balance of time compromise	More unit work	• We would prefer to do more unit work in small groups of fives, we tend to look at more long terms objectives, but due to the time constraints we had to change this to a team feedback
	More one to one	• Feedback sessions tend to be more focused on short terms objectives • As part of EPPP they are training to increase grass time, but analysis / feedback is not included in football time
	Additional sessions in the week	• We would love to spend 20 minutes with each player but we just don't have the time • When we can find spare 15 minutes here we might have some individual feedback / watch the video • Would do more unit work if we had time • We prefer two sessions a week, i.e. ball in play Tuesday 90minutes and 90 minutes on a Thursday to do individual work and feedback, this happens in the pre-season when everyone had a bit more time • I would like to push for an extra hour of feedback sessions within the week
	Conflict with grass time	• I would say that for 10 hours of football a week, a 1 hour video session would be just as useful • I think there is time it's just other things are prioritised over analysis by the manager • Time is a big problem, we have to squeeze it in between their grass time, dinner and education • Ultimately you want more time out on the grass
	Home work	• Due to time constraints with young age groups we get them to take their individuals clips away with them • Even if we had the facilities for the players to do their own analysis I think we would struggle to get time
	Efficiency / quality of work	• It's probably a day's work just burning off DVD's, it would be much more effective if the videos could be posted online • If we had an additional member of staff you would do the same amount of work but it might be more efficient and effective • At the moment there is much more paper work, there's a lot of ticking boxes at the moment especially at academies

Table 4.12: Continued approach changing contexts and constraints

General Dimension	Higher Order Theme	Lower Order Themes
General limitations	Resources	• We don't currently have a management tool to post video onto, due to cost • We do quite well managing with the equipment we have, a lot of our equipment is old with bits failing off • We would love to have a mac with sports code for each coach, as we do a lot of CPD for coaches around it's use • I would love to use the analysis more live in training, but it's difficult due to our equipment and facilities in bad weather • We are havening to reduce the budget by xx millions due to the fair play rules
	Constraints	• We are responsible for putting footage on the 4 plasma TVs we have across the academy training ground, this take 2 or 3 hours a week doing this • Get some strange requests, our time could be better spent doing more relevant duties • Will often have players who are playing up with the first team, play down with the 21' and they have not trained with us for 3 weeks • Constantly having to deal with players playing up and down, can impact on your plans • At 21's it's difficult to predict the team, only had 5 players who played in the last game • At first team there are little changes in the players from game to game, but at 21's and 18's it can almost be a completely different team • Sometimes difficult to get the footage you want from the other clubs • The sustainability of their role is dependent on the environment and the manager you're working under • The environment is solely dependent upon who the key decision maker is at the top, that is who ultimately decides how the club progresses • EPPP is a massive constraint to us, pre-EPPP we were one of the best academies, not sure how this is going to make us better • As we are going through a bad patch of results the coach does not want to get them in and keep showing them the video, as they might see it as a negative • Due to bad results recently the coach just wants to show more positive stuff

Table 4.13: Analyst involvement in player feedback

General Dimension	Higher Order Theme	Lower Order Themes
Involvement in player feedback	Passive analyst role	• Everything is directed by the manager or the assistant, I won't make a point or say anything in front of the group or when players are around • If the players suspect it comes from me it doesn't carry the same weight whether it's relevant or not • Any feedback to the manager or coach will be behind closed doors • I just set up the video to allow the coach to feedback • The manager will run through the presentation and I will assist and stop video when required • I will just operate the system, if there is something I have seen I will point it out but he will project it to the team if its appropriate • I am not going to do things without the consent of the coaches • Everything will go through the coach, I will never feedback to the players • I never show players their videos one to one • I will never show players any video without the coach • During the feedback sessions it's the coach leading, at the end he will ask if I have anything to add but I don't • It's never my voice or opinion
	Active analyst role	• On occasions players will come in and watch their clips, there might be some discussion between us but I don't think it is appropriate that I lead anything • I might just pose a few questions to the players when they sit down with me, but all the team stuff is led by the coach • I do play a role in the team feedback sessions, it's 70% coach and 30% me, the majority is the coach • During the feedback sessions the coach will look at me and ask questions • With the academy the analyst will fire questions at the players, we will say what do you think of this • Sometimes you have to provide some context around the clips for players when they come to you, without giving your opinions • As head analyst I do speak to the academy players at lot • What I would do is I would guide them in the sense of I would say oh look at this we keep getting caught out here • It's not a problem if the analyst is just showing a player their clips, but he should not be advising on the finer points of the game, unless they have the trust and are aligned with the coaches' thinking

