

Coaching with Vygotsky: The application of Vygotskian concepts to improve coaches' practice within rugby union.

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Abstract

As far back as 2003, Cushion, Armour, and Jones (2003) critiqued sport coaching as a coach led, one dimensional repetitive cycle based on physical development and technique. From personal experience of coaching rugby union for over twenty five years it seems little has changed. Nevertheless, within sport coaching research over the past ten years, there has been a greater focus on pedagogy with an increased recognition of the social, relational elements to learning (Jones & Thomas, 2015; Jones, Thomas, Nunes, & Filho, 2018). Subsequently, the work of Lev Vygotsky has been suggested for use within coaching practice, but at present, little empirical research related to his work exists. Therefore, the aim of this thesis was to enhance rugby union coaches' theoretical understanding and application of Vygotskian and neo-Vygotskian concepts to improve athlete learning. Consequently, the study used the notions related to contextual understanding, procedural knowledge and how language and metaphor are used as mediation tools to develop coaches' and subsequently players' scientific concept formation. In order to facilitate the coaches' pedagogical knowledge and develop their coaching practice, action research (AR) was deemed the most appropriate methodology. Two coaches were purposefully recruited to participate in the AR process, they were selected because they were already coaching within the university rugby programme in which I was head coach. The AR process lasted six months incorporating four AR cycles, each comprising of 5-6 weeks. Data was collected via four methods: (1) Voice recorded observations, transcribed into field notes; (2) Semi structured interviews with the coaches at the beginning and the end of the AR process; (3) Coaches' written reflections; and (4) End of AR cycle, focus group discussions with the coaches. Reflexive thematic analysis was utilised to evaluate the findings, with results suggesting improvement in both coaches' practice, with one coach describing the change in his practice as transformational.

Improvements related to providing contextual, game related practices that varied pressure on the players. Furthermore, evidence suggested significant improvement in the use of instruction and questioning, with club metaphors becoming part of the coaches' everyday language. Additionally, data also suggested improvements in the players' scientific concept formation. The study contributes to the developing body of empirical evidence, promoting Vygotskian pedagogy as a credible theoretical lens to develop coaching practice.

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I. INTRODUCTION

1.1 Lev Vygotsky

Lev Vygotsky was not a familiar name to me prior enrolling on the Doctorate of Sports Coaching (DSC), despite him being a leading educational theorist and myself being a PE teacher for twenty-one years. Nevertheless, after reading his work, his ideas resonated with what I believed in terms of teaching and learning, furthermore, many of the practices I believed were instrumental for learning within school had also permeated my practice as a rugby union coach. While teaching, I also acted as subject mentor for countless students who were prospective PE teachers, this experience furthered my interest in pedagogy and whilst I sought to guide and develop students' pedagogical practice, this period also allowed me to reflect on my own practice as a teacher and a coach. Therefore, through experience and working with others within an educational environment, my pedagogical beliefs and values were constructed over time. Much of my own practice related to the work of Vygotsky (1978; 1986; 1987) and in particular his theory of scientific concept formation relating to problem solving, reasoning, planning and communication. The development of scientific concepts within my own learning links to Vygotsky's (1978) theoretical view that learning is a socially and culturally mediated process that brings together individual experience of the learner, new empirical concepts and interaction with a more knowledgeable other. Hence, the DSC has provided systematic instruction from more knowledgeable others which had mediated my learning to provide the formation of scientific concepts and a deeper understanding of pedagogical practices. Through the acquisition of a deeper, more reflexive understanding of my own and others' pedagogical practice, I wondered if, through using the Vygostkian concepts, I could influence other coaches' practice, hence, the thesis journey had begun.

1.2 Sports coaching and pedagogy

Consistent with my experiences, research suggests that sports coaches have displayed limited appreciation of pedagogy (Light & Evans, 2013) often adopting linear, autocratic pedagogies (Harvey & Jarrett, 2014). Such practices have been reinforced within coach education programmes, with sports coaching being promoted as a sequential set of simplistic practices,

whereby emphasis is placed on the transfer of sport-specific knowledge from the coach to the athlete (Cushion, Armour & Jones, 2012). Vygotsky's views on teaching and cognitive development are in contrast to these traditional coaching practices, with him being critical of direct instruction as a means of learning (Eun, 2019). Vygotsky (1987) believed direct instruction merely allows repetition of movement or words without true understanding or genuine cognitive development. Nevertheless, more recent research suggests that coach education, like teaching is slowly being recognised as a highly complex venture (Stodter & Cushion, 2017) with the consensus of contemporary research acknowledging coaching as an educational endeavour. Furthermore, there is recognition that coaching should not only develop the athletes' physical competencies but also their higher mental functions including cognitive, affective and psychomotor abilities (Croad & Vinson, 2018; Nelson, Groom & Greenough, 2016; Vinson & Parker, 2019). Vygotsky (1978) contended that development of higher mental functions occurs through social interaction with a more knowledgeable other. In fact, this social interaction between the coaches and myself, acting as the more knowledgeable other (MKO), is fundamental to this thesis. When acting as the more knowledgeable other, the intention was to develop the coaches' pedagogical practices utilising concepts central to Vygotsky's (1978) cultural, historical theory, which in turn would allow them to act as the MKO when developing the rugby players higher mental functions associated with, self-awareness, self-regulation and problem solving related to tactical awareness. Subsequently, this thesis takes the position that the basis of coaching is related to athlete learning, therefore, coaching is required to move away from the 'what' athletes learn and recognise the importance of 'how' they learn (Jones, 2006a; Jones, Harris & Miles, 2009; Kirk, 2010). Therefore, it seemed the work of Vygotsky (1978; 1986; 1987) would be the perfect vehicle for coaches to develop their pedagogical practices.

Despite Vygotsky's work being focussed on how children learn and develop, there has been an application of his concepts within educational literature, with the belief that the same processes are consistent throughout the lifespan (Eun, 2008). This has resulted in a small number of sports coaching researchers deliberating how Vygotsky's work 'could' be applied to sports coaching (Jones, Edwards & Filho, 2016; Jones & Ronglan, 2017; Jones & Thomas, 2015; Jones, Thomas, Nunes, & Filho, 2018; Potrac, Nelson, Groom & Greenough, 2016) while others have provided more empirical research using the work of Vygotsky as a

lens to review coaching practice through interview and observation (Vinson, Brady, Moreland & Judge, 2016; Vinson & Parker, 2019). However, at present there are no empirical studies which use Vygotsky's work to inform coaches' practice (Vinson et al. 2018). As such, the aim and objectives of my research was:

Aim

To enhance rugby union coaches' theoretical understanding and application of Vygotskian and neo-Vygotskian concepts to improve athlete learning

Objectives

1. To facilitate the coaches' application of the neo-Vygotskian theoretical concepts of contextual learning and procedural knowledge within their practice.
2. To ensure that the coaches understand and apply the use of language as the key semiotic mediator of learning within the development of athletes' scientific concept formation.
3. To develop in coaches an understanding and application of the interrelationship between the use of language, contextual learning and procedural knowledge to maximise learning opportunities for athletes.

1.3 What this thesis is about

At this early stage it must be made clear that the primary focus of this thesis was to utilise the theoretical concepts of Vygotsky in order to develop coaches' practice within rugby union. The nature of such research is unique within the realm of sports coaching as no other work has focussed on coaches or coach educators utilising the work of Lev Vygotsky to enhance their coaching practice. Additionally, the selection of action research (AR), as the chosen methodology along with the use of Vygotskian notions is a further unique and original feature of this thesis. For the purpose of this study, it was decided to adopt second-person inquiry or a Collaborative Action Research (CAR) approach, whereby the rugby union coaches were exposed to the Vygotskian notions in order to develop player learning. Within CAR there is emphasis on the relationship between practice and theory and in this thesis, how the coaches interpreted and made sense of the Vygotskian notions, before utilising them within their

practice. Hence, the use of the Vygotskian notions within a CAR approach to improve coach and player learning is both innovative and unique within the realm of sports coaching research. In support of such an approach, Light, (2016) further highlighted that these two mutually informing entities are key to the development of knowledge that improves coaching practice. Within this collaborative approach, I acted as the researcher and the more knowledgeable other with the aim to guide and facilitate the coaches development over the course of four action research cycles which spanned six months. However, this thesis was not a first-person inquiry into how I facilitated change the coaches' practice as a coach educator/mentor. Nevertheless, what must be noted, is despite the thesis being about the coaches utilisation of the Vygotskian concepts to develop their coaching practice, the role I played within this development cannot be overlooked. Subsequently, much of the thesis will refer to the use of the Vygotskian concepts by the coaches and how their actions promoted learning within the players under their tutelage. However, there will also be sections that highlight the complex interplay between me and the coaches and the coaches themselves in order to make sense of challenging situations to develop understanding and create meaning.

The remaining structure of this thesis, begins with a review of literature, followed by the methodology, results and discussion before finally a conclusion will summarise the main points that outlines implications for coach education and future coaching practice.

II. REVIEW OF LITERATURE

2.1 Introduction

The aim of this chapter is to critically review existing literature relevant to the research aim. In order to provide context to my own study, initially, there will be a brief overview of current pedagogical practices within sports coaching. This will be followed with a review of learning theories related to pedagogies currently utilised within sports coaching including the Game Centred Approach (GCA) and Constraints Led Approach (CLA). These approaches will form the backdrop for presenting the work of Vygotsky as an alternative lens and pedagogical tool for sports coaches to promote athlete learning. Subsequently, the second part of the chapter will provide a summary, analysis and evaluation of Vygotsky's work and his contemporaries. Within this summary, there will be a comprehensive review of Vygotskian concepts relevant to this thesis with research from sports coaching included within each sub section. As already identified, this will highlight the lack of empirical research to support the use of Vygotsky's work within sports coaching, which this thesis intends to address.

2.2 Coaching and Pedagogy

Since Jones (2006) conceptualised the sports coach as an educator, there has been a gradual recognition of the pedagogical nature of coaching and the social, relational elements of learning (Jones & Thomas, 2015; Jones, Thomas, Nunes, & Filho, 2018). Subsequently, the social constructivist pedagogies associated with the work of Lev Vygotsky have been suggested for use in coaching practice (Jones & Thomas, 2015; Jones et al., 2018; Vinson and Parker, 2019; Vinson, Brady, Moreland & Judge, 2016;). However, despite research championing the need for greater pedagogic expertise and a shift to more constructivist pedagogies within coaching, a significant volume of coaching practice retains more behaviourist approaches, based upon coach led, linear practices that are characterised by autocratic delivery methods (Harvey & Jarrett, 2014; Light, Harvey, & Mouchet, 2014). Examples of such pedagogies, extend to rugby union and other invasion games comprising of deliberate, structured, sequential patterns of repetitive drills progressing in difficulty (Cushion et al., 2012; Ford et al., 2010; O'Connor, Larkin, & Williams, 2018; Partington & Cushion, 2013). These training drills are often isolated from the context of the game with the

coach acting as the gatekeeper of knowledge, instructing players on how to perform a particular skill, or implement a tactic (Farrow, 2007; O'Connor & Larkin, 2015; Vinson & Parker, 2019). However, in relation to learning and pedagogy, coaching should not be seen as unproblematic, or the simple application of an instructional model, but as involving a complex interaction of coach, athlete and context (Vinson & Parker, 2019). The work of Vygotsky provides a potential lens through which coaches could view the challenging nature of sport coaching and provide the relevant pedagogies that support athlete learning (Jones & Thomas, 2015). Nevertheless, it is important to recognise that Vygotsky provided limited guidance on the implementation of any pedagogical practices that promoted athlete learning (Potrac & Cassidy 2006; Moll 2014). Subsequently, much of the research provided in this chapter associated with sport coaching is merely the researchers' interpretations of the ways in which Vygotsky's ideas could be utilised to support athlete learning (Potrac & Cassidy, 2006).

Despite a move by sports coaching researchers to utilise the writings of Vygotsky, (1967; 1978; 1987; 2004) as previously stated, the volume of work remains relatively sparse, with a small number of position papers and book chapters relating to his work (Jones, Edwards & Filho, 2016; Jones & Ronglan, 2017; Jones & Thomas, 2015; Jones, Thomas, Nunes, & Filho, 2018; Potrac & Cassidy, Potrac, Nelson, Groom & Greenough, 2016). Furthermore, even less empirical research is present with much of it relating to the how Vygotsky's work 'could' be related to coaching practice (Vinson, Brady, Moreland & Judge, 2016; Vinson & Parker, 2019), rather than using it as a vehicle to develop coaching practice. Subsequently, this thesis will support the notion that coaching should embrace Vygotsky's (1978) social and cultural-historical views of learning, with particular focus on theories related to the development of scientific concepts, including mediation through contextualised learning, procedural knowledge and the use of language and metaphor (Karpov, 2003, 2014; Vygotsky, 1986; Cushion, 2013; Cushion, Armour & Jones, 2006; Jones & Thomas, 2018; MacPhail, Gorley & Kirk, 2003; Potrac & Jones, 2009). Such an approach aims to tackle the complex interaction of coach, athlete and context (Vinson & Parker, 2019), which current pedagogies and learning theories utilised within sports coaching fail to address as outlined in the following sub-sections.

2.3 Learning theories and sports coaching

2.3.1 Behaviourism and Cognitivism

Behaviourist philosophies centre on conditioning human behaviour through, reinforcement, praise and punishment (Cassidy, Jones & Potrac, 2009). However, Vygotsky (1962), among others, criticised behaviourism as being too narrow in focus, overly simplistic, intrapersonal in standpoint and failing to recognise the importance of the interpersonal social element of learning. In relation to sports coaching, behaviourist approaches have been popular, because of their association with military drill linked to regimented conditioning of athlete behaviour (Day, 2013). Nevertheless, there is growing recognition of the limitations of such an approach, particularly within the messy, fluid, ever changing domain of invasion games (O'Connor, Larkin, & Williams, 2018). Behaviourist approaches are associated with coach led, drill focussed, autocratic delivery methods (Williams & Hodges 2004; Harvey & Jarrett, 2014). Examples of such pedagogies, found within rugby union and other invasion games, comprise of deliberate, structured, sequential patterns of repetitive drills often progressing in difficulty (Cushion et al., 2012; Ford et al., 2010; O'Connor, Larkin, & Williams, 2018; Partington & Cushion, 2013). These training drills are often isolated from the context of the game with the coach instructing the players on how to do a particular skill or tactic, involving limited decision-making opportunities (Farrow, 2007; O'Connor & Larkin, 2015).

The cognitivist approach to learning relating to information-processing has also been utilised within sports coaching (Araújo, Davids, Hristovski; 2006). It differs from behaviourism through recognition of an individual's memory and the factors that aid the decision making process, including perception and selective attention (Tomic, 1993). However, cognitivism has also been criticised as being overly reductionist, comparing the memory of a computer to that of the human mind (Mayer, 1996). Within team sports the linear nature of the cognitivist approach, with the basic premise that information input will result in a set output, fails to adequately account for the complex range of factors that influence decision-making (Araújo et al., 2006). Such factors include the significant variability related to open play situations such as space, time, and position of defenders and attackers all constantly changing. (Araújo et al., 2006; Araújo, Davids, Chow, Passos, & Raab 2009). Finally, the mechanistic nature of both behaviourist and cognitivist pedagogies presents an orderly, predictable, and

controllable view of learning, but fail to capture the social, cultural and historical characteristics of the players (Mouchet, 2015; Phillips, 1995).

2.3.2 Ecological dynamics

In response to the dissatisfaction of behaviourism and the limitations of the linear, cognitivist, information-processing approach, Newell, (1986), utilising the theoretical concept of ecological dynamics, developed the Constraints Led Approach (CLA) to learning. Such a notion relates to how an individual reacts to changes in their environment (Araújo et al., 2006). Passos, Araújo, Davids and Shuttleworth (2008) and Araújo, Davids, Chow, Passos and Raab (2009) developed CLA further, resulting in a growth in popularity over the past ten years with a focus on the interaction between the individual, the environment and the task at hand (Araújo et al., 2009). Although CLA has many benefits relating to practice design, Wicker (2002) argues that the ecological approach has limitations as it fails to capture the complexity of everyday reality and the individual's social, cultural and historical backgrounds. Furthermore, Harvey, Pill and Almond (2018) also offer critical analysis, questioning ecological dynamics as the theoretical underpinning to the CLA in relation to an individual's perception-action coupling. They state that within ecological literature, perception-action coupling is independent of cognition (Kirk, 1983). The CLA states that learning and subsequent action i.e., cognition in relation to game intelligence occurs when a player behaves or responds to the environment they are within, which suggests there must be some form of cognition occurring. Hence, the question left unanswered within the CLA theory is how player understanding 'implicitly' occurs through self-organisation within the perception-action coupling process (Witt & Riley, 2014). Furthermore, this notion that the manipulation of constraints means that new behaviour and learning implicitly emerges (Chow, Davids, Button, & Renshaw, 2013; Buszard, Farrow, Reid & Masters, 2014), is at odds with a significant volume of literature that suggests the key influence on learning is making teaching explicit and purposefully directed by a more knowledgeable other (Karpov, 2005; 2014; Karpov & Haywood, 1998; Kozulin, 1990; Luria, 1979). In a Vygotskian sense this 'implicit' learning and subsequent knowledge could be deemed 'everyday' or basic in nature (Hattie, 2009; Phillips 1995; Vygotsky, 1978).

2.3.3 Constructivism and Game centred approaches

Contemporary pedagogic research associated with sports coaching has often focussed on adopting constructivist approaches, whereby players are active participants in the learning process and are encouraged to build their own knowledge through problem solving and engagement within a relevant training environment (Ollis & Sproule, 2007; & Vinson, et al., 2016). Examples of constructivist pedagogies that have been a popular focus of research include the game centred approaches (GCA's) that include Teaching Games for Understanding (TGfU) (Bunker & Thorpe 1982) and Game Sense (Thorpe, 2005a). These pedagogical approaches are considered a shift from more behaviourist, coach centred, skills-based methods to a more collaborative, athlete centred approach aimed at developing skill and tactical awareness within conditioned games (Wang & Ha, 2012). There are many positive elements to GCA's (Harvey & Jarrett, 2014), particularly in relation to placing learners within contextual situations they would likely face within a game. However, there are detractors of these GCA's in relation to the improvement of technique. A review of research found little evidence to support technical skill development (Harvey & Jarrett, 2014; Oslin & Mitchell, 2006). Additionally, further studies identified that coaches found implementing small sided contextual games challenging particularly without appropriate support (Evans, 2006; Harvey et al., 2010a; Thomas et al., 2013). In relation to both GCA's Renshaw, Araújo, Button, Chow, Davids and Moy (2015) highlighted that Thorpe (2015) states, a perfect GCA would be one where the coach has little or no input within the session and the 'game acts as the teacher'. Similarly, as with ecological dynamics and CLA, this notion suggests that there is a form of implicit learning and emergence of new behaviours through merely playing (Chow, et al., 2013). Both approaches fail to recognise the importance of a more knowledgeable other and their impact on the process of learning (Eun, 2019; Vygotsky, 1978; 1987). As stated in the previous chapter, the role of the MKO is central to this thesis from a coach learning and player development perspective. Such a point affirmed by Cushion (2011) who states a possible means of assisting player development is to recognize the distance between existing practice and understanding, and practice when assisted by, or collaborating with more knowledgeable and experienced others (Vygotsky, 1978).

2.4 Why Vygotsky?

2.4.1 Vygotskian notions relevant to this thesis

The works of Lev Vygotsky (1978) and his belief that learning, particularly higher mental functions, is facilitated by social interaction with a MKO, is what differentiates his work from aforementioned learning theories. Vinson and Parker (2018) state that much of Vygotsky's work has an intuitive appeal for sports coaches and coach educators, they suggest his work highlights the importance of social interaction between the more knowledgeable coach and the athlete as well as guidance on how coaches can prepare and enable learners to perform tasks when assistance is reduced (Vygotsky, 1967, 1978, 1987, 2004). This demonstrates clear parallels between training environments (assisted) and competitive play (unassisted) (Vinson & Parker, 2018). Furthermore, there is now a clear recognition within sport coaching of the importance of enhancing players' decision making (Light et al., 2014; Maxwell, 2006; Ovens & Smith, 2006), such decision making relates to Vygotsky's work and his appreciation of cognition, i.e., higher psychological functions and the development of scientific concepts (Vygotsky, 1978, 1987, 1997).

Vygotsky (1978) and contemporaries believe that scientific concept formation is a major mediator of learners' thinking, problem solving and causal thinking (Karpov & Haywood, 1998). Furthermore, Vygotsky also emphasised that scientific concepts could only play a mediational role with mastery of relevant procedures (Procedural Knowledge) (Karpov, 2003), such a notion aligns with the construction of relevant practice situations that would be set up within rugby training sessions. A further mediator in an individual's scientific concept formation is the use of context rich environments that aid participant understanding (Vinson & Parker, 2018). Jones et al. (2016), in their paper relating to Leont'ev's (1978) Activity Theory (AT), acknowledge that research within sports coaching continues to be somewhat starved of contextual considerations. Context rich practice design involves shaping practices and procedures to represent game related situations players will ultimately find themselves in (Griffin & Patton, 2005). Within such learning environments, the degree of challenge can be manipulated to suit the ability of the learner and the aspect of the game that requires attention (Daniels, 2001; Moll, 1990; McKay & O' Connor, 2018). The most challenging situations require the greatest mediation from the MKO using appropriate language and

practices that scaffold (assistance from MKO) the players' learning. Such learning, relates to Vygotsky's (1978 p.86) theory of the Zone of Proximal Development (ZPD), defined as: 'The distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers.'