Table 4.14: Limitations with stats and player recruitment

General Dimension	Higher Order Theme	Lower Order Themes
Player recruitment	Manager orders	• Have to understand to what extent the players you are watching are carrying out a specific role their coach requires them to do • To what extent is the player carrying out the manager's directions, are they performing off their own back • The ability of the player to carry out the manager's ideas • It helps having a defined playing style, this makes it much easier to profile and recruit players to certain positions
	Data base	• It's essential you interact with other departments as we create a database of all trialists or players we might be interested in • All trialists' and players we are interested in's clips are on a server so the recruitment department can access them
Problem with video and stats	Stats and video in triangulation	• If you take the hard evidence from the DVD, video and the coach's opinion, you combine these and it doesn't become subjective, it's objective, used as a personal tool to confirm or change how I have seen things • Sometimes as an analyst you have to explain the context for why they have been clipped, especially for off the ball action • There are no grey areas with the video
	Stats and video in isolation	• Stats and videos when isolated they are dangerous, if taken out of context they are dangerous, can send wrong messages • Stats don't tell the full truth as they can be manipulated • Stats can paint whatever picture you want • I am very close with the analyst, especially on the video side rather than the facts and figures, because facts and figures can sometimes be misleading • There's not a lot you can do with them, you can store them, put them on the wall but they don't really mean anything • Sometimes you win 1:0 but you're down on all the stats, you're not worried, but it can't happen every week • Due to the dynamic nature of football you can't get statistically significant data, so you have to sort of develop and innovate best practice • The information provided has to be right and concise, you don't need to dress it up to 12 or 16 pages of information, just give us 2 sheets

Informed consent form

The participant information sheet 8.08.13
Study title: An investigation into how elite football coaches and analysts: assess, evaluate and feedback on football performance.

You are being invited to take part in this research relating to the perceptions of performance analysis within a football setting. Before you decide whether or not to take part, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully.

What is the purpose of the study?
This project is concerned with how coaches, performance analysts and players might use performance analysis to analyse football performance. The study involved asking participants questions relating to their use and perceived value of performance analysis. The following key themes will be explored within the interview:
- How you view and evaluate performance.
- How you use feedback within your working practice.
- How performance related information informs training.
- How you interact and use wider sports science support.

Hopefully this investigation will contribute to the research helping explore the impact performance analysis has with professional football organisations.

You will be asked to complete one informal / semi-structured interview lasting approximately 30 minutes. All interviews with take place at a mutually convenient localtion i.e. at your club's training ground in the performance analysis room.

We would like to digitally record the interview, following your consent, however, if you do not wish to be recorded, hand written notes will be undertaken.

Why have I been invited to participate?
You have been selected to participate due to your involvement within a high performance football environment which utilises performance analysis as part of your current role.

Do I have to take part?
It is up to you to decide whether or not to take part. If you do decide to take part you will be given this information sheet to keep and be asked to sign a consent form. If you decide to take part you are still free to withdraw at any time and without giving a reason. Also please be aware **you do not need** to answer any questions, and you can stop the interview at any

point. If you wish to withdraw your data from the study, please contact a member of the research team within one month post-interview.

What will happen to me if I take part?

You will only be required to take part in one semi – structured interview with myself as principle investigator. The interview will take approximately 30 minutes. All interviews will be audio recorded, transcribed and then analysed. This information will be securely stored on a university networked PC (pass word protected). All individuals and teams will remain anonymous within any data collected, and will only be identified by a randomly assigned code which will only be known to the research and supervision team. Any information shared will not be made known to other members within your organisation.

What are the possible benefits of taking part?
There is no risk associated with participants engaging in this research. Participants will benefit from contributing to original research and could also benefit from the interview process which will require you to reflect on your own practice while contemplating on your use and engagement with performance analysis approaches.

Will what I say in this study be kept confidential?
All information collected will be kept strictly confidential (subject to legal limitations). Although some aspects of this information might be published in the public domain, no individuals or organisations will be identifiable in any of the presented findings. Individuals' names and comments will remain totally anonymous.   All individuals and teams will remain anonymous within any data collected, and will only be identified by a randomly assigned code which will only be known to the research and supervision team. All information which is collected will be securely stored on a university networked PC (pass word protected). Data generated by the study will be retained in accordance with the University's policy on Academic Integrity.

All data will be retained for 5 years from the end of the project and then destroyed.

What should I do if I want to take part?

If you wish to take part in this study please email me directly to arrange a suitable time to conduct the interview.

What will happen to the results of the research study?

This study is being undertaken as part of a PhD postgraduate qualification. The results from this research will be published within my published PHD thesis and academic publications. A copy of the final document can be provided on request to myself. The anonymous data collected might also be used to inform future research projects within the same research theme.

Who has reviewed the study?
This research study has been approved by the University Research Ethics Committee,

Contact for Further Information
If you have any further questions or concerns please contact myself: Craig Wright, Division of Spots Coaching and Development cmwright1@uclan.ac.uk , 01772892927

If you have any concerns about the way in which the study has been conducted, you should contact The Head of School for Sports Tourism and the Outdoors, John Minten jminten@uclan.ac.uk.

Thank you for taking time to read the information sheet.

Date 01/8/13

Participants information

CONSENT FORM 8/08/13

Full title of Project: An investigation into how elite football coaches and analysts assess, evaluate and feedback on football performance.

Primary Investigator's contact details: Craig Wright, Divisions of sports coaching and development, cmwright1@uclan.ac.uk, 01772894924.

	Please initial box
Please read the following statements and record your initials in the boxes to indicate your 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 reason.	☐
I understand that it will not be possible to withdraw my data from the study after final analysis has been undertaken	☐
I agree to take part in the above study.	☐
I agree to my interview being digitally recorded.	☐
I agree to my anonymous quotes being used in any reports, publications or presentations that are generated from this study.	☐
I give permission for the anonymous data collected to inform future research projects within the same research theme.	☐

_____   _____   _____
Name of Participant   Date   Signature

Craig Wright
_____   _____   _____
Name of Researcher   Date   Signature

APPENDIX F

Player interview guide

How is performance analysis feedback provided at the club you play?

1. When do you receive feedback after a game i.e. video? Is it too close to the game or too soon after? Would you prefer it sooner or later? Why?
2. Is the amount of performance analysis information you receive enough/too much/not enough?
3. Do you receive feedback as a team or as an individual? What do you prefer? Why?
4. Does the analysis provided (i.e. video session) give you the opportunity to discuss positive and negative aspects of performance?
5. Is there an opportunity to give your side/contribute to the analysis sessions? Do you feel this is important? Why?
6. What do you analyse your performance against? i.e. coaches' perceptions of your strengths and weaknesses/strategy, tactic, game plan/own perceived areas of strengths and weaknesses?
7. Are you given the opportunity to explore analysis yourself? Do you think this might be beneficial? Why/why not?

How do you value the use of performance analysis within your club?

1. Do video analysis sessions allow you to identify strengths and weaknesses? Are these team or individual strengths and weaknesses? Can you give examples?
2. Does the coach identify faults/corrections in your individual performance or the team's performance? What are your thoughts on this?
3. Are you given the opportunity to pick out these faults/corrections yourself?
4. Do the analysis sessions accelerate your learning/game understanding? E.g. understanding of your playing position/team shape/role within the team. How and why?
5. Does performance feedback result in an on the field improvement?
6. Does it result in a short term improvement? i.e. from one match to the next
7. Does it result in a long term improvement? Why/how do you know this?