The levels of assistance and in particular the language used by the MKO to scaffold learning is deemed the most important psychological mediation tool in the development of scientific concepts (Vygotsky, 1978; Wood, Bruner, & Ross, 1976). However, despite the work of Vygotsky seemingly being fertile ground for coaching practice to evolve and grow, Jones et al. (2018) reason that although it has provided a greater understanding of the mediated actions of coaches, the scope for further development and the need for empirical research remains considerable.

With such matters in mind the remainder of this chapter will critically review the Vygotskian and neo-Vygotskian concepts that underpin the aim and objectives of this thesis. The initial focus will provide an overview of his cultural-historical theory in relation to the development of scientific concepts within the ZPD highlighting the role of the MKO. The ensuing sections will then concentrate on mediation, initially focussing on the use of the psychological mediation tools of language and metaphor. The final sections focus on what could be deemed environmental mediators (Hall, 2007), initially focussing on procedural knowledge before finally concentrating on activity theory and the importance of context within learning.

2.5 Vygotsky's Cultural-Historical Theory

Vygotsky's approach to learning and development is referred to as Cultural-Historical Theory (Vygotsky, 1978; 1986; 1987). Central to this theory is the premise that all learning is social, historical, and cultural in nature (Karpov, 2005). He argued that the skills and concepts an individual learns are mediated (or facilitated) by social interactions with a MKO (Smidt 2009). Vygotsky's work emphasised the importance of language in cognitive development, stating that how we use language moulds the shape of future learning and understanding (Potrac, et al., 2016 & Vygotsky, 1978;1986; 1987). Subsequently, learning from a Vygotskian perspective is something that occurs in a social context building upon an individual's existing level of

understanding, and principally takes place through the application of cultural and psychological tools that are associated with human history (Karpov, 2005). In summary, this theory connects the key aspects of human social and cultural development. It also enables us to view the source of individual cognitive development within socio-cultural practices and the specific role that cultural tools, especially language, play within that (Cole & Wertsch, 1996; Gredler, 2009). In relation to sport, Jones et al. (2018) believe the recognition of the socio, cultural-historical nature of coaching is beginning to take hold, but at present there is a dearth of empirical research related to coaching relationships and dialogue. With such matters in mind, the following sections will provide an outline of Vygotsky's theories initially relating to how social influences impact on learning before reviewing how cultural and historical factors also influence individuals' development.

2.5.1 Social influences on learning

For Vygotsky, the cognitive development is a socially mediated process that is influenced by present and past social interactions (Karpov, 2005; Vygotsky, 1978; 1986). Social context influences more than just attitudes and beliefs; it also has a profound impact on the nature of individual cognition and subsequent learning processes that influence development (Karpov and Haywood, 1998). He believed that social interactions with a more knowledgeable other are necessary for cognitive development within what he deemed higher mental functioning, which included factors such as self-regulation and problem solving (Kozulin & Presseisen, 1995). Interestingly, Lave and Wenger (1991) utilise the work of Vygotsky when developing their own learning theories based on communities of practice, however, they criticised Vygotsky's work as not being social enough (Potrac et al., 2016). Lave and Wagner (1991) believe that learning is not merely a development of cognition, but the development of the person as a whole and the construction of identity (Lave & Wenger, 1991). Nevertheless, there is agreement on the social nature of learning and in line with communities of practice, Vygotsky considered development as a relationship between individuals and cultural context, which is mediated by a MKO (Christensen, 2016). Vinson and Parker (2019) pick up on this point in their work relating to Vygotsky and non-linear pedagogies. They highlight that coaching environments are replete with more knowledgeable others, including both coaches and other performers, providing significant potential for

interactional opportunities. However, there is recognition from these authors that their research focuses on Vygotskian principles representing a relatively sound conceptual fit, rather than a guiding notion used by the coaches. In line with the aim of this thesis, Vinson and Parker (2019) suggest future empirical research should investigate the use of Vygotsky's work and the how social interaction between various actors could influence learning. Therefore, collaboration with MKO's is worthy of further investigation since it is a key aspect in developing higher mental functions (Kozulin & Presseisen, 1995). This then suggests that social context and the subsequent internalisation of information (see later in chapter) is key to cognitive development. Therefore, it follows that the learner's social environment has been directly or indirectly influenced by human history and cultural development (Bronfenbrenner, 1977). The following sections deal with how cultural and historical factors influence learning.

2.5.2 Cultural-historical influences on learning

Vygotsky (1978) deliberated that the development of both lower and higher mental processes requires the acquisition of culturally generated knowledge (Karpov, 2005; Kozulin, 1990, Luria, 1979). Hence, cultural influences develop a learner's cognition in relation to what they know and how they think. Subsequently, the logic learners use, and the methods employed to solve problems, are influenced by cultural experience (Elkonin, 1972; Kozulin & Presseisen, 1995). Social context is a historical concept because of how culture within a society has developed and progressed through human history (Karpov, 2005). For Vygotsky (1962; 1978), the human mind is a combination of phylogeny (human history), and ontogeny (person's individual history). Hence, the mind has evolved within the history of the human species, with each individual's mind being a product of their unique personal experiences. Therefore, Vygotsky's approach to learning and development is referred to as his Cultural-Historical Theory (Vygotsky, 1978; 1986; 1987). In summary, this theory connects the key aspects of human social and cultural development. It also enables us to view the source of individual cognitive development within socio-cultural practices and the specific role that cultural tools, especially language, play within that (Cole & Wertsch, 1996; Gredler, 2009). Within the realm of sports coaching research, the use of Vygotsky's Cultural Historical Theory has been utilised by Jones and Thomas (2015) when they presented the notion that macro elements of

scaffolding (assisted learning) are culturally and historically situated within existing practice. However, this is one of the relatively few studies that reference the cultural historical nature of coaching with limited empirical evidence presented. Nevertheless, they presented cultural influences as a factor in the development of a coach's cognition in relation to what they know and how they think. Subsequently, the logic learners use and the methods they employ to solve problems are influenced by cultural experience (Elkonin, 1972; Kozulin & Presseisen, 1995). Therefore, in relation to Vygotsky's Cultural-Historical Theory, the following section will critically review the development of higher mental functions and how scientific concepts are developed in conjunction with a MKO within the ZPD.

2.6 Scientific Concept Formation

2.6.1 Higher mental functions

Vygotsky (1978) made a distinction between higher and lower mental functions. Lower mental functions included elementary perception, memory and attention (Daniels 2001; Nelson et al., 2016; Smidt 2009; Moll, 2014), while higher mental functions are associated with logical thought, reasoning and problem solving as well as the ability to classify, order, generalise, and to make purposeful movements (Cole & Wertsch, 1996; Karpov & Haywood, 1998; Smidt 2009). Vygotsky highlighted how social interaction with a MKO is essential for the development of higher mental functions, specifically he noted:

Every function in the child's development appears twice: first, on the social level, and later on the individual level; first between people, and then inside the child. This applies equally to voluntary attention, to logical memory, and the formation of concepts. All the higher-level functions originate as actual relations between human individuals. (Vygotsky 1978 p.57)

2.6.2 Scientific concepts

Scientific concept formation was considered by Vygotsky to be a component of higher mental functioning. Vygotsky (1987) used the term scientific concept to refer to the schooled or academic concepts taught, as opposed to intuitive tacit concepts embedded in everyday contexts (Fleer, 2008). In relation to sport, Nelson et al. (2016), deemed scientific concepts as being related to various team strategies and individual or group tactics, which allow athletes to think abstractly and act purposely with regard to particular aspects of their individual and collective sporting performances (Karpov 2014). Just as mental functioning occurred at a higher and lower level, Vygotsky (1987) believed that concept formation should be thought about at two dialectically related levels, namely everyday spontaneous concepts and scientific concepts (Daniels, 2014). This dialectical perspective of everyday concepts and scientific concepts represents a major contribution to concept formation generally (Eun, 2019; Fleer, 2008; Moll, 2014). Vygotsky believed that concepts are formed through every day or spontaneous understandings linked to prior knowledge (Otero, 2006), including eating, illness, or going to school (Smidt, 2009). These basic, everyday concepts are learned through social interaction and mediated by speech and are experienced first-hand by the individual (Karpov, 2007). Furthermore, the application of everyday concepts cannot be easily transferred to other contexts, thereby reducing the learners' opportunities to apply these concepts to new situations (Fleer & Ridgeway, 2007). However, the opposite is the case for scientific concepts as they are theoretical, while everyday concepts are empirical in nature (Karpov, 2007).

Vygotsky considered a key feature of scientific concepts was their ability to be adapted, developed and applied to different situations and contexts (Ardilla, 2016). Furthermore, Vygotsky believed the development of scientific concepts differs from the everyday or spontaneous concepts, by the manner of their acquisition. Compared with everyday concepts the systematic organization of higher cognitive processes, is the engagement of external artefacts such as symbols and signs (see mediation), which have an independent history of development within the culture (Ardilla, 2016). Nevertheless, Van der Veer and van Ijendoorn (1985) suggest there has been some criticism of Vygotsky's work and particularly the link between lower and higher mental functions. They indicate Vygotsky's

writings often focus on higher mental functions being the product of mediation and social interaction. The main area of consternation is related to Vygotsky's (1978; 1987) suggestion that deems lower mental functions as 'natural' and higher mental functions as 'cultural'. This would then imply that the influence of culture on the mental development of the learner is brought about only by social interaction. Van der Veer and van IJzendoorn (1985) highlight that many Soviet psychologists (see El'konin, 1966) of that time saw this as a reductionist approach, in that an individual interacting with their cultural environment without social interaction will still influence the development of psychological functions. However, despite such critique of Vygotsky's (1978; 1987) work, it is still being utilised albeit in a limited sense within sports coaching research literature. As Vinson and Parker (2019) put it, Vygotsky's work appeals to coach educators particularly in relation to the development of higher mental functions that allow performers to complete complex tasks independent of support.

2.6.3 Sports coaching and scientific concept formation

Despite Vygotsky providing limited detail of the pedagogies necessary to implement his theories, it has not prevented sports coaching researchers from postulating how his work could support athlete learning (Jones et al., 2016; Vinson & Parker, 2019; Potrac & Cassidy 2006). Nelson et al. (2016) utilised the writings of Vygotsky and draws on the work of Smidt (2009), suggesting that coaches should provide learning opportunities that are not only grounded in a players' past experience, but which also seek to actively engage and develop the players strategic and tactical thinking through appropriate practices. This example provides the link between every day and scientific concepts, whereby the coach is taking previously learned skills and tactics (everyday concepts) and, through mediation, applying them to new situations not previously encountered by the learner (Daniels, 2014). Therefore, if every day concepts and scientific concepts are interlaced in an appropriate manner, then an individual's cognition and practice will be transformed (Jones, Morgan & Harris, 2012). Additionally, Jones et al. (2018) encouraged coaches to take care with the everyday and scientific concepts and the language coaches use to stimulate and facilitate learning. They suggested that if too much everyday language is used, then no conceptual, trans locational or transformational thinking is possible, which means ideas, skills and tactics cannot be applied

to different contexts. Conversely, if too much scientific, abstract language is used, then participants will struggle to make sense of a situation or concept (Jones, Morgan & Harris, 2012). Scientific concept formation takes place within the ZPD and the key to moving a player along the ZPD is directly related to the mediation provided by the more knowledgeable other. Without the social interaction of the more knowledgeable other, a player's thinking will remain every day in nature (Eun, 2019; Jones et al., 2018).

2.7 The zone of proximal development and the more knowledgeable other

The development of scientific concepts occurs within the ZPD (Karpov, 2007). Although there has been debate surrounding the interpretation of Vygotsky's ZPD, the most common analysis of the ZPD includes the following assumptions. Firstly, the generality assumption, regarding how knowledge and understanding can be transferred and applied to different contexts, which is also related to scientific concept formation (Eun, 2019). Secondly, the assistance assumption, whereby learning is dependent on interventions by a more competent other (Chaiklin, 2003) and finally the potential assumption, which is the individual's potential and readiness to learn skills and concepts (Gillen, 2000). In relation to the above assumptions, Vygotsky believed learning occurs on two levels that form the boundaries of the ZPD. The lower level is the individual's independent performance, with the higher level being the maximum an individual can reach with help from a more knowledgeable other (Bodrova & Leong, 2007). Vygotsky (1934/1987, p. 21) summarised the point by stating 'what the child is able to do in collaboration today he will be able to do independently tomorrow'. The ZPD is not static, it continually modifies as the individual attains higher degrees of cognition. Hence, when such cognition develops the individual becomes increasingly capable of learning more complex concepts and skills (Bodrova & Leong, 2007).

Vygotsky deemed a learner, within the initial stages of the ZPD, is in the imitation phase. This means the learner is not merely copying but has a limited understanding of a concept, which they are only able to verbalise rather than act out (Eun, 2019). A criticism of Vygotsky's work in relation to the ZPD is the apparent vagueness regarding how an individual reaches the upper limit of the zone. Jones et al., (2018) pick up on this point and offer an insight into the potential difficulty a coach faces when identifying the intellectual and conceptual boundaries of the player in relation to the limits of the ZPD. In such instances

Jones et al. (2018) highlight the importance of social and historical elements of coaching related to the interaction between the coach and the athlete and the ability of the coach to 'see' the level of physical and cognitive capacity of the athlete. As with much of Vygotsky's work related to sports coaching, the research examines the possibilities of its use but there is limited guidance on 'how' coaches could utilize such concepts within their practice. In fact, in relation to the concept formation, Vygotsky himself did not describe how to master scientific concepts after they had been presented to individuals', nor did he support this theoretical doctrine with strong empirical data (Karpov, 2003). However, many neo-Vygotskian authors have sought to develop his work and provide guidance on how to achieve this. Such ideas and concepts have implications for pedagogy within education and sports coaching (Bodrova & Leong, 2007).

2.7.1 Developing the ZPD

Concepts developed by neo-Vygotskian authors include, among others, Amplification, the ZPD as a Construction Zone and Scaffolding. Amplification is a term used by Zaporozhets (1978; 1986) to describe how to use the entirety of an individual's ZPD to the fullest. Amplification, is associated with higher mental functioning in that the process builds upon individual strengths and increases cognition. This is achieved through self-regulation and critical thinking but importantly does not reach outside the ZPD, which means the tasks are always achievable (Bodrova & Leong, 2007). An aim of Amplification is to assist behaviours on the edge of emergence, using psychological tools and assistance from the more knowledgeable other (Zaporozhets (1978; 1986). Similarly, Newman, Griffin and Cole, (1989), described the ZPD as a "construction zone." They focussed on the importance of the co-construction and the role of the teacher or coach constructing the individual's cognition through questions, probes, and actions. However, the pedagogical approach that is most commonly associated with the work of Vygotsky is scaffolding. Scaffolding is a metaphor associated with a temporary framework utilised in construction, while in a pedagogical sense it describes degrees of support provided by a MKO (Wood, Bruner & Ross, 1976; Jones & Thomas, 2016).

2.7.2 Scaffolding

Wood et al. (1976) developed the concept of scaffolding to facilitate a learner's progression through the three phases of the ZPD. Scaffolding aligns with Vygotsky's belief that in order for a novice to perform at a higher level there is a need for collaboration with a MKO (Daniels, 2001). Within the initial phase of the ZPD, neo-Vygotskian authors have advocated more frequent and elaborate teaching from the MKO (Daniels, 2001; Potrac et al., 2016; Wood et al., 1976), including the use of instructional strategies such as demonstrations, asking leading and open-ended questions, and introducing the solution to the initial elements of a task. However, as the learner's understanding of a concept develops, the assistance provided by the MKO becomes less frequent and greatly reduced (Potrac et al., 2016). Hence, Wood et al.'s (1976) notion of scaffolding supports Vygotsky's view of learning, in that a task does not alter, but there is initial support for the learner, then as the learner's knowledge and understanding increases the assistance from the MKO is reduced. Scaffolding has been researched within sports coaching, with suggestions on its use that include carefully thought out explanations and demonstrations, as well as the use of tools and artefacts to promote learning and facilitate meaning to athletes and players (Jones & Thomas, 2015; Jones, et al., 2018; Vygotsky, 1978; 1987). Furthermore, Jones and Thomas (2015) described scaffolding as a process to be used within coaching as a method for a coach to monitor athletes within a context specific situation. Within such situations the coach must either decide to provide greater support or move the learning on. In fact, Jones and Thomas (2015) describe scaffolding on three levels; macro, meso and micro, which all align with Vygotskian theories that are also relevant to this thesis. Macro level scaffolding, related to the cultural and historical backgrounds of the participants, aligns with Vygotsky's cultural-historical theory and the notion of scientific concept formation. At a meso level, the practices that are organised by the coaches in order support individual learning within the ZPD, align with the notion of procedural knowledge (see later in chapter). Finally, micro level scaffolding and the coaches use of language within sessions, supports Vygotsky's concept of mediation with language being the most important to learning (Vygotsky, 1978). Amplification and scaffolding are both examples of mediation that aims to develop scientific concepts within

the ZPD, however these are only two examples and therefore the next sub section will deal with the main mediation tools utilized within this thesis.

2.8 Mediation

The following section will critically review research related to the mediation tools central to this thesis. The initial section will provide an overview of mediation before a review surrounding the use of language and metaphor as a mediation tool. The final two sections will focus on procedural knowledge (knowing how to do it) and contextual understanding, which is derived from the work of Vygotsky and Leont'ev's (1978) activity theory. When contextual understanding and procedural knowledge are utilized in conjunction, they could be deemed environmental mediators (Eun, 2019; Hall, 2007).

Vygotsky (1978; 1987) suggested a mediator is something that stands as an intermediary between an environmental stimulus and an individual's response to that stimulus (Bodrova & Leong, 2007). Such mediation tools can be words or symbols, images (both still, or moving e.g., performance analysis), physical objects and signs, but the most powerful and important mediator is language (Nelson, Groom & Potrac, 2016; Kozulin et al., 2007). However, there is a process for learners in using and acquiring such tools effectively. The use of semiotic mediators including gestures, and writing supported by language, all act as abstract tools for changing the character of human mental functions (Vygotsky, 1978). Semiotic acts of mediation create meaning, and meaning can be constructed by various semiotic modalities, of which language is only one instance (Vygotsky 1962; 1978; 1981). This internalisation of semiotic tools leads to the development of higher mental function and scientific concept formation (Karpov, 2007). Furthermore, metacognitive mediation allows a learner to acquire the semiotic tools of self-regulation, self-planning and self-evaluating (Karpov & Haywood, 1998), all essential elements in a player acquiring new skills and tactics. Within learners, the development of conscious self-regulation requires the use of external artificial stimuli or tools and it is only when such tools are internalised and are under a learner's control that they can be generalised and used elsewhere for other means (Karpov, 2007). Unfortunately, there is little if any empirical research relating to the means of acquisition of such mediation tools within sports coaching. This thesis aims to address such a situation and provides support to the work of Potrac, Nelson and Groom (2016) who utilised

the work of Smidt (2009), which was based within education. They noted that many modes or ways of learning should be considered, suggesting that Vygotskian-inspired coaching sessions should combine play, problem solving, and game-like situations. Furthermore, coaches should use questioning and discussion as the basis for promoting player learning and development. Nevertheless, these are only suggestions with no empirical evidence to support their conclusions. Croad and Vinson's study (2018) is one of the few that has investigated how coaches use questioning, peer review and discussion to promote self-planning and evaluation, but in this instance the work of Vygotsky was not used as the lens through which they investigate athlete learning.