APPENDIX G

Coach/Analyst interview guide

Final interviews Version 5 22/11/13

Questions to Coach **Core Questions**	Questions to Analysts **Core Questions**
Intro/ Game approaches **Give a bit of background on your involvement in football up till this point?** **Who do you support?** • **What factors have influenced your involvement within football up to this point?** **How have these shaped how you view/evaluate the game?** **What factors do you associate with a successful performance?** **How have these evolved / changed over time?** • KPIs: what influenced their selection? **How do you measure success?** **Is this influenced by external pressures?** **Specifics to consider / prompts:** • Implication for coaching philosophy, tactics and strategy? • Stability game to game? • **How do you make a decision on first 11, based on who does and does not start the game / play?** • **How do you want your team / players to play?** **Anything you would like to add… which is important to these topics…**	Intro/ Game approaches Give a bit of background on your involvement in football up till this point? Who did you support? What factors influenced you to decide to choose a career as a performance analyst? How have these shaped how you view/evaluate the game? What factors do you associate with a successful performance? What factors influence what you are required to analyse each game? • Do you use KPIs? • Do these come from the coach? • Are these fully explained to you, in terms of what the coach believes these to be? Do you consider these to be associated with: • Success. • Specific team strategy or tactics. • Training focus. • Medium / long term goals. Is the information consistent or does it change depending on the circumstances? • Do you provide additional insight which the coach has not asked for?

Role of Feedback	**Role of Feedback**
How important do you value the role of the feedback you utilise i.e. video, stats, personal perspective, other coaches FB?	**What is your role within the feedback process?**
Do you use Pre and Post game feedback sessions?	**What involvement do you have in terms of pre and post-game feedback?**
Do you feel the feedback process is effective? • Too much / not enough • Timing point in the week	**How do you use feedback throughout the training week?** **Do you feel the feedback process is effective?** • Too much / not enough • Timing point in the week.
Do you think feedback / information provided has an impact on the player: Learning/performance/motivational/impact on their confidence?	**How important do you value the role of the feedback you utilise i.e. video, stats, personal perspective?** **Do you think feedback / information provided has an impact on the player:** Learning/performance/motivational/impact on their confidence?
Planning and Practice	**Planning and Practice**
Does anyone collect information on your behalf relating to performance?	**Do you feel / see any evidence that your analysis aids the coaching process or improves performance/ results in winning?**
How does information which is collected or provided to you inform your planning? / **What happened on pitch..**	**Do you have any role in helping coaches use information to devise specific practice activity?**
Or practice	**Do you provide information which encourages the coaching team to reflect on the effectiveness of their tactics / strategy?**
Possible prompts: • Does it allow you to recreate match situations, specific phases of play and scenarios? • Does it provide evidence for individuals to enhance strengths / correct weaknesses? • Does information impact / inform short, medium and long term planning? • Do you use it to audit your decision making? • Is it reactive or proactive? • Does the analysis allow you to form performance related questions?	**Is the data collected used to track, short, medium and long term goals / plans?** **Do you complete longitude analysis to look for patterns or trends over a number of games?** **Or is the key focus from one game to the next?**

Team interaction / communication

Do you think it's important to integrate with performance analysts and sports science support?

How do you ensure an effective working relationship is maintained?

Prompts:
- How important is an integrated relationship?
- What do you do to facilitate this?
- What do you do to allow clear and effective communication or transfer of information?

Team interaction / communication

How do you interact with the wider coaching / sports science support team?

How do you ensure an effective working relationship is maintained?

Are you given clear expectations at the start of the season? If not are these developed as you go along?

Are there different roles of requirement between yourself and other PAs at the club?

Do you see your role as a valuable part of the coaching / performance process?
Do you feel there is anything else you could offer which would add additional value?

Do you feel that PA enhances your coaching?
Do you feel that PA enhances performance?

On a scale of 1 to 5 what value do you feel the coach places on use of PA with regards to

1 to 5 scale.
5: Essential
3: Somewhat essential
1: Not essential

How valuable is PA in assessing performance?
How valuable is PA in supplementing feedback?
How valuable is PA in informing practice and training?

How would you rate your working relationship with your PA?
1:Poor
2:Fair
3:Good
4:Very good

Do you feel that PA enhances performance?

On a scale of 1 to 5 what value do you feel the _coach places_ on use of PA with regards to
- **Assessing performance?**
- **Supplementing feedback?**
- **Informing practice and training?**

On a scale of 1 to 5 what value do _you places on use_ (as Performance analysts) of PA with regards to
- **Assessing performance?**
- **Supplementing feedback?**
- **Informing practice and training?**
1 to 5 scale/5: Essential /3: Somewhat essential /1: Not essential

How would you rate your working relationship with your coach / manager?
1:Poor
2:Fair
3:Good
4:Very good
5: Excellent

5: Excellent Possibly explore this if time… **Impact of research inform how we develop students** **Confidentiality,** **Open interview some board concept like to cover, feel free to talk around** **Just be aware from time to time I will need to refer to my notes just to remind me where we are up to.**	**Summary** **Obvious constraints** **KPIs** **Work load..**

Appendix H

Example of NVIVO output raw data themes: Players

Name		Sources	References	
Team Individual		10	38	
	Improvements		3	
	Negative		6	
	Neutral		6	
	Positive		9	
Pre Post match		1	1	
	Positive		7	
	Negative		5	
	Neutral		8	
	Improvement		4	
Comparisons of different Level.		7	24	
	Confidence Motivation		0	
Debate Discussion		0	0	
	Improvement		0	
	Negative		3	
	Positive		7	
	Neutral		4	
	Player Inclusion		10	
	Players Included			
	Learning from Other Players			

		Players Not Included	

⬤ Self analysis Reflection		0	0

	Improvements		3
	Negative		1
	Neutral		6
	Positive		9
	Personal Reflection		9

⬤ Duration		2	2
⬤ Frequency		0	0
⬤ POS vs NEG		7	26

	Negatives		3
	Result Related		1
	Positives		4

⬤ Timing		10	36

	Soon After		5
	After Delay		6

⬤ Environment		10	41

	Individual		6
	Team		7

⬤ Strengths and Weaknesses		6	11
⬤ Psychological Effects		6	9
⬤ Amount of Information		10	24

	Enough Info		7
	Too Much		2
	Not Enough		1

349

Appendix I

Example of NVIVO output raw data themes: Coach and Analysts

Name		Sources	References	Sources
Analysis Focus & Relationship		0	0	
Congruency between C&A		23	86	
	un-coded in this node		0	
	Requirements of analyst Role clarity		4	
	Communication methods channels		9	
	Initial planning meeting		7	
	Open honest discussion and respect		11	
	Interpersonal relationships		1	
	Club and Coach philosophy		1	
	Congruency or not congruence		1	
	Facilitate coaches needs		2	
Lack of Congruency between C&A		11	28	
	Philosophy of approach		2	
	Focus on Results Development		2	
	Ineffective use		6	
	Perceived importance		3	
	Control of information		2	
	Coach fixed approach		2	
	Lack of role clarity and direction		4	
	Congruency of not congruence		2	

		14	32	
⬤ Congruency within the club		14	32	⬡
	Transition between level		6	
	Progressive use of analysis		3	
	usage across the club		4	
	Constant approaches across levels		3	
	Interactions between analyst		1	
	In support of philosophy		3	
	important un-coded		1	
⬤ Lack of Congruency within the club		6	11	⬡
	Coaching Club Philosophy		4	
	Progressive use of analysis and Guidance		3	
	between sites		3	
⬤ Difference between clubs		9	18	⬡
	Open and Restriction of its us		4	
	Evidence based approach		1	
	Duties of analyst		2	
	Balance pre and post-game focus		1	
	Player focused		1	
	formal ID of club philosophy		1	
⬤ Link KPIs' and Philosophy		22	64	⬡
	Evaluation of KPIs associated with CP		11	
	Flexibility in KPI's Philosophy		6	
	Specific KIP's		11	
	Not that interested in data patters in play		5	
	Use of pre and post-match		2	
	un-coded in this node		2	
⬤ Development and Elite Focus		9	34	⬡