2.8.1 Mediation and the importance of language

Language is considered as the most important semiotic mediator in learning (Vygotsky, 1978). Vygotsky (1978) considered language to have a dual mediating role. Firstly, as a way of creating meaning through social interaction, often with a more capable other and secondly, making sense of that interaction through inner speech, whereby the individual internalises and makes sense of the situation (Eun, 2019). The concept of internalisation is a key aspect of Vygotsky's work and particularly within the notion of scientific concept formation. In order for higher psychological functions to take place, mediated speech must be used (Karpov, 2007). It is a standpoint which privileges the importance of the meaning attached to the words spoken, as opposed to the words themselves (Jones, et al., 2018). This suggests that learners must comprehend the inference and context of the words spoken otherwise words merely become repeated without understanding. Vygotsky (1978) placed further emphasis on speech as an 'organising' principle, claiming that speech and action were part of 'one and the same psychological function' and that speech was as important as action in goal attainment. However, the association of social interaction and the role of speech has come under scrutiny and been criticised as over simplistic (Bruner, 1975; Van der Veer & van IJzendoorn, 1985). Vygotsky's work suggests that psychological processes, where there is no interaction through speech, are considered 'natural' or 'biological' and, therefore, only lower psychological functions will develop (Van der Veer & van IJzendoorn, 1985). However, research by Bruner, (1975) and Lewis and Freedle (1973) suggested that non-verbal interactions between individuals have an impact on learning, particularly in the early phases

of childhood. Therefore, this could imply that non-verbal communication and interaction could also have an impact on learning and the internalisation of scientific concepts later in life (Van der Veer & van IJendoorn, 1985). However, despite such reservations, many authors (See Daniels, 2001; Galperin, Zaporozhets & Elkonin, 1963; Karpov and Hayward, 1998) have reinforced the Vygotskian view of placing instruction within the realm of learning and the Vygotskian view that ‘the only good kind of instruction is that which marches ahead of development and leads it; it must be aimed not so much at the ripe but the ripening functions’ (Vygotsky, 1986 p.188). Subsequently, for learning to occur, the practice and the language used must be within the boundaries of an individual’s ZPD. For physical and cognitive development to occur a player needs to make sense of the training situation and, if they are to carry out the action within a competitive match, then internalisation of the decisions, tactics and skills is required (Potrac et al., 2016; Smidt; 2009, Vinson & Parker; 2019). Hence, a key aspect of coaching is related to the clarity of message and the information provided by the coach, because if the external speech is clear, and sufficiently challenging, then the process of internalisation is made easier (Ardila, 2016; Daniels, 2001; Latukefu & Verenikina, 2011). Subsequently, the use of metaphor is a means of aiding the process of internalisation that minimises the amount of confusing information that could be provided by coaches. Hence, the next sub-section deals with the Vygotskian notion of *Perezhivane* and the associated use of metaphor.

2.8.2 *Perezhivane* and the use of metaphor

Perezhivane is a Vygotskian term and there is general agreement that it is a reference to ‘experience’, or in Vasilyuk’s terms, ‘experience as struggle’ (Clara, 2016; Jones et al., 2018). This experience or struggle relates to a specific, challenging situation whereby an individual would learn. Hence, an external event would cause internal transformation through internalisation or inner speech leading to the expansion of consciousness (Toassa, 2009). However, Vygotsky (1978) recognised that different situations could be perceived differently by different individuals. This is because the influence that the environment exerts is determined by the meaning each learner forms of that situation. Crucially, Vygotsky recognised that meaning and subsequent learning is derived from the individual physically experiencing a situation (Clara, 2016; Jones et al., 2018; Vasilyuk, 1984). If *Perezhivane* and

the experience of learning can be seen as a struggle, Veraksa, Gorovaya and Leonov (2012) made the case for using metaphor as a way to overcome this issue. When learning new techniques and tactics in sports, players' deriving meaning can be challenging (O'Connor & Larkin, 2015; Vinson & Parker, 2019). Hence, Versaka and colleagues investigated the use of metaphor as a means of minimizing the amount of potentially confusing explicit knowledge often provided within coaching situations. In fact, a metaphor is an "invitation to see the world anew"; "a way of presenting something as if it were something else" (Barrett & Cooperrider, 1990 p. 222). This transformative element to players deriving meaning from a situation through metaphor, is considered crucial within Perezhivane. This is because a word, or words have the potential, when used in the context of another situation to transform the structure of that situation for the learners in accordance with its content (Clara, 2016; Jones & Thomas, 2015; Jones et al., 2018). An example of this within rugby is the use of the term 'jackling.' The description emanates from the jackal (Genus - Canis) of Africa, an opportunistic predator. Hence, in relation to rugby 'the jackler' is deemed a defensive player on their feet who attempts to gain the ball from an attacker on the floor before a ruck is formed. The act of doing this is called 'jackling' (Freeman, 2015). Consequently, in order for an athlete to gain meaning from a situation, the choice of descriptors, metaphors and analogies used by the coach, to 'frame' the activity is essential (Cassidy, Jones, & Potrac, 2016). Such 'framing' is associated with an athlete having the ability to 'paint pictures in their heads' with all the resultant implications (Sabo & Jensen, 1994). In relation to framing and painting pictures in the mind, Jones and Thomas (2015) see the use of metaphor as an essential element of this. For example, a metaphor can develop understanding and clarification of a theory, or in the case of sport, a set play, a tactic or a technical concept. Other research within sports coaching also identified language as a key mediator in learning, particularly within complex tactical situations (Santos et al., 2013). In addition to the use of language, they also found elite level coaches using context rich environments and activities to stimulate curiosity and develop tactical understanding within game like activities (Santos et al., 2013). Subsequently, the final sections will focus on the acquisition of scientific concepts through the mediation tools of procedural knowledge and contextual understanding and how these notions combine to provide context rich practice design.

2.9 Procedural knowledge and scientific concept formation

Vygotsky (1988) recognised that verbalising scientific concepts was the starting point for a learner's understanding and subsequent development, a criticism of his work is that he failed to explain how these concepts should be taught (Bodrova & Leong, 2007). His untimely death also meant he didn't adequately investigate the role or type of instruction that can lead to the cognitive development of the learner (Arievitch & Haenen, 2005). That was done by contemporary Russian authors who developed his ideas (Galperin, Zaporozhets & Elkonin, 1963; Karpov, 2005; Karpov & Haywood 1998). These neo-Vygotskian followers contended that the acquisition of psychological tools, including scientific concepts, is not merely the acquisition of verbal knowledge, but it is also the mastery of relevant procedures that allowed their implementation (Galperin, 1957/89; Galperin et al., 1963). Hence, true scientific concept formation is related to procedural knowledge in that it can be deemed as 'knowing how to do it', and when linked together there is potential development of problem-solving skills and strategic thinking (McCormick, 1997). In light of neo-Vygotskian authors, Anderson (1987) believes, when it comes to learning procedural knowledge, a balance should be struck between detailed procedures that support learners in specific contexts and abstract ones that are challenging to use. The key to the correct level of support is the learners' level of scientific or conceptual knowledge, having greater scientific knowledge becomes more important as the complexity of the situation increases (Eun, 2019). Such a notion equates exactly to a sporting situation, whereby individuals with greater cognitive and physical abilities will be able to manage complex pressure situations with greater ease than those players who are less skilled (Potrac, et al., 2016).

Neo-Vygotskian authors have advanced his work further by applying it to how individuals develop their higher mental functioning and scientific concept formation through the mastery of relevant procedures within practical activity. Hence, their work is particularly relevant within sports coaching. Zaporozhets (1966) stated that effective learning takes place within practical activity by understanding the context of a situation, self-organising and adapting the processes connected with this activity. Therefore, the following sub-section focusses on the importance of providing context to develop scientific concept formation and subsequent learning.

2.10 Activity theory and contextual understanding

Traditional behaviourist approaches to learning, such as direct instruction, assume that relevant knowledge can be embedded within such instruction regardless of individual context (Harvey & Jarrett, 2014). Such ideology doesn't fit with Vygotskian and neo-Vygotskian learning theory, which assumes that when instructed directly, learners can only memorise and verbally repeat certain features of a task (Jonassen & Rohrer-Murphy, 1999). However, true understanding of a task or procedure can only be gained by actually performing it within context (Tessmer & Richey, 1997; Vygotsky, 1978). Hence, Activity Theory (AT) is based on the assumption that conscious learning emerges from activity through performance, which is opposite to the traditional mentalistic and idealistic view that learning precedes activity (Leont'ev, 1972). The philosophy that underpins Activity Theory is associated with Marx and Engels, as well as the work of Vygotsky and his contemporaries, Leont'ev, and Luria (Jonassen & Rohrer-Murphy, 1999). A criticism of Vygotsky's work was over emphasising the role others play in shared activity with a lack of focus of the active contribution of the learner. It was partly in response to this criticism that the neo-Vygotskian author Leont'ev (1978) developed his AT, which stresses the individual learner's active participation within shared activity (Bodrova & Leong, 2007). Vygotsky and his contemporaries recognised the importance of contextual practical activity in developing theoretical knowledge of learners, because it focuses on the interaction of human activity (performance) and consciousness (the human mind as a whole) within its relevant environmental context (Tessmer & Richey, 1997). Furthermore, activity and subsequent performance cannot be understood or analysed outside the context in which it occurs. Therefore, when analysing practical activity, we must examine not only the kinds of activities that people engage in, but what their goals are, what occurrences come from the activity, the rules and norms that delineate that activity, as well as the wider community in which the activity occurs (Bedker, 1991a; Jonassen & Land, 1999; Jonassen & Rohrer-Murphy, 1999).

AT is a concept drawn from the idea that social actions are mediated by language, discourse and other cultural means and that practical actions must be examined within a learner's specific environmental context (Jones, Edwards & Filho, 2014). In relation to sports pedagogy, AT is particularly relevant because it focuses on practice which, in turn, is taken as

being mediated by cultural 'tools' used by a coach (see mediation). These tools mediate thoughts, during the interaction between subject and context. Such tools can be physical or material, for example cones, bibs, and contact shields, while other mediators highly relevant to coaching include the ways in which a coach uses language and discourse, including questioning and instruction (Nardi, 1995; Jones et al., 2014). Hence, along with the pedagogical aspect of AT, its purpose is to understand the unity of consciousness (learning) and activity (Kuutti, 1996). Context is a key factor in this unity because it allows practitioners to reframe their behaviours as they engage within that activity with the relevant environment (Leont'ev, 1978). Despite such recognition of contextual factors being key to creating effective learning environments (e.g., Cushion & Jones, 2006; Purdy, Jones & Cassidy, 2009), research in the field continues to be sparse. In fact, a great deal of research within sports coaching has tended to ignore the social, contextual and pedagogical factors within sports coaching (Jones et al., 2014). However, the neglect of such factors is unwarranted, particularly in relation to the considerable amount of evidence regarding athlete development within contextually relevant activity (Saury & Durand, 1998; Jones, Armour & Potrac, 2004; Jones, Potrac, Cushion & Ronglan, 2011; Jones et al., 2014). From the work of Vygotsky and his contemporaries, the role of context within individual understanding and subsequent learning is clear.

2.10.1 Contextual understanding and sports pedagogy

In line with the teachings of Vygotsky (1978) and in relation to sports coaching, if facts in isolation are directly taught to the learner and there is a failure to provide context, then learners would only have the ability to memorize those facts and will not be able to think creatively, critically and analytically (Clara, 2016). Furthermore, there would be an inability to transfer such knowledge to practical, real-life situations (Komalasari, 2009). Therefore, providing contextually rich situations when coaching is effective because it assumes that learning is occurring if students can find meaningful correlations between abstract thinking and practical application in the real-world context (Blanchard, 2001; Bern & Erikson, 2001). A relevant example would include a small sided conditioned game ensuring there is the correct numbers of players in a given space. Furthermore, those conditions placed on the practice, replicate what would occur within a match e.g. controlling the speed that the ball is available

from a ruck. Additionally, Vygotsky recognised that meaning and subsequent learning are derived from the individual physically experiencing a situation (Clara, 2016; Jones et al., 2018; Vasilyuk, 1984). In such a learning experiences, facts, concepts, principles and procedures are internalised through discovery, and reinforcement within interpersonal processes (Forgaty, 1991; Matthews & Cleary, 1993). Subsequently, providing context to a learning situation develops individual cognition, through the coordination of subject materials (contents) and the environmental needs at that given time (Blanchard, 2001; Johnson, 2001). Furthermore, Martins and Veiga (2001) have highlighted the importance of providing context in understanding scientific concept formation. They argued that failing to contextualise a situation leads to confusion, which in turn leads to an inability to adapt that situation to other more challenging scenarios. Being able to apply a task from one learning situation to another is a feature of scientific concept formation (Wells, 1999). Fundamentally, when a learning situation or scenario is set up, it should be explained and demonstrated in relation to the wider context, for example the specific facet of the game that is being covered (Martins & Veiga, 2001; Potrac et al., 2018).

Within sports coaching research, Santos et al. (2013) identified that coaches used context rich practices to create positive learning environments for their players, highlighting the link between context and the creation of meaning, relating to player understanding (Vinson, Brady, Moreland & Judge, 2016). More recently, Vinson and Parker (2019) used the work of Vygotsky as a lens to review coaches' implementation of context rich practice design and how the players viewed such pedagogies. Vinson and Parker (2019) were complementary of the contextual situations utilised that stimulated curiosity and developed tactical understanding in the participants. However, they also recognised that within such complex situations, a high degree of instructional input was required from the coaches, which some found challenging. Furthermore, many of the scenarios were full sided match situations and not broken down into smaller sided situations which added even further complexity. Finally, some the players within the study didn't recognise the value of contextual matches stating they did not see their value outside of gaining match fitness. Nevertheless, there was an acknowledgement of a need for further investigation into the use of context within relevant practice design (Jones et al., 2016; Vinson and Parker; 2019).

The aim of this chapter was firstly to critically review existing learning theories and pedagogical practices utilised within sports coaching, before providing a rationale for an alternative pedagogical approach related to the work of Vygotsky. The subsequent sections of the chapter focussed on the work of Vygotsky and contemporaries and how their concepts could provide a valuable lens to deliver an alternative coaching philosophy based on scientific concept formation. This philosophy centred on developing scientific concepts through the application of relevant mediation tools including the use of procedures or practices within contextual game like situations. Furthermore, the use of language and in particular the use of metaphor as a mediation tool was also considered central to coach and athlete learning. Hence, the combination of context, procedures and the use of language to develop scientific concepts will form the theoretical basis of this thesis.

III. METHODOLOGY

3.0. Introduction

The aim of this study was to enhance rugby union coaches' theoretical understanding and application of Vygotskian and neo-Vygotskian concepts to improve athlete learning. In order to facilitate the coaches' pedagogical knowledge and develop their coaching practice, action research (AR) was deemed the most appropriate methodology (McNiff, 2016). Without the progressive, development spirals associated with the AR process, the coaches' practice could have been constrained by existing coaching culture and tradition, described by Cushion, Armour, and Jones (2003) as a repetitive one-dimensional circle.

In terms of structure, following an explanation of the ontological and epistemological assumptions, there will be an overview of and a justification for the use of AR within this study. This will be followed by a defence of the selection criteria of the participants, the research design, data collection and analysis. The final section will review the quality assurance procedures within the study and ethical concerns will be examined.

3.1 Paradigms: Ontology, epistemology and methodology

Denzin and Lincoln (2018) stated that a research paradigm guides a researcher's beliefs, their view of the world and their relationship with it. Such assumptions determine the lens through which the world should be studied (Sparkes, 2012). Paradigms associated with the researcher's epistemological, ontological and methodological perspectives legitimise the way in which their research is conducted. The paradigm relates to the overall aim of the study, allowing for an appropriate and legitimate contribution to the development of knowledge or theory (Sparks, 1992). Ontology refers to assumptions regarding how the researcher views the world in relation to the nature of reality. Epistemology is related to beliefs about the acquisition of knowledge, while the methodology is concerned with the justification of the procedures which subsequently create the aforementioned knowledge claims (Guba, 1990; Sparkes, 1992). Traditionally, ontology, epistemology and methodology can be assessed along a fairly arbitrary continuum moving from an objectivist (positivist/realist) to a subjectivist

(interpretivist/relativist) perspective (Coughlan & Brannick, 2005). Up until the mid-seventies, researchers ontological, epistemological and methodological assumptions tended to fall into one of two mutually opposing categories; interpretivists (relativists) and positivists or (realists) (Coughlan & Brannick, 2005; Habermas, 1984). Positivist and interpretive paradigms are concerned with perceiving occurrences through different lenses. Positivism seeks objectivity, measurability and predictability through the use of data (Wyn & Williams, 2012). Alternatively, interpretivism adopts the position which asserts that social phenomena and their meanings are continually being constructed by individuals (Habermas, 1984; Littlejohn & Foss, 2009). Within sports coaching research, there has been a recognition that it is a socially complex endeavour whereby the reductionist, positivist position, related to quantitative analysis is insufficient in explaining the phenomena (Jones et al, 2011; Potrac et al, 2013). Subsequently, this has seen an increase in the interpretive perspective being utilised for example (Light & Evans, 2013; Jones et al., 2012; Vinson & Parker, 2019). Additionally, Carr and Kemmis (1986) also reject positivism but accept the importance of participants' interpretations, suggesting a subjective epistemology. However, Carr and Kemmis (1986) also state that interpretations are not sufficient because they can be ideologically distorted, leading to illusory self-understandings, which needs to be overcome by finding ways of transforming the individual. Subsequently, such musings led to the emergence of Critical Theory and the critical paradigm. Critical theory is associated with AR and research that challenges conventional knowledge bases and methodologies that makes claim to scientific objectivity (Carr & Kemmis, 1986; Denzin & Lincoln, 2018). Critical research attempts to produce change, by aiming to reveal the socio-historical specificity of knowledge and to shed light on how particular knowledges reproduce structural relations of inequality and oppression (Cohen, et al., 2007; Denzin & Lincoln, 2018). The critical paradigm acknowledges the existence of the world as a historically created social reality, but also acknowledges the role independent actors' subjective knowledge has on influencing and shaping the same world (Archer, et al., 2016; Denzin & Lincoln, 2018; Wyn & Williams, 2012).

3.1.2 Paradigmatic position

Since paradigms consist of one's beliefs, at this juncture and in relation to the aim of the research, it is important to define my position which falls within the critical paradigm (Sparkes, 2012). The aim of this thesis was to enhance rugby union coaches' theoretical understanding and application of Vygotskian and neo-Vygotskian concepts to improve athlete learning (scientific concept formation). Hence, AR, was the methodology selected to best achieve this aim, because the process is related to the creation of new knowledge, to transform the present and produce a different future for the coaches within the study (Carr & Kemmis, 1986). According to Carr and Kemmis, (1986) AR falls within the critical paradigm whereby, as previously stated, there is recognition that a historically created social reality exists. Subsequently, within this study there was an intersubjective agreement that constituted the 'social reality' between me and the coaches related to coaching practice. However, within the critical paradigm the individual and society are considered as connected in a dialectical relationship (Carr & Kemmis, 1986). This means that the coaches on the one hand are considered as subject to the conditions and reality of the society i.e., coaching practice, and on the other hand are regarded as active co-creators of the very same conditions (Ashgar, 2013; Qvortrup, et al., 2016; Scotland, 2012). This dialectical relationship between society (reality) and the individual (subjectivity) results in my ontological position being one of historical realism, whereby reality has been shaped by social, political, cultural, economic, ethnic, and gender values (Guba & Lincoln, 1994). Epistemologically, this thesis takes a subjectivist position, whereby knowledge is both socially constructed and influenced by power relations from within society itself (Cohen, Manion & Morison, 2007). Therefore, such a standpoint aligns with the AR process in so much that participants and researchers are intersubjectively responsible in the dialectical task of unveiling reality, critically analysing it, and recreating that knowledge (Freire, 1970).

3.2 Action Research

There are multiple definitions of AR and but the definitions selected are relevant and appropriate to this research question (Grundy, 1988; Kemmis & McTaggart 1988; McCutcheon & Jung 1990). In its most basic form 'action research' simply means 'action',

what you do, and 'research' how you find out about what you do. It is about identifying areas for improvement, developing ways to improve your practice and evaluating and reflecting upon such practice (McNiff, 2016). While a more targeted definition by Carr and Kemmis (1986) states that the 'objects' of AR, are practitioner's own educational practices, their understandings of such practices and the situations in which they practice.

AR originated in the United States with the work of psychologist Kurt Lewin who is widely attributed with creating the term action research (Drummond & Themessl-Huber, 2007; Hart & Bond, 1995; Rapaport, 1970). Lewin established two basic components of AR, firstly the generation of knowledge and secondly the changing or development of a social system (Hart & Bond, 1995). In order to do this, Lewin proposed a cyclical method of research that remains a fundamental feature of all modern AR (Waterman, Tillen, Dickson & de Koning, 2001). However, Sparkes (1992) suggests that there is a lack of consensus amongst academics regarding the nature of AR. Furthermore, AR at times is viewed as being controversial because it is perceived by many in the professional and academic research communities as lacking academic rigour by not adhering to the methodical standards that regulate scientific research (Drummond & Themessl-Huber, 2007).

3.2.1 Rationale for the selection of action research

Despite reservations from some quarters of the academic community (e.g., Drummond & Themessl-Huber, 2007). AR was selected within this thesis as the method of improving the coaches' practice because it is distinctive in relation to problem solving, individual knowledge generation, collaborative working and the use of reflection. These features work collectively to improve practice or praxis, by developing individual or collective knowledge, which in turn, develops future action (Reason & Bradbury, 2006; 2008; McNiff, 2016).

3.2.2 Type of action research within this study

Action research can be conducted individually, in pairs or in small groups. For the purpose of this study, it was decided to adopt second-person inquiry or a Collaborative Action Research (CAR) project (Coghlan & Brannick, 2005). Within CAR there is emphasis on the relationship between practice and theory as mutually informing entities that are key to the development of knowledge and improvement of the coach's practice and confidence (Light, 2016). Within

the CAR process, I assumed the role of the more knowledgeable other (MKO), while the coaches acted as the second persons within the enquiry, with collaboration between the coaches and myself. Such a collaboration allowed me to inquire into and work with the coaches on issues of mutual concern, through face-to-face dialogue, conversation and joint action (Light, 2016). Collaborative action research (CAR) took place between the coaches and me in a partnership, through which, we sought to develop pedagogical practices in relation to athlete learning.

3.2.3 Theoretical orientation of action research

The orientation of the AR being used has important implications for action researchers, it is essential that within the study, the interests and intensions of the individual researcher(s) are made clear, this will dictate the orientation of the AR. There are various modes of AR (Holter & Schwartz-Barcott, 1993) but for the purpose of this study the orientations selected were: technical, practical, and emancipatory (Carr & Kemmis, 1986; Grundy, 1987; Grundy & Kemmis, 1988). The technical orientation is grounded in experiences and observations, and often relies upon experimentation (Grundy, 1987). The underlying goal of the researcher is to examine a particular intervention based on a pre-specified theoretical framework, with the nature of the collaboration between the researcher and the practitioner being technical and facilitatory (McKernan, 1991). While the technical aspect of action research is associated with control, the practical orientation is linked to understanding (Rearick & Feldman, 1998; Grundy, 1987). This type of research is based on a realisation that knowledge is gained through the interpretation and deliberation of events as well as seeking alternative actions in order to improve practice (Carr & Kemmis, 1986). Within the practical realm, new action occurs as a result of the interaction between individuals and their subsequent interpretation of meaning. Finally, the emancipatory position is linked to social and political structures that coerce and inhibit freedom. The intention of the AR is to empower individuals to engage in autonomous action that provides freedom from such social and political structures (Rearick & Feldman, 1998; Grundy, 1987; Carr & Kemmis, 1986; Habermas, 1971). When considering the various orientations of action research within this study, it can be argued that all three orientations were present. From a technical standpoint, Vygotskian concepts were used as a lens to guide the coaches' practice and develop new knowledge. The thesis relates to the

practical orientation through the interactions between me and the coaches whereby we collaboratively interpreted a coaching situation to create meaning, which informed future action. Finally, the emancipatory orientation was evident with the aim of freeing the coaches from their previous coaching practices.

3.3 Participants

Two coaches were purposively sampled to participate in the AR process. The relatively small sample size was in keeping with Miles and Huberman (1994) 'tight' approach to qualitative research, adopting restrictive selection criteria. They were selected because they were working within the university rugby programme in which I hold the position of head coach, they were committed to the duration of the AR process and had varying degrees of coaching experience. One coach Rob, (pseudonym) had a wide experience from both the participation and high-performance aspects of the game, while the second coach Neil, (pseudonym) had a wide experience but predominantly in the participatory, 'community' level of the game. I recruited the coaches based on previous conversations related to their desire to improve their coaching practice and myself as a researcher wanting enthusiastic participants who would be committed to the six-month AR process. However, it also important to recognise my position with the AR process, which highlights the researcher as a participant within their studies (McNiff, 2016). Subsequently, my role not only as a researcher but also as facilitator acting as a more knowledgeable other must also be considered. My position became essential in facilitating the coaches' understanding of the Vygotskian and neo-Vygotskian concepts and how these notions transferred into their coaching practice. I was actively involved in the development of the study alongside the coaches.

3.4 Research procedures

For the purposes of this study the Action research worked through a cyclical process of consciously and deliberately: (a) diagnosing; (b) planning action; (d) taking action; (c) reflecting and evaluating the action, leading to a new cycle, potentially leading to new objectives and further planning (Reason & Bradbury, 2006). As identified in the participant section, the research involved me as the action researcher and two coaches working within the rugby club.

Within the initial phase of the AR project, baseline data was collected through observations of the coaches' practice followed by semi structured interviews. The purpose was twofold, firstly, to provide an insight into the coaches' pedagogical practice in relation to the development of scientific concepts and secondly to observe if what was seen in practice matched what was said in the interview. Within the interview, the coaches were also introduced to the Vygotskian and neo-Vygotskian theoretical concepts relating to scientific concept formation, contextual learning, procedural knowledge and the use of language as a key mediator for learning (Hedegaard, 2007; Karpov, 2003, 2014; Daniels, 2007; Martins & Veiga 2001). To aid understanding, a diagrammatic planning framework (See Appendix 1) related to the Vygotskian notions was presented to the coaches and they were encouraged to use this when thinking about how they would approach their sessions. Each interview lasted roughly 90 minutes in duration.

The first two AR cycles were five weeks in duration, divided by a three-week Christmas and new year holiday period. Similarly, the 3rd cycle was also over 5 weeks, but the final cycle was extended to 7 weeks because the team reached a national cup final. In order to facilitate coach learning a number of strategies were agreed. Firstly, within each AR cycle there were a number of observations of coaches' sessions by me acting as a more knowledgeable other. Within the 1st AR cycle there were five observations, in AR cycle 2 there were four with a further 2 observations in each of AR cycles 3 & 4. From the outset the coaches understood the purpose and scope of my role and it was made clear that I was not part of the coaching 'team' delivering any sessions. While I did not involve myself within the coaching process 'on field', I did immerse myself in discussions prior to the sessions, taking the role of more knowledgeable other by asking questions or providing advice if required. At the end of the sessions, we would meet briefly as a group to discuss the main elements, but no detailed reflections or feedback were provided at this stage. The reason for the 'light touch' approach was due to the fact that I provided more detailed feedback via email or telephone after I had received the coaches' reflections on the session. I did not want to influence their reflections with my reflections of the session at this stage. The feedback and action points provided were based on the observational field notes related to the Vygostkian notions central to the thesis (See Appendix 2). As stated, the coaches kept a reflective log (See Appendix 3) of their sessions based on the aforementioned theoretical concepts to support and develop their own

coaching and professional practice. The reflective logs were based around critical questions surrounding their practice, which aligned with the thesis objectives. After the first two cycles, in keeping with the evolving AR process, these questions were modified to reflect the progress the coaches were making in their practice (See Appendix 4). At the end of each AR cycle observations and reflective logs were reviewed, the data was analysed and feedback and intervention strategies were provided to the coaches as development goals for the subsequent cycle (See Appendix 5). These were provided as a written document with a more detailed verbal explanation relating to their practice and the application of Vygotskian notions. These interactions were either face to face, when coaches were available, or by telephone. Additionally, at the end of each cycle a focus group discussion was held between me and the two coaches. The conversations were based on the coaches' experiences from the previous cycle, this allowed them to share experiences and to pose questions to myself regarding any of the observations, reflections or theoretical concepts related to their coaching. Additional Vygotskian concepts were integrated within the focus group discussions in order to enhance the coaches theoretical understanding. For example, the ZPD and internalisation were introduced at the end of AR cycle 1. The AR process began in early November culminating in a national final seven months later in May, in total there were 4 AR cycles.

3.5 Data collection

Action research is participative, qualitative and oriented towards action (Dick, 1999). Subsequently, a range of qualitative data gathering techniques were utilised within the project. The qualitative methods allowed me to explore participants' feelings, opinions, and experiences, throughout the AR process (Denzin & Lincoln, 2018). Additionally, the methods provided an insight into the coaches' interpretation of the Vygotskian theories and how the subsequent meanings were shaped through and in the AR process (Cohen et al., 2007)

Data was collected via four methods: (1) Voice recorded observations which were then transcribed in the form of field notes. (2) Semi structured interviews at the beginning and the end of the AR process. (3) Coaches written reflections, based on critical questions that I provided. (4) End of each AR cycle, focus group discussions, held between myself and the two coaches to review the previous cycle, clarify any points of theory in relation to

practice and finally, set goals for the next cycle. The choice of data collection methods reflects the research requirements (Branigan, 2003) with the collaborative AR process being a rich and full approach that took into account the coaches' everyday practices and professional situation.

3.5.1 Semi structured interviews

Semi structured interviews were the method selected to gather initial baseline data (See Appendix 7) prior to AR cycle 1 and at the conclusion of the study after AR cycle 4 (See appendix 8). Questions were prepared prior to the interviews and outline interview scripts were utilised related to the coaches' previous experience and knowledge of coaching and pedagogy. The purpose of such questions was to elicit open responses that enabled lines of conversation to emerge in situ in ways that could not have been anticipated (Irvine, Drew & Sainsbury 2013). The intension of the semi structured interviews was to find the middle ground between informal chats and wholly structured interviews (Mandill, 2011). An example of a question used in the diagnosing phase to gather baseline data was 'what are your thoughts when planning or organizing a practical session'? Such a question was related to one of the deductive themes related to contextual understanding, with the intention to ascertain if the coaches thought about specific aspects of the game when planning. Further probing questions were then asked in an informal manner based around the response, often asking for examples and descriptions of their practices. However, interviews can often be seen as a simplistic method of data collection, particularly when failing to consider the interactional constraints between the interviewer and interviewee (Roulston, 2014) and the potential interplay between perceived power of the interviewer and the potential powerlessness of the interviewee (Jacobsson & Åkerström, 2013). Such factors were at the forefront of my thinking when deciding on the format of these interviews. It was important to set up a non-threatening situation within the interviews that would build rapport and subsequent trust, which in turn would lead to freer flowing, naturalistic responses from the coaches, leading to a greater depth and richness of data (McNiff, 2016; Silverman, 2013). From a procedural standpoint, interviews were conducted within the initial 'diagnosing' baseline data gathering stage in order to assess the areas of coaching the participants needed to develop in line with the

research aim. Semi structured interviews were also used in the final review at the end of AR cycle 4.

3.5.2 Observations and field notes

All research begins with observation, you view what is happening and systematically record your observations (McNiff, 2016). Elliott (1991) identified the first phase of any action research project should include a reconnaissance phase where, through observation you interpret what is happening. Observation and the subsequent recording of field notes were a key method of collecting data throughout the study, these notes were the observations made within the social situation I was investigating (Crano & Brewer, 2002). When real time observations occurred, voice recordings were made using a smart phone to provide immediate thoughts and feelings on each situation, these were transcribed systematically as field notes immediately after the session's conclusion (See Appendix 6). In situ observations and the taking of field-notes with reflections, are key data collection procedures within an AR methodology (Bernhard, 1998). Observation of the coaches' practice continued throughout all four AR cycles, with the coaches fully aware that they were being observed. As stated, while I did not take part in any 'on field' coaching, acting as the MKO, I did immerse myself in discussions with the coaches within in the planning meeting or when walking out to the training field. Such a collaborative involvement as an action researcher provided first-hand exposure to the coaching setting, which allowed me to experience the events, demands and processes which occurred (Berkeley & Thomas, 2004).

3.5.3 Focus group discussions

Morgan, (1997) identified a focus group as a technique that allows data collection on topics decided by the researcher and facilitates in-depth discussions with a small group of people from the specific population on issues related to the study (Kahn & Manderson, 1992). The focus groups were held at the end of AR cycles 1-3, whereby the points raised from the previous AR cycle were discussed between me and the two coaches. The discussion was a means of gathering information from the coaches regarding the development of their practice, as well as affording me the opportunity to reinforce or introduce new Vygostkian concepts, or provide guidance on any issues they had. There were also discussions between

the coaches on their interpretation and application of the theoretical concepts and the impact it was having on the players. Morgan and Krueger (1993) believe such interactions offer valuable information on the diversity and the extent of consensus between the participants, as well as the researcher being able to ask for comparisons among their experiences in the same context. Saferstein (1995) emphasised the essential role of the researcher within such interactions, whereby there was an emphasis on ensuring that participants had equal voice and were not overly influenced by viewpoints expressed by the other coach. The discussions were more akin to an informal chat, whereby the coaches talked freely of their experiences often posing questions to myself and each other based on the previous AR cycle. The discussion also provided the opportunity to collaboratively set goals for the next AR cycle.

3.5.4 Personal reflective logs

Reflective logs are used to record ideas and observations about actions (McNiff, 2016). Within the study the coaches recorded their own thoughts and feelings about the events relating to all aspects of the practical sessions (See Appendix 3). The logs were a powerful tool for keeping track of actions and showing the development of the coaches' professional and reflective practice. Critical reflective questions were provided to aid the reflective process, but agency was given for the coaches to provide any additional information outside of the questions provided. Within the log, the coaches were encouraged to provide 'thick' descriptions of the session that demonstrated complexities of a situation rather than 'thin' descriptions that present an unproblematic interaction (McNiff, 2016). In keeping with the evolving nature of AR, the reflective questions changed after the second AR cycle to reflect the development in the coaches' practice and their application of the theoretical concepts (See Appendix 4). Within AR cycles 1 & 2 it became apparent that performance analysis (PA), introduced by head coach Rob, played a significant role in the development of both the coaches' and the players' scientific concept formation. Subsequently, as the AR project developed, the coaches utilised PA as a basis for their reflections, with the process becoming a form of a cyclical mediation tool. PA formed the basis of the reflective questions in AR cycle 3&4, with coaches using it to identify areas of weakness from the previous weekend's match. Learning outcomes for the practical sessions would be based on the weaknesses, before

finally, there was a review of the following week's match to assess if progress had been made. Essentially, these became weekly micro cycles, within the main AR cycle.

3.6 Data analysis

3.6.1 Thematic analysis

In order to analyse data, Reflexive Thematic Analysis (RTA) was the selected method (Braun, Clarke, Hayfield & Terry, 2018; Braun & Clarke, 2019). Central to RTA is the acknowledgment of the researcher's subjectivity and reflexivity and the need for clarity in locating their stance and philosophical position(s). Such considerations align with my own research philosophy believing that the themes present 'creative and interpretive stories about the data, produced at the intersection of the researcher's theoretical assumptions, their analytic resources and skill' (Braun & Clarke, 2019 p.594). Thematic Analysis (TA) is a fairly common tool for examining data within qualitative research. It is a means of identifying, analysing, and reporting patterns within data, it is a highly flexible method that is commonly used because of the wide variety of research questions and topics that can be addressed (Braun & Clarke, 2006; Castelburry & Nolan, 2018). When deciding on the type of thematic analysis utilised, decisions revolve around the 'level' at which themes are identified. Braun and Clarke (2006) refer to semantic or explicit level themes, or latent, interpretative level themes (Boyatzis, 1998). The thematic analysis utilised within this study focussed on the semantic approach, whereby the themes identified related to surface meanings associated to the aim and objectives of the thesis (Braun & Clarke, 2006). The analysis process involved progression from the description and organisation of events that occurred within the training sessions, to an interpretation of how these events related to the Vygotskian notions. Within the AR cycles, these theoretically informed interpretations of events along with their broader meanings and implications were then used to develop the coaches' practice (Braun & Clarke, 2006; Patton, 1990).

As stated earlier in this section, throughout the AR process, data was constantly being collected analysed and interpreted before further ideas and concepts were presented to the coaches for use in their practice. Within this process, it was essential that the concepts presented were based on the theoretical objectives related to the work of Vygotsky, hence,

elements of the analysis could therefore be described as ‘theoretical’ in nature (Braun & Clarke, 2006). Subsequently, as part of RTA, I had to consider how the coaches social, and cultural-historical backgrounds influenced how they interpreted events within training sessions and matches. Furthermore, I reflexively analysed my own teaching approaches, along with how the coaches interpreted information I provided, whilst also retaining a focus on the application of information within the coaching ‘reality’ (Braun & Clarke, 2006). Such coaching reality, in association with RTA, aligns with my ontology and epistemology falling within the critical paradigm (Guba & Lincoln, 1994). Within this study, there was recognition of the dialectical relationship found within the critical paradigm (Carr & Kemmis, 1986). There was an intersubjective agreement that constituted the ‘objective material world’ between me and the coaches related to coaching practice, while at the same time the coaches were also the co-creators of knowledge and meaning within the coaching environment.

Within the analysis process, a revised version of Braun and Clarke’s (2006) six step process to analysis was used as the template for my own analysis (Table 1). However, despite the analysis of data seemingly being a step-by-step linear process, it was in fact more a recursive process with continual movement back and fore within the stages of thematic analysis (Braun & Clarke, 2006). Stages 1 - 3 predominantly occurred during the AR process, with all being applied once more when all the data was harvested. Predominantly, deductive analysis was used in line with the aim and objectives of the study. Nevertheless, as can be seen in Stage 4, when reviewing the data codes, inductive themes began to develop particularly in relation to how the coaches interpreted the Vygotskian concepts and applied them within PA.

Table 1. Revised version of Braun and Clarke’s (2006) six step process to analysis

Stage 1	Familiarisation of the data	<ul style="list-style-type: none"> Initial transcribing of data with reading and re-reading the data Repeatedly listening to the data recordings and noting down initial codes based on the Vygotskian concepts
Stage 2	Identifying deductive themes within the data (Vygotskian concepts)	<p>The deductive themes were based on the thesis objectives which were:</p> <ul style="list-style-type: none"> The use of language and metaphor as a learning tool

		<ul style="list-style-type: none"> • Application of procedural knowledge • Contextual understanding in relation to specific game situations
Stage 3	Generating initial inductive codes	Inductive codes were generated in relation to the deductive themes e.g. How the coaches interpreted contextual understanding and set up practices with variability in numbers of participants, amount of space and degree of contact
Stage 4	Reviewing deductive themes	After reviewing the initial themes it was decided to join the themes of procedural knowledge and contextual understanding because of their interdependence on one another. Additionally, as inductive codes emerged then followed new inductive themes, an example of this related to the use of performance analysis, which emerged within the AR cycles 1&2 and this approach became a theme in AR cycles 3&4
Stage 5	Defining and naming themes	Ongoing analysis to refine the specifics of each theme, and the overall story the analysis tells, generating clear definitions and names for each theme
Stage 6	Producing the report	The final opportunity for analysis. Selection of vivid, compelling extract examples with final analysis relating back to the research question and literature

In Stages 2 & 3, the themes were related to the thesis aim and objectives and the ‘central organising concept’ related to scientific concept formation and the subsequent coach and player learning. As a result, the coding process sought to find links, associations and interpretation of meaning around these themes (Braun & Clarke, 2019). A code in qualitative research is associated with a word or phrase that ‘symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute for a portion of language or visual data’ (Saldana, 2006 p.7). As stated, data was gleaned from the coach’s behaviours and reflections and was subsequently analysed throughout the AR process. This initial coding and evaluation of the data is described as ‘open coding’, this related to the deductive themes of contextual understanding, procedural knowledge and the use of language to develop scientific concept formation. However, once patterns had been established a greater degree of ‘axial coding’

took place, which then sought to establish links and connections between the codes (Corbin & Strauss 2008). Such examples included the use of PA within AR cycles 1 & 2 which established links between the coaches' practices (procedures) and the context of the game. Such axial coding continued within the AR process, which resulted in the analysis of scenario-based coaching within AR cycles 3 & 4. Hence, through the adoption of open and axial coding methods, Bernard (2011) believes such a combination helps "the search for patterns in data and for ideas that help explain why those patterns are there in the first place" (p. 338). Nevertheless, as Braun, Clarke, and Weate (2016) state, high quality RTA is more about thoughtful reflective engagement with the data and reflexive engagement in the analytical process than following set procedures and in obtaining reliability within the coding system.

3.7 Ensuring Quality in AR

There is no single definition of action research, because it depends on many environmental, situational, personal and organisational factors and multiple perspectives (Grundy, 1988; Kemmis & McTaggart 1988; Zuber-Skerritt & Fletcher, 2007). For the same reasons and despite calls for a universal criterion, there is no agreed framework between researchers that ensures quality within AR (Dixon-Woods, Shaw, Agarwal & Smith, 2004). Nevertheless, academics have developed their own list of considerations to ensure quality in AR, with similar aspects evident between researchers (Bradbury and Reason, 2001; Elliot, 2007). Subsequently, the work of Zuber-Skerritt and Fletcher (2007) and their list of requirements to ensure quality within AR was selected for this thesis. Their list of requirements, is followed by how this thesis met such requirements.

1. Rigour in their action research methodology, using multiple perspectives of knowing, triangulation of appropriate methods and theories, and connecting their own judgements to discussion in the current literature.

Within this study, the multiple sources of data included observations and taking of field notes, semi structured interviews, focus group discussions and participant reflective logs (Lincoln & Guba, 1985; Yin, 2003). Lincoln and Guba (1985) suggest that triangulation is intended as a check on data in relation to elements of credibility as well as to provide insights and comparisons on members' constructions of data. These 'checks' appears to reflect the belief that triangulation can lead to a multi-dimensional understanding of complex pedagogical

issues. There are many iterations of triangulation, with no formalised method of application. In fact, the procedures in applying triangulation itself is limited by a scarcity of literature explaining how this technique is applied (Farmer, Robinson, Elliott & Eyles, 2006). Nevertheless, for the purpose of this analysis in relation to triangulation, the work of Denzin (1978) was used. Two of Denzin's (1978) descriptions of triangulation are relevant to this study. Firstly, 'data triangulation', which included sources of data from observations and taking of field notes, semi structured interviews, focus group discussions and participant reflective logs. Secondly, 'theory triangulation', involved using the concepts of Vygotsky and neo-Vygotskian authors to inform the pedagogical practice of the participant coaches. This type of triangulation uses a variety of theories in order to provide multiple perspectives to interpret a single set of data as opposed to utilizing one viewpoint only (Cohen, et al., 2007 & Janesick, 1994).