	Opposition and internal focus		3	
	In Contradiction of development philosophy		3	
	In contradiction of elite Philosophy		1	
	In support of development philosophy		10	
	In support of elite philosophy		1	
	either or		4	
⬤ Evidence of Buy in		18	43	⬣
	Coach value it or not		12	
	Open mindedness of coach		6	
	Value of analysis		5	
	Buy into CP and way of working		4	
	Support coaches perspective		3	
	Analysts role in buy in		5	
⬤ Roles and requirements		16	57	⬣
	Specific role and tasks		4	
	Demands & Demanding		7	
	Changing context and constraints		2	
	Pervious experiences influence analysis		6	
	Analysis focus		4	
⬤ Consistencies inconsistencies in approaches		0	0	⬣
	Constant approach within the club across levels		2	
	Similar approach between clubs		3	
	Difference approach between clubs		2	
	Consistent with use of analysis		3	
⬤ PA Approaches		14	23	⬣
⬤ Ability to learn		16	29	⬣
	Development and improve		13	
	Enhance reflection and recall		5	

	Players are Finished article		2
	enhance coach evaluation		0
	One on one coaching		4
	Self-reflection and analysis		11
	Positive reinforcement		2

⬤ Having an Impact & Value statements of impact		18	67

	Specific analysis projects		2
	Evidence of player evaluation		1
	Team presentations		1
	Pre and post-match analysis		3
	Injury audit		2
	Limitations		0
	Ability to provide insight training and games		8
	General insight		11
	Psychological issues		3
	Player progressing up levels		1
	Planning focus and targets		17
	Behaviour change		8

⬤ Whole process in action		10	19

	Post-Match analysis		7
	Post-match discussion		6
	Post-match feedback		5
	Pre match scouting and info		5
	Pre match discussion		1
	Pre match team and player feedback		4
	Long term data and trends		1
	One on one feedback		4
	example of working week		3
	Pre and post-match split		1

⬤ Player approach & Consideration		27	63

	Feedback process		9	
	Individuality of players		17	
	player contact and feedback		4	
	Coach and player interaction		12	
	Coach approach and personality		3	

Approaches Changing context & Constraints		19	42	

	Manager Head coach		0	
	Time limitations		10	
	General limitations		8	
	Wider environment		4	
	Variability of factors		2	

Involvement in feedback to player		9	22	
Defining PA		4	6	
Player recruitment		2	2	
Problem with videos and stats		2	3	
buy in		2	3	
Understanding of requirements		1	2	
Case study club 4		2	26	

	Part 2 Case study 4		0	

	targets team and individuals			
	team review			
	Group and individual feedback interaction			
	How feedback			
	Impact into training			

Case Study club 5		3	15	

| | Development and improvement | | 3 | |
| | Philosophy game plan link to analysis | | 3 | |

354

	Part 2 Practical aspects		3	

⬤ Club 3 Part 1		0	0	🟠

	Congruency in relationship		2	
	role and requirement		3	
	Buy in		2	
	philosophy		2	
	Club 3 Part 2		0	

	Inform the planning and training week			
	Interaction with player during feedback			
	Lots of individual and unit and team targets			
	Insight of data			
	Use of feedback			
	Player progress			
	work load			

⬤ Open communication congruence in relationship		3	9	🟠
⬤ Case study 2		7	113	🟠
⬤ Case study 1		0	0	🟠

	Part 2 practice and training		5	
	Part 2 Pre match opposition analysis		5	
	Part 2 Ball in play		3	
	Part 2 management tool		3	
	individual team and unit evaluation		2	

⬤ individual team and unit evaluation		0	0	🟠
⬤ Part 2 Case study club 3		0	0	🟠
⬤ Direct quotes part 2		0	0	🟠

355

	Impact planning		2	
	impact pre and post		1	
	Impact consistence of approach		1	
	impact coach reflection		1	
	impact big picture analytics		2	
	Feedback team and individual		4	
	feedback specific 1st team		2	
	feedback player engagement		5	
	self-reflection		4	
	Additional but interesting		1	
	analyst role in feedback		4	

⬤ Direct quotes to use Part 1		0	0	🟠

	Key theme 1		6	
	Key theme 2		6	
	Key theme 3		11	
	Key theme 4 KPI		10	

⬤ Misalliance Button		10	17	🟡