2. Practice-oriented and participative in order to improve practice

The research dealt with improving the coaching practice of Neil and Rob. Whereby, utilising the work of Vygotsky as a theoretical lens and in collaboration with myself, they were active participants in setting their own performance goals and developing their coaching practice.

3. Focussed on significant issues relevant not only to themselves but also to their community and organisation, contributing something new to knowledge within theory and practice.

The research is new and original, utilising the work of Vygotsky as a theoretical lens for the development of coaching practice. The work can also transfer to other sports and coaches regardless of the age or ability of the participants.

4. Reflective, reflexive, self-critical and ethical.

Reflexive TA was utilised as the method of data analysis within this thesis, subsequently much of the knowledge created was based on reflection and interpretation of data, therefore, as the principle researcher, it is important to consider 'the role of self in the creation of knowledge' (Berger, 2015). The nature of AR means the researcher is an instrument within the data collection and as such will influence the data collected (Alvesson and Skoldburg, 2000). Subsequently, to look inwardly of oneself and reflexively understand why assumptions, relating to the interpretation of data are made is key to ensuring quality within the AR process (Cohen et al, 2007). To aid the reflective and reflexive process, I kept my own personal reflective logs, based on my thoughts and feelings about the process, these were recorded at

the end of an AR cycle (See Appendix 5). Furthermore, as the AR process developed, new themes emerged and to aid the reflexive process, these themes were discussed, reviewed and developed, with the aid of the participants along with my tutors acting as critical friends (McNiff, 2016). In fact throughout the AR process, my tutors acted as critical friends providing alternative perspectives and challenging my assumptions, ensuring critical analysis of the data (McNiff, 2016).

3.8 Ethical considerations

When considering the research ethics within this study, it was fundamental that the rights and values of the participants were not threatened by agreeing to partake in the AR process (McNiff, 2016). It was vital that ethical principles and practices were followed in relation to the purpose of the research, the procedures followed and how the outcomes were reported (Cohen, et al., 2007). At this stage, it is pertinent to assert that this study followed Cardiff Metropolitan University's Ethics Committee guidelines and recommendations. This resulted in the following procedures being undertaken. Initially, a requirement of participation within this study was the signing of a consent form (See Appendix 8) stating that the coaches understood the nature of the research and that they were voluntarily participating. Prior to signing the consent, a detailed oral explanation about the study, with simple, non-technical terms was provided. Furthermore, an information sheet was also provided (See Appendix 9) to the participants highlighting the procedures involved and the potential risks involved and how such risks would be minimised. It was made clear from the outset that the coaches could withdraw from the AR process at any point with no consequences to their positions within the club. Confidentiality of the participants was also a key consideration within this study. Subsequently, the data gathered during the research would only be used in the context of the doctoral thesis, in potential research papers published in academic journals and in academic conferences or seminars. Within all these situations, all participants' information regarding identity and links to various clubs were anonymised with the use of pseudonyms and fictionalised club and place names. Because of the nature of the AR process, my position as the researcher could also have raised potential ethical issues. Firstly, my role as the researcher can be seen as one of an 'insider'. Carr and Kemmis (1986) argue that in order to transform social practices, the researcher needs to position themselves inside the

environment and be actively involved in the field and in mutual collaboration with the participants (Gilbourne, 1999). However, by adopting such a position, Collins (2004) highlights the potential issues of language, power, authentic participation and collaboration, between the researcher and the participants. Nevertheless, it could be deemed that any form of research between individuals is already a manifestation of power and it is up to the researcher to be aware of such power dynamics when conducting the research (Carr & Kemmis, 1986; Rowlands, 2000). However, some of these potential well-being issues were recognised and strategies to reduce any potential uneasy situations were used. These included demonstrating a sincere interest in their information and ideas and ensuring that the participants viewed themselves as co-researchers within the process rather than mere subjects.

IV. RESULTS AND DISCUSSION

4.1 Introduction

The aim of this study was to enhance rugby union coaches' theoretical understanding and application of Vygotskian and neo-Vygotskian concepts to develop players' scientific concept formation. Hence, this chapter will primarily focus on critically analysing the data and discussing how the two coaches interpreted the concepts and applied them to their coaching practice. The main Vygotskian concepts used were contextual learning, procedural knowledge and how language through metaphor were used as key mediators in player learning. The Vygotskian and neo-Vygotskian concepts used within this thesis are all interrelated and when used in conjunction aim to create a learning environment, which promotes the development of scientific concepts and higher mental functions (Galperin, 1957, 89; Jonassen & Rohrer-Murphy, 1999; Leont'ev, 1972; Vygotsky 1962; 1978; 1981). Hence, rather than focussing on each concept in isolation and splitting this chapter into subsequent themes, the structure will follow the chronological order of the four action research cycles. The first section will focus on the baseline data gathered in relation to the coaches' practice and their individual approach to learning prior to the AR process. Initial baseline data was gathered through initial semi-structured interviews and observation of their practice. At the end of the initial interviews, I provided an overview of the Vygotskian concepts to the coaches and we collaboratively set goals for the first AR cycle.

Following the initial section focussing on interpreting the baseline data, the subsequent sections will convey the story of the four AR cycles, within which, data was collected through interviews, observations of sessions with field notes, group discussions, supplemented with the coaches' reflections and my own thoughts at the end of each cycle. The order of each sub section of this chapter will form a similar pattern, the objectives of the thesis will provide the deductive higher order themes relating to the development of scientific concepts through contextual understanding, procedural knowledge and the use of language and metaphor. As explained in the earlier data analysis section, additional lower order themes were inductively generated as the AR process developed and are presented in the results. Diagrams are provided at the beginning of AR cycles 1 & 2 and 3 & 4 to provide an insight into the deductive and inductive themes generated. The coaches who formed the basis of this

study were part of a large, 10 team rugby programme at Milgard University RFC (pseudonym). Rob (pseudonym) was head coach of the U19 programme and Neil (pseudonym) was an assistant coach responsible primarily for the forwards and the contact area¹.

4.2 Baseline findings related to coaches' practice

This section will provide an overview of the baseline data collected from the initial interviews and observational field notes of Neil and Rob's coaching practice. Despite, at this point, the coaches not being introduced to the Vygotskian concepts related to this thesis, the terminology will nonetheless be utilised for consistency purposes. This data aims to provide an insight into the coaching methods employed prior to the AR process, with the information demonstrating how the coaches sought to develop the players scientific concepts through the use of context rich practice design, procedural knowledge and their use of language.

4.2.1 Scientific concept formation

4.2.2.1 Scientific concept formation - Neil

While observing Neil's practice prior to the AR process, there was evidence to suggest that he aimed to develop the players' scientific concepts, particularly in relation to skill development. In this example, Neil utilised an iPad as a video recording device and provided players with an opportunity to observe and analyse their technique. The session involved 1v1 technique development related to the scrummage²:

Scrum Process 1v1 using forwards (skill based) – Neil provided appropriate technical feedback regarding body position and more specifically the foot position. Very good use of an iPad to show the players their body position which was a useful learning tool.
(Baseline observation field notes, 27/10/18)

This observation suggested that Neil had good technical knowledge of the scrummage. Furthermore, the use of the iPad as a mediation tool and the support of Neil meant that

¹ Contact area – the situation that arises from a tackle being made

² Scrummage - a means of re-starting the game after a minor infringement. It takes place predominantly between 8 forwards from either team, in three interlocking rows. line from the position of said ruck

players could observe and self-assess what they were doing well and what they needed to develop.

After my initial observation, I wanted to get an insight into how Neil approached his sessions, so during the initial interview, I asked him to provide an example of a high-quality session he had delivered previously. He responded by giving an example from a defence orientated session he had coached two weeks previously:

I set it up as a sort of a self-taught session. The 1st thing I did was to nominate two quiet players who do not normally put themselves forward and I said to them, we are working on how we set up a ruck chain³. So, I placed a couple of tackle bags in the 22m area of the pitch, which will simulate the position of rucks⁴ for the games-based scenario. Then it's go on guys, you now explain the ruck chain and how would you do it from this type of scenario.....They had a couple of minutes to discuss this and I would question to ensure learning and check they knew what to do and then they were straight into it. (Neil' baseline interview, 30/10/18)

I found such an approach to player learning both interesting and somewhat puzzling. The issue I had, centred on Neil's delivery method, whereby he stated that he selected two 'quiet players', provided them with, what I considered to be, fairly vague instructions, then asked them to have a discussion for two minutes and then develop scenarios and practices relating to ruck defence. I immediately felt this would have been beyond the capabilities of two young, inexperienced players in the timeframe provided. Furthermore, this type of delivery was nothing like the session I had observed the previous week, where I noted: 'Neil demonstrated what he wanted from the pick and drive practice before splitting the group with a fellow coach' (Baseline observation field notes, 27/10/18). Also, within the interview there were several references to games or scenario-based delivery. Such an example, was a response from Neil regarding a question I posed about what he thought about when planning sessions:

I think about what can we do to improve our processes and then combined with my own knowledge gained, I then bring in, not so much my own drills but more of my own game based scenarios that we can work on (Neil's baseline interview, 30/10/18)

³ Ruck chain – after a tackle is which results in a ruck, it is the order in which the defenders organise their line from the position of said ruck

⁴ Ruck – A ruck is formed after when a player is tackled to the floor and two opposing players compete for the ball while on their feet

However, the session I observed was not a game-based practice and it did not reflect the scenario or learning outcomes he stated at the outset of the practice as I noted:

The practice didn't meet his intended learning outcome or match the context of the game because it was very tight, close quarter contact and not related to the more open play scenarios he stated in his learning outcomes. Therefore, the practice was more closed in nature rather than open, which means it's more of a drill-based activity rather than a game like practice. (Baseline observation field notes, 27/10/18)

These extracts suggested that Neil recognised the potential benefits of using games related activities and 'athlete centred' coaching. However, at this stage of his development he only possessed basic procedural knowledge relating to their implementation and therefore wasn't able to set up context rich practice situations that represented the ever-changing situations found within open game play situations. Conversely, when developing players' technical scientific concepts relating to more 'closed' situations, Neil demonstrated greater procedural knowledge utilising drills to develop players' technique in the scrummage and lineout⁵.

4.2.1.2 Scientific concept formation – Rob

Through both observation of practice and the initial interview, it was immediately apparent that Rob thought very carefully about the learning environment he created in order to develop players' scientific concepts. In the initial observation I stated: 'A very good coach, who thinks carefully about his practice and the players' learning' (Baseline observation field notes 30/10/18). Interestingly, when he was initially questioned on his coaching practice, he felt he was neglecting the learning needs of some of the players under his tutelage, particularly in the early stages of the rugby season, which had begun only a few weeks prior to the initial interview. He stated: 'I always make it a high priority that everybody's active at the same time, there is no standing in lines. I suppose I favour the high intensity side of things over learning' (Rob's initial interview, 1/11/18). He continued to explain the rationale for high intensity game like activity when he stated:

The players had two weeks before the first game. So, for me they have to learn through game-based scenarios rather than breaking it down. I'm building the jigsaw

⁵ Lineout – A re-start in play from where the ball has crossed the touchline. It involves 2 or more players from either side, but the defending team is not permitted greater numbers

puzzle I suppose, when they came here, they had to get straight involved and personally, I think the quickest way to learn is just get them doing the skills through games. (Rob's baseline interview, 1/11/18)

However, he felt that by adopting such an approach learning was being neglected for some of the players, as he stated:

I feel there're different ways for players to learn and I feel I've only shown them one way. So, I've got say 80 players, all 80 players aren't learning through high speed game-based scenarios. So, I felt that I haven't really covered off everybody's learning. Some players learn through high intensity repetitions, they understand it through doing, while others like to walk through situations with somebody talking them through it, while others like to see it on a whiteboard or computer. (Rob's baseline interview, 1/11/18)

However, in keeping with the AR process and acting as a 'more knowledgeable other', I challenged his assumption on players' scientific concept formation and stated that learning would be taking place within such game related activities. I referred to the session I observed two days earlier where, I stated: 'the defence practice developed quickly and really challenged the players' scanning, decision making, particularly within the game related elements. There was clear improvement in play' (Baseline observation field notes, 30/10/18). While it was clear that within such high-speed scenarios, concept formation would take place, I also suggested that individual differences in relation to ability would mean that certain players would internalise the information and make sense of the situation quicker than others. Nevertheless, evidence implied that Rob thought about concept formation and player development within his planning and when asked about a session he felt was of a high quality, he identified a defence session he had coached approximately two weeks previously:

I don't follow traditional coaches where I go from simplistic to more difficult, I go straight into difficult game scenarios, I suppose what the players would face in games. I believe that they learn quicker and get better through real life situations that they'd find in the game, rather than practices that are broken down to the very detailed drill type activities. (Rob's baseline Interview, 1/11/18)

Contextual learning and procedural knowledge are key objectives within this thesis and despite having not introduced these concepts to Rob at that point, it was clear that he thought carefully about game related contextual situations and how his procedures or practices should reflect that context.

4.2.2 Discussion - Scientific concept formation

A key concept within this thesis is related to Vygotsky's work regarding the importance of cognition through higher mental functions and the development of scientific concept formation (Vygotsky, 1978, 1987, 1997). Vygotsky believed that scientific concept formation is a major mediator of learners' thinking and problem solving. Furthermore, neo-Vygotskian authors also emphasise that scientific concepts can only play a mediational role with mastery of relevant procedures (procedural knowledge) (Karpov, 2003). From the initial interview and the observation of Rob's practice, there was evidence to suggest that the sessions he developed for his players were focused on the acquisition of procedural knowledge and mastery of physical and cognitive skills. The practices, particularly those of a high speed, game-based nature, related to procedures evident within the context of the game, this was highlighted when Rob stated: 'I think the quickest way to learn is just get them doing the skills through games.' (Rob's baseline interview, 1/11/18). Importantly to sports coaches, Vygotskian and neo-Vygotskian researchers believe that if individuals had knowledge of theoretical concepts, e.g., complex technical and tactical elements of the game and an understanding of the procedures to carry them out, then this would lead to an increased mastery of tasks with the players able to answer 'why' questions to substantiate any claims or to defend any results obtained (Aidarova, 1978; Elkonin & Davydov, 1996; Galperin 1985).

According to Vygotsky (1978), a further mediator in an individual's scientific concept formation is the use of context-rich environments. Vygotsky (1978) believed that if facts in isolation are directly taught and there is a failure to provide context, then learners would have the ability to memorize those facts, but not be able to think creatively, critically and analytically. There was evidence of this within Neil's initial contact area session, whereby a practice didn't meet his intended learning outcome, or match the context of the game, because it failed to relate to the open play scenarios he wanted to work towards. Subsequently, players didn't develop new scientific concepts, but merely utilised their existing everyday knowledge. Therefore, within sport, context-rich practice design involves shaping activities and procedures to represent the game related situations players will ultimately find themselves in (Griffin & Patton, 2005; Vinson & Parker, 2018). Within rugby,

such situations should promote the acquisition of scientific concepts in order to develop decision making and tactical understanding (Karpov, 2003; Vygotsky, 1978). For example, when to pass the ball and place attacking players into space. There was evidence to suggest that Rob's approach to coaching was already based on context rich scenarios, whereby he felt the players learn quicker and get better when placed in real life situations.

In terms of Neil's approach to learning, there was also evidence of context rich practices, but these were mainly observed in set piece, or more closed practice situations. When it came to scenario based, game related situations, the observation of his practice and information provided in his initial interview did not match. Nevertheless, within the initial interview, it was apparent Neil possessed an understanding of game-based practices and the benefits of providing contextual scenarios. However, his coaching practice failed to reflect what he was verbalising. Such a position is in accordance with Vygotsky's (1987) theory of imitation. Here, Vygotsky moves away from the traditional definition of imitation as simply copying, to one where he assumes a position in which imitation presupposes a basic understanding of the structural relations in a problem that is being solved (Vygotsky, 1987). Evidence suggested that Neil had some understanding of game related context and procedural knowledge, and it was greater than basic everyday understanding (Vygotsky, 1978). An example of this was related to his verbalising how to organise a defence around a ruck and the need to practice the situation within a conditioned game. However, he was not able to implement his verbalisations into practice within more complex, messy, open gameplay situations. Such sentiments also align with imitation in that, for a given learner, these maturing functions are developing, but at that point are unable to support independent performance (Elkonin, 1998). Additionally, Chaiklin (2003) highlighted, a primary focus for the collaborative interventions between the more knowledgeable other and the learner is to find evidence for maturing psychological functions and, therefore, to support the learner to take advantage of the situation and develop their practice further. It therefore became clear, that it was going to be my responsibility, as the 'more knowledgeable other', to provide Neil with greater clarity regarding the link between the procedures, or practices and matching the context of the game, in order to provide a positive learning environment.

4.2.3 Coaches' use of language

4.2.3.1 Rob's Use of language within coaching

Rob had previously encountered a range of experiences in terms of the age and abilities of the players he had coached and the responsibilities he held. He explained that, despite his relative youth and the short period since finishing playing the game, he had gained a variety of coaching experiences in different countries. These included holding WRU Hub Officer roles within two Welsh secondary schools (promoting participation) and a Director of Rugby (DOR) position in New South Wales, Australia, which involved organising the coaching and development of senior players at an amateur level. However, a role Rob held immediately after leaving university, had a significant impact on his future coaching practice. He stated that: 'after leaving university I started Rugby Tots which is a rugby franchise, coaching children from two to seven years of age' (Rob's baseline interview, 1/11/18). When asked how this type of coaching impacted on his performance as a coach, he specified his use of questioning and voice intonation, as coaching skills which he had developed:

I always ask for the players opinions and I reach that understanding through questions and probably that comes back to Rugby Tots because they're two to seven years of age. I had to get that understanding through questioning, but not only questioning, I mean I used a different tone of voice and to provide a different energy. (Rob's baseline interview, 1/11/18)

However, as well as improving his questioning, working with children so young also opened his eyes to the impact of creating imagery through the use of metaphor in order to provide meaning to a situation and ultimately promote learning. Despite Rob not specifically using the term metaphor, it is clear from the following description, he realised the relevancy of it and its potential impact on learning:

It's also about using their imagination and really painting a picture for them. For example, when they score a try, it's not scoring a try, it's squashing worms, so then they do the actions because they think or imagine that they are squashing worms. So, you have these languages and terminologies which reflect or relate to something they know. And I think it is definitely the same within senior rugby as well. So that's probably opened my eyes in terms of using this imagery as well as language to incorporate into the sessions. (Rob's baseline interview, 1/11/18)

4.2.3.2 Neil's use of language within his coaching

As with Rob, Neil also had a variety of coaching experiences to draw upon. He seemed an enthusiastic coach who explained that on leaving university after having an injury that curtailed his career, he immediately succeeded in obtaining a head coaching position at a division 3 club. As he stated: 'I went straight into a head coaches' role and then did my level 2 and stayed in that role for two seasons' (Neil's baseline interview, 30/10/18). When asked if he found the level 2 course useful, he replied: 'It was ok, but it was where I first met Dave (pseudonym and current DOR at Milgard Uni RFC) he went onto be my level 2 tutor and he was very good at supporting me and challenging my thinking and developing my questioning techniques' (Neil's baseline interview, 30/10/18). It seemed that communication and, in particular, questioning was a definite focus of Neil's coaching when he stated: 'I think about what questions I could ask the players; I check their understanding by asking open ended questions about what they know' (Neil's baseline interview, 30/10/18). Furthermore, when I initially observed Neil's practice, I stated he had demonstrated: 'good communication and use of questioning and clearly thinks about players' learning in relation to skill development' (Baseline observation field notes, 30/10/18).

4.2.4 Discussion – Coaches' use of language

It was evident from the observations and the initial interviews that both coaches understood the importance of language in relation to scientific concept formation and the creation of meaning for the players, but at this time they were unfamiliar with this terminology. I highlighted questioning as a particular strength with both coaches, but interestingly they highlighted very different experiences that had impacted on their questioning ability. Neil identified being challenged by his WRU level 2 coach education tutor and Rob viewed working with two to seven-year olds in Rugby Tots as being instrumental in developing his approach. In relation to Neil, coach education and its impact has been widely researched with mixed results, ranging from genuine 'education' to 'indoctrination' (Nelson and Cushion, 2006; Cushion et al., 2010; Piggott, 2012, 2013; Townsend & Cushion, 2015). The findings suggest that Neil had benefitted from his interactions with his coach education tutor, who acted as a 'more knowledgeable other' (MKO) in supporting him (Vygotsky, 1978). Utilising a MKO has

been associated with enlightened, good practice in relation to developing coaches' knowledge and expertise as far back as Bloom, Durand-Bush, Schinke & Salmela (1998). Nevertheless, the relatively short period of time the tutor worked with Neil supports the research of Jones and colleagues who affirmed that, there remains a lack of clarity in relation to coach education and the impact of a MKO on a coaches' development (Jones, Harris and Miles, 2009).

The insights Rob provided from his experience of working with young children, provided evidence to suggest he realised the importance of his use of language as a mediation tool within the process of scientific concept formation, but as stated, as yet he was unfamiliar with the Vygotskian terms. Language is considered as the most important semiotic mediator in learning (Vygotsky, 1978). Vygotsky considered language to have a dual mediating role. Firstly, as a way of creating meaning through social interaction, often with a more capable other and secondly, making sense of that interaction through inner speech, whereby the individual internalises and makes sense of the situation (Hasan 2002; Kozulin, 2003). In relation to Rob's evidence, the use of terms such as 'squashing worms' in order for the children to 'use their imagination' to 'paint a picture', is consistent with the work of Veraksa, Gorovaya and Leonov (2012) who made the case for using metaphor as a way of creating imagery. They argued that, when learning new techniques and tactics in sports, getting players to derive meaning from challenging situations can be difficult. Hence, Versaka and colleagues investigated the use of metaphor as a means of minimizing the amount of, potentially confusing, explicit knowledge provided within coaching situations. A metaphor is an "invitation to see the world anew"; "a way of presenting something as it were something else" (Jones, et al., 2018). This transformative element of a word, or words has the potential, when used in the context of another situation to transform the structure of that situation and its content. It is a standpoint which privileges the importance of the meaning attached to the words spoken, as opposed to the words themselves (Jones, et al., 2018).

Based on the evidence presented above, my initial impressions were that Rob despite not being introduced to the Vygostkian notions, was already thinking carefully about the learning environment he created and how he would develop players' everyday concepts into scientific concepts through the use context rich conditioned games. He also combined questioning and metaphors into his sessions with positive outcomes. Within Neil's practice

there was also evidence of him providing relevant context and procedural knowledge to the players, but these were mainly found within closed situations related to set piece.⁶

4.2.5 Coaches' development goals

As a result of these initial observations and evaluations, development goals were collaboratively set between me and the coaches based around the thesis aim and objectives. In relation to Rob, the goals centred around refining his pedagogy and providing greater detail within his practices in relation to the development of technical scientific concepts. Subsequently, the first goal was to think carefully about the amount of pressure he put on players within the contextual game related activities. He generally put the players in high pressure situations, meaning some were working outside the limits of their ZPD, which at times led to a breakdown in the players' skills. This could be beneficial in developing a player's scientific concepts, but with continual failure limited progress will occur (Eun, 2019). Additionally, despite him predominantly focussing on games as a means of delivery, the second goal was based on developing players' procedural knowledge in relation to skills and techniques within situations that were less pressurised and, at times, more closed and drill like in nature. This level of support from the more knowledgeable other would mean that all players would work within the limits of their ZPD, to enable them to progress through the zone at a faster rate (Vygotsky, 1978) when placed within high-speed game like scenarios. The final goal focussed on the mediation tool of language and the consistent use of the club metaphors in order to develop the players' scientific concepts. Rob had worked within the club for over a year; therefore, he was familiar with the terms but didn't always use them.

After reviewing the baseline data from Neil's interview and the practical observation, evidence suggested that Neil thought about learning and the development of scientific concepts within his sessions and his use of language in relation to questioning was a strong element of his coaching. However, at that point, he had only been coaching within the club for a short period of time and, despite being aware of the terminology, he was yet to embrace the club metaphors that created meaning within different situations, e.g., Hammer = a defensive line moving forward in unison at speed. In fact, Neil's use of metaphor as a

⁶ Set piece – a means of restarting the game usually in the form of a lineout or a scrumage.

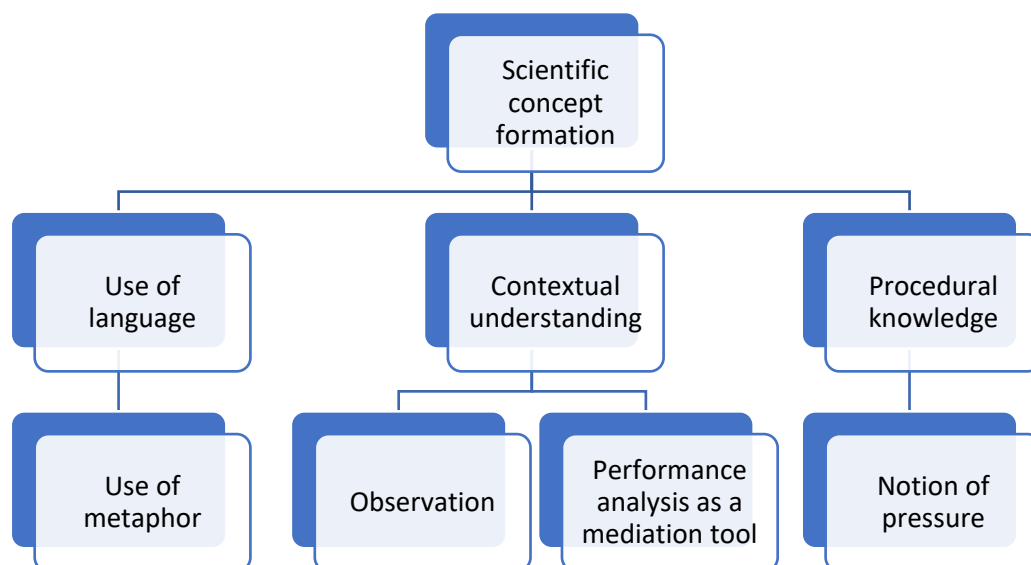
mediation tool became the basis of his initial collaboratively agreed goal. His second goal was related to the objectives based on contextual learning and procedural knowledge in order to develop scientific concept formation. From the baseline data, it was evident Neil was limited in his application of using context rich practices to provide positive learning situations. The evidence suggested he was comfortable providing game like context and procedural knowledge within more technical, closed aspects of play related to the scrummage and lineout, but he needed to expand his repertoire to more messy and chaotic open play situations, including the development of tactical scientific concepts. However, my intention was not to rush Neil into coaching the larger game play situations, but to expand his practice and relevant procedures beyond the set piece situations where he was comfortable. Hence, I aimed to develop his own scientific concepts, but didn't want to place him in situations that were beyond the upper limits of his ZPD, resulting in failure, which could in his eyes lead to a loss of face and therefore credibility (Goffman, 1959; 1967). We therefore decided to use a skills carousel⁷ as a means to develop his practice. It was agreed that he would utilise small sided conditioned games based on the contact area to develop the players' scientific concepts through the mastery of the relevant procedures (Aidarova, 1978; Elkonin & Davydov, 1996; Galperin 1985). Subsequently, the intension was to move Neil away from the imitation phase of learning and onto scientific concept formation within the ZPD (Vygotsky, 1987).

⁷ Skills carousel – Three different coaching practices (stations) set up to develop players technical and tactical understanding. Each playing group will rotate around station

4.3 Action research cycles 1 & 2

Despite there being four AR cycles within the data collection period, for the purpose of this chapter and as stated within the data analysis section within the methodology, AR Cycles 1 & 2 are combined, followed by 3 & 4. The rationale for this choice is based on similar development goals being collaboratively set for cycles 1 & 2 and then advanced and refined for AR cycles 3 & 4. AR cycles 1 & 2 focuses on the main theme, which was the development of scientific concepts. The higher order themes of language, context and procedures will form the basis of this sub section relating to how the coaches utilised these notions in developing the players' scientific concepts. Additionally, lower order inductive themes emerged as the cycles developed, including how observation and performance analysis were used at mediators to develop the coaches' contextual understanding, as illustrated in Figure 1 below.

Figure 1 – AR Cycles 1 & 2, higher and lower order themes



4.3.1 Scientific concept formation

4.3.1.1 Use of language and metaphor

One of the development goals focussed on Neil increasing the use of club metaphors within his sessions, and evidence suggested that Neil was becoming more comfortable using the club's language (i.e., metaphors), when he reflected:

The language I used was a positive, I continued using the terms to keep them consistent. E.g., being more dynamic in the carry, 'win the race' at the breakdown, 'long present'⁸. I questioned why the long present is more effective and how can working on the floor (which we expanded on with explanations and demonstrations of positive body position), create the long present and influence how we play in terms of attacking structures. I felt this aspect was crucial as players understand how being effective at the breakdown can influence the speed of ball. (Neil's cycle 1 reflection, 13/11/18)

This reflection demonstrated Neil's thoughts on the impact language had on scientific concept formation and, therefore, player learning. For example, by keeping his language positive, Neil was aiming to maintain levels of motivation in the players. He was also using the club metaphors e.g., 'win the race' and 'long present', but crucially he was providing demonstrations and explanations around the meaning of these metaphors and reinforcing 'why' these processes were so important when related to the context of the game.

Rob had also been set a goal of being more consistent with his use of club metaphors. Within the end of cycle 1 discussion, he was asked to reflect on how he had approached this goal, upon which he responded:

I was lucky enough to do a full pre-season, so the terms were quite embedded when going into the season. The big thing for me is to remind myself of what the terminology means. So, it's important for me to know what the action is, rather than me just shouting words and not really knowing. (End of cycle 1 discussion, 11/12/18)

This explanation demonstrated that he felt it was important to gain clarity about the meaning of the terms himself, because if he didn't understand them, then it was unlikely the players would derive any meaning from them, as he continued:

Also, rather than just saying the words it's important how the players implement them within the session. So then by me saying 'Do you understand' this is one of the worst questions to ask the rugby team. Rather than verbalise it, just say show me, if you understand don't nod your head and don't say yes or we were going to do that. (End of cycle 1 discussion, 11/12/18)

As well as asking players to physically demonstrate their understanding within a practice, Rob also sought other means to check their understanding, when explaining a new practice or

⁸ Long present – When a player in possession of the ball and is tackled to the ground they place the ball as far away from themselves as possible towards fellow attacking players

scenario. In this example, he was using cones to simulate the position of defensive players and explain how he wanted them to cover space:

I started the first 30secs of the 6min rotation using cones and my language through questions as tools in mediating the players' learning. It was astonishing how many of the players were unaware of what I have been asking of them within the games.
(Rob, cycle 1 reflection, 4/12/18)

There are a number of noteworthy elements to this reflection, firstly he was using the Vygotskian language related to mediation, suggesting he had begun to internalise the concepts. It was also interesting to note that Rob also recognised that through using a combination of cones, as a visual representation, and questions to promote thinking, the players had not fully grasped the concepts previously coached. Subsequently, this suggested that the players' concept formation remained at an everyday level, rather than the scientific level we were aiming for.

4.3.1.2 Language and coach development

Within the AR cycles 1 & 2, the coaches were in the early stages of their interpretation and understanding of the Vygostkian notions that had been presented to them. As stated, particularly in the case of Neil he was in the imitation phase of learning within the ZPD. Subsequently, in line with Vygotskian concepts, it was important that within these initial stages of learning that additional support was provided to the coaches. This support within AR cycles 1 & 2 came in the form of discussions prior to sessions within the planning meetings, whereby I would challenge and question the tasks and practices the coaches were planning. One such example was when I questioned Neil regarding his contextual understanding in relation to a contact area practice, when I stated 'have you considered the amount of space you are using for this practice, because it will be vital in the amount of tackles and contact situations you have' (Cycle 1 Observation field notes, 8/11/18). Such an intervention allowed Neil time to think more carefully about his practice and reflect on whether his current plan would allow him to meet his learning objectives.

As well as the discussions prior to the sessions, I also provided feedback on their sessions based on the main Vygotskian notions of contextual understanding, procedural knowledge and the use of language. The feedback was provided after their written reflections

had been received, in order that there was a degree of intersubjective understanding of what was deemed 'good' practice in relation to the application of the Vygotskian notions. An example of specific feedback provided to Rob regarding a game based activity and the overall targets for the following sessions is highlighted below:

Game related practice – 14 v 13 Initially in a 15m – 15m area.

- *15m to 15m area was too small with 14 players in the front line, you complained about spacings but there was not an opportunity to have good spacings because of the lack space available*
- *Wouldn't have 13/14 defenders in the frontline with the defenders staying in the game and all on their feet*
- *Questions – one question was 'what aren't we doing'. This is a very generic question and one that is unlikely to provide the desired response*

Targets

- *Head Coach – Send out what you want from the week in terms of coaching on the Sunday or Monday to allow coaches to plan accordingly, if changes are made to the plan, then inform the coaches at the earliest opportunity. This provides an appropriate level of planning time for them to think how they would implement the Vygotskian notions*
- *Really think about the procedures matching the context of the game both in a drill and game scenario*
- *Think about the pressure you want to put on attackers/defenders and ensure the space provided, the opposition and speed of ball reflect what you want to achieve*
- *Think carefully about some of the questions and demonstrations you provide in terms of detail*

(Cycle 1 Feedback Email, 10/11/18)

Both the pre-session planning discussions and the written feedback after the sessions were support mechanisms to develop the coaches learning in relation to the Vygotskian concepts in line with the aim of this thesis. As the data suggests, both coaches had different needs in relation to the application of the theories within their coaching practice. This support was aimed at placing the coaches within their ZPD's and to aid the sense making processes in relation to utilising the theory and applying it to their practice.

4.3.2 Discussion – Use of language and metaphor

It was evident that the coaches were becoming more comfortable in the use of previously club metaphors. Neil had made significant strides in this area with examples of its use

including 'being more dynamic in the carry, 'win the race' at the breakdown, 'long present' (Cycle 1 observation field notes 19/11/18). Also, his questioning technique had developed to challenge and make players think about their performance. Furthermore, there was evidence of Rob using specific Vygotskian language associated with mediation tools within his reflections, demonstrating how he had not only begun to internalise the club metaphors, but also the Vygotskian language central to this thesis. This process of internalisation occurred because of the social interaction between me and the coaches, within training situations and the end of cycle discussions. Vygotsky (1978) believed that learning is socially constructed between a learner and a more experienced other at the interpersonal level and then internalised on an intrapersonal plane by the learner (Hasan, 2002; Kozulin, 2003). The notion of internalisation is a key aspect within scientific concept formation and by me acting as the MKO, the use of mediation tools such as the Vygotskian planning framework (Appendix 1) was central to the coaches' developing their practice. Mediation explains the process of individual transformation, it develops human cognition through the creation of meaning, and meaning can be constructed by various semiotic modalities including sign systems (for example pictures, maps and language) which in turn, act as abstract tools in changing the character of human mental activity (Wertsch, 1985; Tharp & Gillimore, 1988). An example of a sign systems I used to mediate the coaches' learning, included the use of the aforementioned Vygotskian planning framework (See Appendix 1). The use of the model as a visual mediation tool was encouraged when the coaches were planning their sessions in relation the Vygostkian and neo-Vygostkian concepts. Furthermore, through the semiotic mediator of language, I also provided feedback to the coaches after sessions that I had observed, e.g., to keep reinforcing the club's terminology (metaphors) for example 'winning the race'. Additionally, the end of cycle group discussion allowed for further interaction between me and the coaches and thus provided further learning opportunities. These discussions allowed the coaches to pose questions and gain further clarity on the concepts being used, while I had the opportunity to scaffold the coaches' learning further.

Evidence suggested that the consistent use of metaphor and the use of the Vygotskian concepts were relatively new theories for the coaches, hence they were within the initial stage of the ZPD. At this stage of learning, Vygotsky (1978) advocated more frequent and elaborate teaching from the MKO, including the use of leading and open-ended questions,

and introducing a solution to the initial elements of a task (Daniels, 2001; Potrac, et al, 2016). However, as the coaches' scientific concept formation developed, the assistance I provided, acting as the MKO became less frequent and greatly reduced (Potrac et al.; 2016).

Vygotsky also believed the integration of speech and practical thinking is essential for scientific concept formation to take place, he emphasised speech as an 'organising' principle, claiming that speech and action were part of 'one and the same psychological function' and that speech was as important as action in goal attainment. Such an example came within the end of cycle 1 group discussion, where I reinforced the key Vygotskian notions and introduced the concept of ZPD. Additionally, I also provided examples of what Vygotskian concepts looked like in practice. One example related to the amount of space afforded to the players not matching the context of the game, which meant an unrealistic learning situation was produced and players were not within their ZPD. Hence, the learning opportunities I provided after sessions and within the group discussions further aided the process of internalisation. This sense making developed their understanding and provided meaning to the situation allowing their coaching practice to be developed (Ardila, 2016; Daniels, 2001; Latukefu & Verenikina, 2011).

The interactions between myself and the coaches, were essential in their scientific concept formation, hence, the clarity of message and the information provided was crucial, not only for coach learning, but also for the development of the players' scientific concepts, where, if the external speech is clear then the process of internalisation is made easier (Jones et al., 2018). Building on the notion of speech and action as being part of the same psychological function, it was interesting to note that Rob stated in the end of cycle discussion: 'rather than just saying the words, it's important how the players implement them within the session' (End of cycle 1 discussion, 11/12/18). This statement suggests that Rob felt some players were able to verbalise their actions but were unable to carry them out in practice. These sentiments also align with Vygotsky's aforementioned concept of imitation, which is the initial stage of the players' ZPD. With some players being at the imitation stage, it meant that they only had a basic understanding of a concept, technique or tactic and while they could verbalise the required actions, they were not able to demonstrate them in practice (Vygotsky, 1987; Eun, 2019).

These findings have potential implications for both coaching and coach education in so much as the data highlights the need for coaches and coach educators to be clear in the concepts they are using when attempting to develop players' and coaches' practice. The notions of contextual understanding and procedural knowledge were initially abstract concepts offered to the coaches, which would, in time, become concrete interpretations that they would attempt to utilise in their practice (Jones et al., 2018). Hence, this study highlights the need for coaches and coach educators to carefully consider the language used to mediate coach/player learning whilst also providing time and space for the coaches/learners to internalise new knowledge before it can be applied in practice. Within such interactions the specific language used needs to be carefully thought through and scrutinised. If misconceptions do occur, then the MKO needs to address these through a series of intervention strategies. If there is a failure to adopt such an approach, the data suggests that any mis-conceptualisations on the part of the coaches, could have a negative impact on athlete learning.

A further consideration that also became clear during AR cycles 1 & 2 is that both coaches in this thesis had very different learning needs. Subsequently, in order to develop the coaches' knowledge and understanding it became clear to me that they needed individualised support to ensure they both developed, which drew attention to how I differentiated the support for each coach. Such events led me to conclude that one size does not fit all in relation to coach education and subsequent learning. Nevertheless, the data suggested that Vygostkian notions and the use of the planning framework, helped shape the coaches' thinking in relation to the key objectives of the thesis. The use of the Vygotskian concepts within a coach education context is unique to this study and one that I believe deserves further research. However, as stated previously, it's not merely about providing abstract theories, coaches need time and appropriate support in internalising new ideas and implementing them into practice, which ensures their praxis is developed.

A further key objective of this thesis was to maximise learning opportunities for the players. This involved the effective combination of developing the coaches' contextual understanding, procedural knowledge and how the coaches used language. The following sub section will focus on how contextual learning was developed through observation and the use

of PA and how the coaches varied the amount of pressure within their practices and procedures in order to develop scientific concepts within the players.

4.3.3 Contextual understanding

4.3.3.1 Observation

Neil's collaboratively set, development goals were focussed on providing context rich, game like practices using established language already in use throughout the club. It was therefore refreshing to read his first reflective log within cycle 1:

Throughout the day I was thinking about and jotting down ideas of how can I coach this area and/or that area e.g. Contact area, attacking shape with the principle of applying it in a game context. Constantly thinking 'How does this happen in games?' Do we use the full width of the pitch to replicate spaces relating to our attacking structures in order to give context of spacing between players, timings and players' responsibilities? (Neil's cycle 1 reflection, 6/11/18)

This reflection demonstrated that Neil was thinking carefully about the initial goals we had collaboratively set. His reflections were in essence a way of recording his inner speech, which is associated with Vygotsky's concept of internalisation. Neil was using it to make sense of the concepts in relation to the practical coaching situations. However, as well as verbalising such concepts and practices it was also important that he was able to demonstrate them in situ, within a practical session. Later in his reflective log, it was evident that Neil found such a delivery method challenging when he stated: 'We went straight into game-based learning - something I haven't had a big emphasis on previously as a coach and I initially probably struggled with the concept' (Neil's cycle 1 reflection, 6/11/18). This reflection reinforced my view that Neil had not used a great deal of game-based practice within his coaching, as he had claimed in his initial interview. More importantly, it alerted me to the fact that some further guidance on the contextual learning and procedural knowledge would be required in relation to his coaching. Mindful of Neil's reflections, I sought to support his learning through a joint observation of another coach in the club, delivering a defensive session to the 3rd and 4th team players:

We critiqued a defence practice that was going on in the 3rd/4th's session and after some prompting, Neil began to notice that the practice didn't fit the context of the game. They were not using the full width of the pitch and it was 14 defenders v 11 attackers. He eventually picked up on this and also there were 14 defenders in the

defence frontline with everybody on their feet. He also picked up the impact on the tight spacings and the lack of role understanding of the some of the players. (Cycle 1 Observation field notes, 8/11/18)

I felt such an approach would allow Neil to observe in practice what I had been verbalising in previous meetings and it would develop his contextual understanding further. It was a useful exercise in Neil observing and critiquing the concepts in practice and identifying pedagogical issues, as well as questioning some technical and tactical elements of the session, a point he acknowledged in the end of cycle discussion when he stated: 'observing Pete (pseudonym) helped me realise the link between the practice he was doing and the context of the game' (End of cycle 1 discussion, 11/12/18).

4.3.3.2 Performance analysis as a mediation tool

The mediation tool of performance analysis (PA) utilised by the coaches, provided a further insight into how they created additional learning opportunities for the players in order to develop their scientific concepts. Such provision allowed me to observe how the coaches used language in the 'classroom' when delivering a performance analysis review and how they used selected clips to provide context to what was being covered within training that week. Both Neil and Rob fully embraced the PA provision, and it was quickly embedded within their practice. Early within the 1st cycle, Rob reflected, 'I'm going to get clips for the backs to see why it is important for the 2 to 3 passes to be a crisp fast process, and that it's not just about the traditional fixing of the 1st defender then pass' (Rob's cycle 1 reflection, 4/11/18). This was an interesting use of PA, since he wanted to provide a rationale as to why the backs should challenge their existing knowledge and develop their thinking further. Similarly, Neil also used PA with the forwards to highlight key points from the lineout within the previous match, as I noted:

Good preparation in the classroom with players highlighting positives in terms of spacings and role awareness. Also highlighted inconsistent processes related to drive position, while identifying the lift being fairly consistent. The training objectives set were based on the drive position when setting up a maul. (Cycle 1 observation field notes, 19/11/18)

This observation highlighted how Neil used PA initially, from a learning perspective, to highlight positive and faulty processes. Furthermore, the PA meeting also served to set the

learning objectives for the forthcoming practical session and provide context to the technical elements being covered within the lineout. Finally, the way PA was delivered, developed as the coaches moved into the 2nd cycle, when Neil reflected, 'I set the scene and provided game specific scenarios in the lock zones (22m area). I also linked it to the opposition e.g., Pontycup and Hilltip (pseudonyms) and how they defended in this zone.' (Neil cycle 2 reflection, 16/1/18). I also highlighted how the use of PA led to 'more player led elements within the review, with some very good discussions between groups' (Cycle 2 observation field notes, 16/1/18). This development in the use of PA demonstrated how Neil provided even greater context to the game scenarios by analysing previous opposition matches and reviewing the tactics they used. Players were also beginning to take a leading role in some PA reviews, using club metaphors and discussing possible solutions to opposition tactics. This social interaction is in line with Vygotsky's cultural, historical theory, whereby the information shared is related to the development of cognition through problem solving and causal thinking, consistent with Vygotsky's concept of higher mental functioning. The use of players leading the PA sessions was something that Rob had witnessed and noted the success of within the first team squad, and sought to implement within his own U19's squad sessions. In terms of learning, these sessions offered greater context for the players in relation to the practices. Furthermore, the reviews also provided a scaffolded approach to learning with players gradually taking greater responsibility within the reviews.

4.3.4 Discussion – Contextual understanding

4.3.4.1 Observation

Observation is a key element in every aspect of the coaching process; it is an interpretation of a situation witnessed by an observer (Gilbert and Cote, 2013). In fact, in order for a learner to be supported within the ZPD, there will be a degree of interpretation of the points made between the MKO and the learner. Despite observation not being a specific objective within this thesis, what coaches observed and responded to in different situations underpinned their coaching practice. Furthermore, how the coaches used observation and attempted to place the players within their ZPD was central to them providing context rich practices, whether this was through observing other coaches' practice, or through the use of PA to develop their

own and the players' scientific concepts. Examples include Rob using PA to 'to get clips for the backs to see why it is important for the 2 to 3 passes to be crisp'. The players also used observation within PA sessions when responding to questions and scenarios set by the coaches. Some authors view the knowledge gained through observation to be 'neutral' in construction (Gilbert and Cote, 2013, Knowles et al., 2001). However, others suggest that this is an over simplified view, and that observation is not a neutral event but is heavily influenced and shaped by social, historical and cultural factors (Corsby & Jones; 2020; Cushion & Partington, 2014; Luhmann, 2002; Vygotsky, 1978). The deconstruction of the act of observation was not covered in the writings of Vygotsky despite it being associated with social learning. Therefore, the act of observation which is central to the development of the coaches' and players' scientific concepts within this thesis must be critiqued. Utilising the work of Luhmann (1995b, 2002) and Corsby and Jones (2020) as a lens through which to view observation; it should be noted at this juncture that they believe observation deals with differences in process and meaning, it is deemed all descriptions are re-constructions and interpretations of the observed (Keiding, 2010).

In the following example the observations were related to what the coach valued, potentially based on cultural historical factors such as prior knowledge and experiences (Vygotsky, 1978). The example came from the interaction with Neil and the observation of 3rd and 4th team training. Neil's past experiences as a player, assistant coach and head coach are what Vygotsky (1978) deemed cultural, historical factors that have heavily influenced and shaped his practice. Hence, he valued different aspects of coaching and the game to me. Neil placed a significant focus on the technical, closed elements of the game such as the set piece, with little thought of the pedagogies that would promote learning within the more open, continuous, phase play ⁹scenarios. Subsequently, drawing on the aforementioned work of Corsby and Jones (2020) and Luhmann (2002), and in relation to the earlier example of observing another coach's practice, Neil's attention focussed on what was referred to as 'marked space' or what he would normally observe i.e. the technical elements. However, through guiding and prompting Neil to look beyond these instances and focus on the wider

⁹ Phase play – A "phase" is the period of play from a set piece or restart for first phase, and the following tackles and rucks count as each phase of play.

issues occurring, I was encouraging him to observe the 'unmarked', often unseen or unnoticed space within the practice e.g. the wider space and the amount of defenders present within such space (Spencer-Brown, 1969; Luhmann, 2002). Through observation of the unmarked space, Neil made a number of 'distinctions', which meant instances now moved into the realm of the marked space. As a consequence, he began to observe that there was insufficient space for the attacking team in relation to the amount of defenders present, this meant there was unrealistic pressure on the attack. This process aided Neil's internalisation of developing context rich practices.

4.3.4.2 Performance analysis as a mediation tool

At this point, it is pertinent to highlight the significance of the interactions between me, the coaches and the players within the PA sessions. As stated previously, Vygotsky's work didn't cover the sense making and creation of meaning that originates from the interaction of different parties observing the same act. Subsequently, this could raise additional issues related to coach and player learning, which have implications for coach educators and coaching practice. This aforementioned observation has wider ramifications related to what I felt was 'good coaching' and 'good play'. At a surface level the method of observing progress and assessing learning presumes the ability of coaches and coach educators to 'see' progression of learning through action and then inform participants of what needs to 'done' to improve (Jones et al, 2018). This is because, in sporting contexts, learning and subsequent progress can only be assessed through the demonstration of a desired outcome of a set task or challenge (Cushion & Partington, 2014). However, utilising the work of Corsby and Jones (2020), they suggest the act of 'seeing' good coaching and good play, and putting interventions in place for improvement, is more than an arbitrary interaction between a MKO and a lesser informed participant. Corsby and Jones (2020) assert that the act of seeing is a process of ensuring or attempting to make contextual information coherent. From this perspective, when observing the coaches' practice, or the coaches working with the players in the PA sessions, the observation shifts from a visual act, to one that relies on the interactional procedures of social actors i.e. me and the coaches, or coaches and the players. Consequently, there is a need to achieve an intersubjective understanding of what is deemed

‘good’ in practice, with each actor making sense of their own and others’ observations regarding ‘good’ performance. An example of such an intersubjective understanding came throughout the CAR process but specifically in the pre-session coaches meetings that I attended, as highlighted earlier within the AR cycle 1 results section. The work of Corsby and Jones (2020) suggests that understanding can only be possible through extensive joint interactional and re-constructual work between the MKO and the learners. Nevertheless, despite the importance placed on its consensual construction, it is inevitable that ‘seeing’ was often contested because different aspects of play were valued differently between me, the coaches and the players. However, a factor that needs to be brought into sight in these social constructions is the dynamics of power within the interactions (Jones et al, 2017). Because of my role as the MKO and head coach within the environment, and the roles of the coaches in relation to the players, it should be recognised that in this instance Neil potentially agreed with what I was seeing because of the position I held and the players would ‘go along’ with the coaches observations to prevent conflict. Nevertheless, despite the omnipresence of power within the interactions, which are relevant to coach education, there are other considerations that also have implications for the wider field of sports coaching.

Within this thesis, the act of observation and the socially negotiated task of ‘seeing’, between a MKO and coaches under their tutelage, is potentially unique within sports coaching research. The interactions between me and the coaches and how I sought to develop their practice points towards a new appreciation of the need for coaches and coach educators to make themselves coherent to the learners in order to aid the internalisation of information. Additionally, this study also highlights how a MKO and coach learn off each other and search for that coherence and subsequent sense making. Corsby and Jones (2020 p.351) describe the situation as ‘what is seen, or will be seen, therefore, is only given sense through the course of interaction’. This suggests that observations stretch further than mere evaluations and that coaches and coach educators should also consider the influence of ‘others’ when forming observations. It also gives weight to how instruction and suggestions are understood, interpreted and negotiated by the different parties (Lieberman, 2013). However, in order for an acceptable level of coherence to be established and subsequent progress to be made, the coach educator. and coach are not only required to have a significant level of understanding of the sport they are coaching, but also of the pedagogies required to ‘see’ what needs to be

improved. Additionally, by accepting that observation is fundamental to the work of the coach, then these findings suggest that coaches and coach educators, should challenge their existing understanding on how they see, evaluate and subsequently negotiate different situations.

4.3.5 Procedural Knowledge

4.3.5.1 The notion of pressure

As the weeks progressed through AR cycle 1, there were signs of Neil thinking more carefully about specific game context within his coaching practice as well as the amount of pressure he was placing on the players. An example came in a lineout segment of the session when I observed: 'It was a fully opposed lineout session where Neil was trying to make it as specific to the game as possible by telling the boys to speed up the calling, otherwise they would concede a free kick as in a match' (Cycle 1 observation field notes, 8/11/18). Similarly, within the skills rotation where Neil was in charge of the contact area, I observed: 'a good 4v3 fully opposed practice and initial game, whereby defenders are conditioned to overload the ruck to test the body position and technique of the attacking players' (Cycle 1 observation field notes, 8/11/18). These practices demonstrated that Neil was thinking about the amount of pressure he was putting on players and the conditioning elements of the practice to achieve desired outcomes i.e., technique at the ruck area. An issue with these fully opposed sessions was player welfare. There was a great deal of contact due to the small numbers resulting in a few players getting injured. This was an area I highlighted and requested he considered ways of varying the pressure on the players whilst trying to avoid continual full contact scenarios. This focus on the amount of pressure placed on the players was something that Neil found challenging. Such an example occurred a few weeks later: 'I took the contact element out of the session allowing players to execute the technique accurately and under less pressure' (Neil's cycle 1 reflection, 11/12/18). I challenged Neil on such an approach, which put little or no pressure on the players, leading to unrealistic situations that would never occur with the game context. Within the end of AR cycle 1 focus group discussion, I explained the lack of pressure and subsequent challenge meant the players were not within their ZPD, they were merely using basic everyday concepts rather than developing their scientific concepts and

higher mental functions. The notion of creating or reducing pressure on the players was something that Neil found challenging. Subsequently, this was a key focus within our end of cycle 1 group discussion whereby I explained:

Within a session we are trying to get the players in their ZPD, you are trying to speed up the player's decision making and pressurise their technical processes. So, our goal is to re-create that game like context where possible. Conversely, if something is new to the players, we may need to reduce pressure, but if they have the tactical and technical ability then these skills and decisions need to be placed under greater pressure. Hence how can we increase or decrease pressure?

Rob: Time, space and the conditions you place on the practice.

Me: How do you control time

Rob: Speed of rucks.

Me: Yes, you can control time through speed of ball, how can you control the speed of ball?

Rob: Through conditions, for example if a ball carrier gets touched, he has to go to the floor, roll and place the ball back but the ball cannot be passed away until another two attackers are over the ball.

Me: How can we vary pressure through space?

Neil: Bigger space means less potential contact but could increase pressure on passing and movement. A smaller space will mean more potential contact.
(End of AR cycle 1 discussion, 11/12/18)

Acting as the more knowledgeable other, I questioned the coaches on the levels of contact used and how that could be conditioned to vary the pressure exerted. The discussion centred around the use of padded contact shields and thinking carefully about the space afforded to players in the practice, thus placing them in their ZPD. In relation to Neil, the intension of this inter-personal social mediation was to provide further insight into the variability of pressure and placing the players within their ZPD in order to develop their scientific concepts.

After the end of the AR cycle 1 discussion, there was a four-week break before the beginning of AR cycle 2. This was useful internalisation time for Neil related to the development goals that had been set. I had also asked Neil to take a greater role in the full team practices in order to develop his practice further. Subsequently, in the second week back after the holiday period Neil delivered his best session up to that point, he stated:

I felt the session was one of the better sessions I've coached. The theme of the session was exiting from the 22m area, through kicking or running, if the opportunity presented itself. My aim was to reflect this theme in the initial set piece units and later in 15v15. Teams were given 2 scenarios 1st - 5m line and 2nd from the 22m line and played out various attacking and defensive options of their choice. Each team's decisions and actions would be questioned by the coaches. (Neil's cycle 2 reflection, 18/1/19)

I was also pleased to see the progression in Neil's practices regarding the pressure he placed on the games to provide match like context, as I observed:

Overall, it was pleasing to see a real game related emphasis on the scenarios in the lock zone. Also, the level of grab tackling and later introducing a live ruck area ensured the processes/procedures were put under almost game specific pressure, without going to full contact and risking injury. Some excellent discussions amongst the players facilitated by the coaches. (Cycle 2 observation field notes, 18/1/19)

There was further evidence of Neil's development within the end of the cycle 2 group discussion, which revealed how his approach to learning and the use of pressure within his coaching sessions had developed:

If we are focussing on speed of the ball carrier or how dynamic they are on the floor, pressure can be taken off by using shields, so limiting live contact. We then build up to a live contact scenario to build up pressure on and put more detail on that with the elements related to the game context. (End of cycle 2 discussion 1/2/19)

This demonstrated that Neil was thinking about and applying various levels of pressure to support players' learning.

In relation to Rob, his initial goals were also collaboratively set with me, prior to the first AR cycle. I observed that he generally put the players in high pressure situations, which at times placed them outside their ZPD, resulting in a breakdown of their skills. I therefore tasked him to think carefully about the amount of pressure players were placed under within his practices, which would move their concept formation from every day to scientific. At that time, all of Rob's coaching that I had observed was based around games with very little technique-based activities evident. It seemed Rob was totally opposed to the use of drill within his practice, a point reinforced when I asked him what he felt were the benefits of drill and what it improved, he stated:

Just the drill, you just improve that, say you're doing the contact area in a certain way, you will then master or improve that skill in that scenario you're faced with in that drill.

So, when you transfer that into a game there's so much variance within decision making and scenarios, then that drill will be irrelevant. (End of cycle 2 discussion 1/2/19)

While I agreed with this sentiment to a degree, 'I also stated that it was fine to use drills that varied pressure and focussed on developing players' skills and techniques, however, these practices should also be contextual in nature and related to the game itself' (End of cycle 2 discussion 1/2/19).

When setting development goals, based on developing the players' scientific concepts we agreed to use elements of contextualised drill-based practices along with varying the pressure being placed on the players within his preferred game-based scenarios. At this early stage, I was looking forward to watching Rob's practice more closely, because my initial impressions were that he was a coach with outstanding potential. However, his coaching practice within the first two sessions of cycle 1 did not meet my initial expectations. Within the skills carousel, key points I noted included:

Initially the practice had 3 defenders v 5 attackers (Inc. 1 Scrum half) this was an immediate issue because the widest defender had a 2v1 against him every time. Also, despite questioning there were issues around the spacings between defenders, which affected the context. Players were confused with the practice. (Cycle 1 observation field notes 6/11/18)

Furthermore, within the game-based aspects of the following session later in the week, there was a failure by Rob to apply game context to his practice, when I observed:

Game related practice – 14 v 13 within the 15m to 15m area is far too small with 14 players in the front line of defence. Rob complained and questioned the players about the lack of space between them, but in reality, there was not an opportunity for the defenders to have appropriate spacings because of the narrow pitch dimensions. (Cycle 1 observation field notes 8/11/18)

It was evident that he was also disappointed with his own coaching practice throughout the week, as when reflecting on the 14v13 game he stated:

I planned to build to 2 smaller games at the same time, but for some reason felt I needed to put it into a single game straight away. I felt my explanation of the game was poor, rushed. It lacked flow, it lacked total understanding of what was asked of them. (Rob's cycle 1 reflection, 8/11/18)

Furthermore, in summary of both sessions, Rob was critical of his practice when he stated that they: 'just felt like poor sessions from me in general. Felt really messy, players not understanding, making a lot of errors' (Rob's cycle 1 reflection, 8/11/18). Because the space was too small, insufficient pressure was placed on the players resulting in them merely utilizing everyday concepts within their play. At this stage I felt it important to reaffirm the neo-Vygotskian notions related to contextual learning and procedural knowledge; hence I reinforced this point through a discussion with Rob and within the post session email where I stated:

- *Really think about the procedures matching the context of the game both in a drill and game scenario*
- *Think about the pressure you want to put on attackers/defenders and ensure the space provided, the opposition and speed of ball reflect what you want to achieve*
- *Think carefully about some of the questions and demonstrations you provide in terms of detail. (Cycle 1 Email, 7/11/18)*

In the subsequent sessions within the 1st cycle, there were some instances where Rob didn't fully consider game context, as I observed: 'within the defense rotation, think of the space you allow, it was initially quite narrow, but this did improve by the time I observed the last rotation' (Cycle 1 observation field notes, 19/11/18). This demonstrated Rob's ability to reflect in action and to notice when practice was not representative of the context within the game. Also, as the first cycle progressed there were definite signs of improvement in Rob's sessions, as I summarized, 'Very good session in relation to explanation of ruck chain with the practices relating to the game' (Cycle 1 observation field notes, 11/12/18). Rob also noted improvements when he reflected, 'the understanding is much better and the players demonstrated this in a practical sense' (Rob's, reflection cycle 1, 4/12/18). Furthermore, there was continued progress into the 2nd AR cycle when I observed:

Overall, this was a high-quality session, with the players responding well to questioning and instruction. In the games, there was clear role awareness and the conditioning of the attack ensured the aims of the session were met. (Cycle 2 observation field notes, 18/1/18)

A significant factor in this continual improvement came to light within the end of AR cycle 1 discussion. Rob explained how he had thought about our conversations on providing game like context to his practices, he explained:

In the first week when the defence was on top, the practice was unrealistic in terms of what would happen in the game. Since then, I've always made sure that I've guesstimated the numbers we're going to have, based on the scenarios which they would face in games. So, when I watch rugby games on TV or when analysing our games, I now pause the play on a ruck and see how many defenders they would have within that area, how many players would be within the certain width. So, when I come into my sessions, I can just go through what I've seen on TV and what has come through from the analysts. (End of cycle 1 discussion, 11/12/18)

This evidence provided an indication of the level of detail Rob used in order to provide contextual game like scenarios. After our post session discussions, Rob had begun to internalise the concept of contextual understanding, but he further mediated his own learning, utilizing tools such as PA and television footage to analyse scenarios from professional matches and his own team's performance. This was something I had not prompted Rob to do, since I had never thought about it, but it was a method that I began to utilise in my own practice. This highlights the reciprocal nature of the AR process.

4.3.6 Discussion - Procedural Knowledge

4.3.6.1 The notion of pressure

Vygotsky (1978) theorised that for the development of scientific concepts, there must be some form of instruction or support from a more experienced or knowledgeable other, with mediation by psychological tools such as language, signs or symbols (Karpov & Haywood 1998). Neo-Vygotskian followers also contended that the acquisition of psychological tools, including scientific concepts, is not merely the acquisition of verbal knowledge, but it is also the mastery of relevant procedures that allowed their implementation (Galperin, 1957/89; Galperin, Zaporozhets and Elkonin, 1963). The aim of the practices was to develop the players' procedures and subsequent scientific concepts within the ZPD (Karpov, 2003). In the case of Neil, he initially struggled to vary the amount of pressure on the players skills and decisions, with some practices offering very little challenge. Conversely, Rob's practices were too challenging placing too much pressure on the players resulting in a breakdown of the practices. Jones et al., (2018) picked up on this point highlighting the potential difficulty a coach faces when identifying the intellectual and conceptual boundaries of the player in relation to the limits of their ZPD. Furthermore, as with much of Vygotsky's work, Jones et al.

(2018) argued that the ZPD has been under theorised in a sports coaching context, but nevertheless have started to make tentative links and observations regarding its potential application. However, an additional issue in applying the concept of the ZPD, was the need for the coaches to assess the conceptual boundaries of over fifty players' ZPD's, a seemingly impossible task and one which potentially undermines the concept for use when coaching large groups. Jones et al. (2018) also suggest that key to learning within the ZPD is a MKO enabling learners to participate in and lead practices slightly above their existing capabilities, because as Vygotsky stated that "...the only good kind of instruction is that which marches ahead of development and leads it; it must be aimed not so much at the ripe as at the ripening functions" (Vygotsky, 1997, p.188). This notion highlights the need for an individualised approach to learning, which in itself provides its own challenges particularly, in this instance when attempting to meet the needs of so many players. In fact Vygotsky's theorisations have been criticised for focusing only on the individual and how they interact with objects in the world to mediate learning (Jones et al., 2016). Subsequently, building on the work of Vygotsky, Leont'ev (1978) interpretation of AT and (Engeström's, 1991) Activity Systems Analysis (ASA) could potentially prove to be a more fruitful theoretical lens to observe how learning takes place within a larger group of players. A brief overview of how ASA could inform coaching practice is provided below.

In response to the work of Vygotsky (1978), and in particular his focus on the individual, Leont'ev (1978) developed a framework to illustrate how cognitive change happens within a collective or mutual context (Blin & Munro 2008). Hence, he drew a distinction between individual action and collective activity, with individual action being considered a part, and the result, of a system of social interactions, as opposed to the isolated or unrelated cognitive functions of a human agent (Nardi, 1996). Leont'ev (1978) developed the theorisations of Vygotsky (1978) and his ideas around learning through the interaction of the *subject* (individual player or coach) the *object* (new tactic or skill) and *mediating artifacts* (tools e.g. metaphor). Leont'ev (1978) provided an additional layer to support the learning process, which related to the collective actions of the group that the individual is part of. This additional layer of analysis included elements related to *rules* (norms of the activity), *community* (group who share a common object) and *division of labour* (tasks and power) (Nardi, 1996). However, it is perhaps the third iteration of AT developed by (Engeström,

2001), which in addition to the work of Leont'ev, takes into consideration the lives and biographies of all the participants, as well as the shared understanding and history of the wider community (Engeström, 2001; Jones et al., 2018). Moving still further away from Vygotsky's person-centred considerations of AT, and in addition to Leont'ev's focus on the collective actions of the group, Engeström (1987, 1991) addressed both the individual and the social through the concept of ASA. Five basic principles underpinned his amended theorization of AT, which will now be explained and analysed in relation to the research data within this thesis (Engeström, 1987; 2001; Jones et al., 2018):

1. *The activity system as primary unit of analysis*: the interaction as a collective, 'artefact-mediated and object-orientated activity system' (Engeström 2001 p.136). In relation to context of the activity system within coaching, the object could have been related to the example of Rob and the development of the players' tactical understanding of defence. In relation to this object the basic unit of analysis then consisted of three separate but interconnected systems: the game of rugby, the task/practices and the laws of rugby. Hence, the object of the activity is only understandable when interpreted against a wider contextual backdrop of rugby union.
2. *Multi-voicedness*: the activity system is a community of multiple points of view, traditions and interests, which can lead to different interpretations, disputes and negotiation. This is also associated with the division of labour; whereby conflicting ideas may be evident. In this AR process, the voices of me, the coaches and the players all of whom may have had different opinions and interpretations related to the object in question i.e. tactical understanding within defence. Subsequently, we resolved any disputes and came to agreement through an intersubjective understanding of the various techniques, tactics and decisions. The process of resolving disputes and achieving an intersubjective agreement between me the coaches and the players were key influences on learning and progression.
3. *Historicity*: the activity systems take shape and get transformed over long stretches of time. Potentials and problems can only be understood against the background of their own histories. In relation to the players' tactical understanding of defence, this can only be analysed in the context of rugby within that particular session or subsequent sessions.

However, the new tactical understanding can only be developed and understood in relation to what is previously understood and enacted by the players. There has to be an intersubjective agreement related to what the activity 'should look like' and what is accepted as good and bad within a given situation.

4. *The centrality of contradictions*: These are related to sources of change and development, which are essential if any system is to develop and transform. In relation to the development of tactical understanding around defence, the contextual practices developed by the coaches create contradictions related to what the players already know (Historicity) and what the coach and the task/practice is demanding of them. Although they generate disturbances, such contradictions are perceived as opportunities for player learning through innovation and progressive practice.
5. *Activity Systems' possibility for expansive transformation*: This relates to cycles of qualitative transformation, which could be tentatively related to the AR cycles within this thesis. The transformation of practice is related to the continual creation of the aforementioned contradictions leading to both questions and deviations from established norms. Such a notion relates to the coaches attempting to continually develop practices that not only challenge the players existing knowledge but also the established cultural patterns and norms related to coaching. Essentially, transforming practice through an alternative way of coaching moving away from traditional, coach led, autocratic coaching practices.

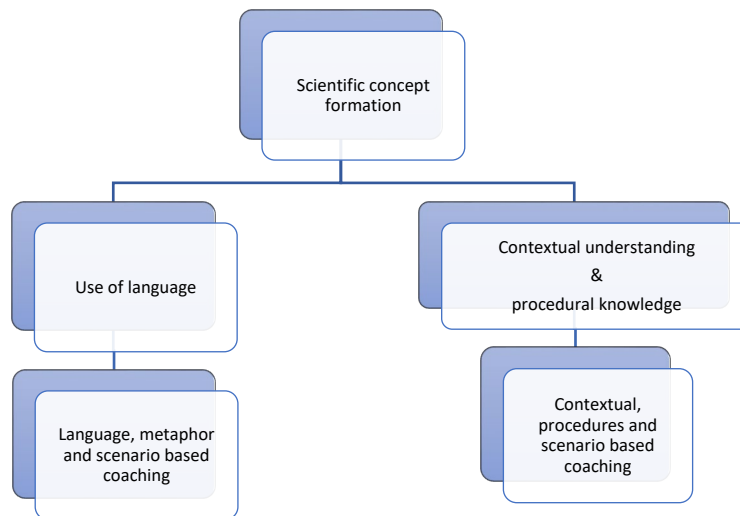
An additional strength of ASA is related to the fact that it could be used as a tool utilised by researchers who take an interventionist role in the group's activities with the aim of changing their experiences (Engeström, 1991). Such a practice also aligns with the action research methodology and the aims and objectives of this thesis. However, there remains some criticisms of Engeström's (1991) work. These include much of his theory being based on the individual being faced with or placed in a situation where there are contradictions to what they currently know; Engeström believed that as individuals, we are motivated to solve and learn from such contradiction. However, Langemeyer (2006) argues that many individuals do not seek to solve such contradictions to transform their practice but merely to avoid conflict with those suggesting or providing the contradictions. Finally, associated with the previous point, some authors suggest there is a weak acknowledgement of power within Engeström's

writings (e.g. Blackler and McDonald 2000). Nevertheless, despite such criticisms, ASA could be a potential lens for coaches and researchers to analyse the multi-faceted, messy nature of sports coaching, particularly within team sports with larger groups. The brief example related to defensive tactical understanding, merely provides a tentative insight into how coaches and researchers could use ASA to review the social interactions within group with a shared goal of transforming practice.

4.4 Action research cycles 3 & 4

Within AR cycles 1 & 2 there was evidence of increased use of the PA provision that informed practice and provided context rich practice design through the use of small sided conditioned games, relating to a specific instance or scenario that occurred during a match. In terms of developing the coaches' practice further, I was aware that the players Rob and Neil were coaching were a very strong group. From the match results achieved against perceived strong opposition and the observed progress of the players, the squad had every chance of winning the national cup competition. Furthermore, within AR cycles 3 & 4 there was potentially a quarter final, semi-final and final. Hence, I felt I needed to challenge both the coaches further and be mindful of their focus relating to a potential cup run. Therefore, the performance goals collaboratively set with the coaches incorporated the use of PA as a form of cyclical mediation tool relating to contextual understanding, procedural knowledge and how language through metaphor would aid the players scientific concept formation. They would use PA to identify areas of weakness from the previous weekend's match, set learning outcomes based on these issues and then review the following week's match to assess if progress had been made. I also provided a new set of reflective questions (Appendix C) which would aid this process. Essentially, these became weekly micro cycles, within the main AR cycle. I also reminded the coaches of the importance of their initial goals relating to the continued use of the club's terminology related to metaphor and to constantly review their use of context rich practice design, as outlined in the Vygostkian planning framework (Appendix 1). As a result of these discussions and the focus on winning the national cup there was an emergence of 15v15 scenario-based pedagogies within both coaches' practice. This is represented in the lower order themes within Figure 2 below, whereby contextual understanding and procedural knowledge are combined to represent context rich scenario-based practices. Similarly, the use of language and metaphor also relates to scenario-based coaching.

2 – AR Cycles 3 & 4, higher and lower order themes



4.4.1 Scientific concept formation

4.4.1.1 Language and metaphor within the scenario-based practice

From the aforementioned evidence the use of player led discussions was having a positive impact on the players' learning. However, this wasn't the only way the coaches used language to challenge and develop scientific concepts with their sessions. Within this example both coaches were involved in the practice, with Rob was leading the game with Neil assisting. Rob stated:

Neil was hot on the players with their contact area skills. In the moment feedback was given to each player from Neil in this contact area, which was great as the game kept flowing but quick, on the fly feedback was given "no work on the ground, no long present, no fight etc." However, when necessary I would intervene on some occasions, stopping the session with a "freeze" and rewind the scenarios to question what went wrong for everyone to see.

Strengths

Open questions

Really Challenging participants through questioning

Quick feedback

All areas coached within 15v15. (Rob's cycle 3 reflection, 14/3/19)

This evidence highlights the diverse methods the coaches were using to challenge the players learning. In this instance, Neil was coaching utilising an autocratic feedback method in order to maintain a high intensity within the practice. Furthermore, it was evident that the use of

club terminology and metaphors were now embedded within both Rob and Neil's practice. Additionally, by Rob pausing the game and asking players to freeze in their positions, this provided a visual representation that provided context to the players in relation to his questions. Also, within such 15v15 scenario-based situations, it was positive to observe all coaches being involved in the aspect of the game they were responsible. For example, Neil facilitating the contact area discussion and Rob, as well as officiating, taking responsibility for defence, which provided extensive learning opportunities for the players.

This notion of learning opportunities links back to the 3rd objective of this thesis; to develop the coaches' understanding and application of the interrelationship between the use of language, contextual learning and procedural knowledge to maximise learning opportunities for athletes. Evidence from previous quotes and observations demonstrates that both coaches were providing learning opportunities based on the integration of context, procedures and language. Further evidence of such provision was highlighted within Rob's practice, when he stated:

The practices and games I have incorporated throughout the season I believe have transferred to the field. Due to the context being close to the game I see and hear the players using Cardiff Met language along with defensive processes. (Rob's cycle 3 reflection, 14/3/19)

Similarly, Neil reflected on one of his sessions, when he stated:

I would use a turnover of possession scenario in our 22m area, with the aim to exit (clear ball from 22m area). The 2nd scenario would consist of an exit from a lineout 5m out from our line. I would question the roles and responsibilities – e.g., who hits the contact area, who latches¹⁰ and who is in the blocker role. We would often break out into groups within the teams to discuss each aspect of the process. (Neil's cycle reflection, 23/3/19)

Both examples demonstrated how the coaches were attempting to maximise player learning through the provision of context rich scenarios and practices, along with their use of language through metaphor, questioning and discussion. The result of such an approach was that players were challenged both physically and cognitively, which made the transference of skills, tactics and decisions into the matches more seamless.

¹⁰ A latch is a metaphor for a player binding onto the ball carrier just prior to a tackle and subsequent contact area situation.

4.4.2 Discussion - Language and metaphor within the scenario-based practice

Vygotsky believed that cultural and historically developed tools mediate the process of learning, and the ability of the learner to apply these tools is acquired in social settings with support from significant others (Kozulin et al., 2007). Such mediation tools can be symbols, images, objects, signs, but the most powerful and important mediator is language (Nelson, Groom & Potrac, 2016; Kozulin et al., 2007). As stated, there was evidence of the coaches continuously challenging the players in how they used language in order to develop the players' scientific concepts. Vygotsky made the point that 'the only good kind of instruction is that which marches ahead of development and leads it; it must be aimed not so much at the ripe but the ripening functions' Vygotsky (1986 p.188). There was evidence of this throughout AR cycles 1 & 2 and enhanced further within cycles 3 & 4, with pertinent and challenging practices, coupled with appropriate questioning that aimed to develop the players' scientific concepts. Such notions relate to the work of Jones et al. (2018) who encouraged coaches to take care with the everyday and scientific concepts and the language they use to stimulate and facilitate learning. They suggested that if too much everyday language is used, then no conceptual or transformational thinking is possible, which means ideas, skills and tactics cannot be applied to different contexts. Conversely, if too much scientific, abstract language is used, then participants will struggle to make sense of a situation or concept (Jones, Morgan and Harris, 2012). Evidence from AR cycles 3 & 4 suggested that the coaches predominantly provided the correct balance of everyday and scientific language, with appropriate tasks and scenarios evident throughout.

Finally, the evidence was overwhelming that both the coaches and the players were utilising the club metaphors within AR cycles 3 & 4. The vast array of specific terminology relating to set plays, technical skills and tactics were commonplace within sessions and matches, this was evident when Rob stated that he continually heard the players using Cardiff Met language within defensive processes. Such internalisation initially by the coaches and latterly by the players relates to what Vygotsky described as *Perezhivane*, a term that has reference to 'experience', or in Vasilyuk's terms, 'experience as struggle' (Clara, 2016; Jones et al., 2018). Vygotsky recognised that different situations could be perceived differently by different individuals. This was initially a 'struggle' for the coaches in AR cycles 1 & 2 in relation

to the various players with diverse cultural, historical backgrounds using different language and terminology within rugby. If Perezhivane and the experience of learning can be seen as a struggle, Veraksa, Gorovaya and Leonov (2012) made the case for using metaphor as a way to overcome such stress. When new players were required to learn new techniques and tactics within AR cycles 3 & 4, deriving meaning and understanding was often challenging. Subsequently, metaphors were used to assist the players and reduce the 'struggle' by minimizing the amount of potentially confusing explicit knowledge often provided within coaching situations (Veraksa et al., 2012).

4.4.3 Contextual understanding and procedural knowledge

4.4.3.1 Context, procedures and scenario-based coaching

Throughout AR cycles 1 & 2 there was evidence of 15v15 games taking place within the training sessions, however there was rarely a specific focus or scenario set, which meant players would merely use their everyday knowledge rather than developing their scientific concepts. Within the end of AR cycle 2 discussion, Rob had posed a question to me related to these games when he asked:

My question to you would be that we've got a bigger picture in mind for us; our youth (U19's) and Freshers side. But regarding the teams we play against we don't replicate the way they play within our training sessions. So, if I'm on a defensive set, would we want Richie (pseudonym) (attack coach) to mimic the team we're playing against even though it's not the way we play, and it could instil bad habits in our players. Would you still say to coach that? (End of cycle 2 discussion, 1/2/19)

This suggests that Rob was already thinking about scenario-based coaching as a means to develop the players' scientific concepts, before I had set a new focus for AR cycle 3. However, in this exchange, it was evident that Rob was concerned about whether it was the right thing to do. In summary, I advised that it could be one way of applying scenarios and I didn't feel it would cause bad habits as long as skill levels and tactical understanding of the players were maintained. Rob seemed happy with this and, consequently, 15v15 scenario-based coaching was utilised far more within AR cycles 3 & 4.

With Rob being the head coach and having responsibility for overall team development, I questioned him on his thought processes around the introduction of 15v15 scenario-based coaching, to which he responded:

In the first block of the season, the players needed to understand the language and the basics of our game, the second block would be to understand the way we'd set up training sessions and the third block we used scenario-based sessions to make sure all the blocks were collectively joined together. (Rob's final Interview, 7/5/19)

This implied that he thought about the season in sections and was working towards the goal of the national cup final, using the season as building blocks towards that goal. As stated, there had been some examples of 15v15 context specific games within AR cycles 1 & 2. However, through the new goals collaboratively set and Rob's views on building the season in blocks in relation to player development, there were now specific match related scenarios being introduced by both coaches. Neil, used an example from training when he stated:

I think it's important to be providing scenarios, to give them different situations they are likely to face, like an attacking scrum outside the 22, when you are losing by 6 points. Or just different scenarios to see how they react to it and but just give them one chance then if they blow it, well that's it, no second chance. (End of cycle 3 discussion, 19/3/19).

These 15v15 scenarios were contextual to the game, also the outcome would be the same as a game, because if the team failed to meet the demands of that scenario or made an error, then play would move on to the next scenario. These instances relate to the generality assumption associated with the ZPD, regarding how knowledge and understanding can be transferred and applied to different contexts, which is also related to scientific concept formation. There were further examples midway through AR cycle 3 with scenarios based around the identification of space. Defenders were conditioned to be narrow, with space initially available in the wider channels of the pitch, within this extract Rob stated:

It feels like I have been saying the same things over and over and the same errors occurring within our 15v15 scenarios. Yes, our attack has developed to a new level through spending more time on the 1-3-3-1 shape at the start of every session, but we should be more consistent. However, by getting these 15v15 scenarios filmed within our sessions is showing us coaches real game-time decisions made by certain players who we can then show footage and feedback to. (Rob's cycle 3 reflection, 14/3/19)

This highlights Rob's use of 15v15 scenarios and the frustration with the inconsistency of performance. This also demonstrated that the coaches were using PA in some training sessions, as well as matches, as a mediation tool for the players. Furthermore, within the same session, Rob wanted to introduce a new scenario related kick off formation, which he felt would provide a greater attacking threat, as he stated:

With visuals shown in the PA review prior to training, I wanted to have 10mins on just running through the kick offs without any coaching points. This led to players questioning some aspects, which is great and shows they are thinking of their job role. Also, if they did not agree with it, they could they show me a better way of doing it.
(Rob's cycle 3 reflection, 14/3/19)

These reflections demonstrated the development in the coaches' practice, with Rob using specific game related scenarios to challenge the players' decision making. Even when introducing a new tactic or set up, he wanted the players to discuss the scenario and challenge his thinking, and to come up with alternative solutions if necessary. Evidence from the data suggested there was a desire from Rob to develop the players' higher mental functions related to self-regulation, planning and self-evaluation of their actions.

In relation to Neil, there was further evidence of his coaching adopting a more scenario-based focus. When asked to explain what factors his 15v15 scenarios were based on, he stated:

So, I looked at match analysis from Saturday to see what needs developing. Even if something went well, I still think you can carry on the development of their practice. For example, the conditions I've put on in the past include; if I know we're playing a team that was very heavy upfront, a very forward dominant team, I tend to put conditions on the defence to overload the ruck area just to replicate the opposition. I also focus on the different areas of the pitch depending on what I feel is required. The contact area can vary in terms of numbers of attackers and defenders for example, close to the opposition try line with close quarter contact. This would be different to a contact scenario in the wider channels. (Neil's final Interview, 8/5/19)

It was pleasing to witness Neil using the mediation tool of PA to inform his practice, as per the targets set. It was also interesting to note that rather than providing general scenarios in line with the earlier example, he was now adding the additional level of challenge by asking the players to mimic the opposition they were facing in the following match. The variability in scenarios aligns with the assistance assumption related to the players' ZPD, whereby

learning is dependent on interventions by a more competent other. All the additional levels of challenge ensured that the players were remaining within the boundaries of their ZPD and subsequently, continued development of their scientific concepts. There was further evidence of such an approach within Rob's practice, from his response when he was asked how he thinks about the conditions within 15v15 match like scenarios:

I have started looking into coaching games within games, so putting in conditions on certain people within a defence for example. So, if you have a group of eight you'll have four people who you condition to shoot out from the line with really hard defensive line speed¹¹ which replicates a dogleg then, which then creates gaps. Then the other four you condition not to move forward as quickly and again it produces a dogleg. The other seven play as normal. You wouldn't say anything to the attackers and you would want to see if they can observe and exploit the space created. (Rob's final interview, 7/5/19)

As well as placing pressure on the players through specific conditions when training within the squad, Rob and Neil also sought to pressurise the players through other means, as Rob stated:

So, in terms of the thought processes behind playing the boys in St Matilda's (Pseudonym) and the training sessions we've had against Llanraven (Pseudonym) etc. The plan is to get them within their zone of proximal development or even get them at the edge or over the top, so that the pressure is too much for them. Yeah, so then they will fail quite a lot. Whereas in the past and what they've had leading up to the quarterfinals, there's a lot of success and were not getting challenged enough. So, leading up to the semi-final I wanted them to get a bit of a pasting and a bit of a humbling experience to make them think that they're actually not there at the moment. I think playing them against a higher standard of opposition and having them fail makes them develop more than if things are easy. (End of cycle 3 discussion, 25/3/19)

Within this example, St Matilda and Llanraven are both senior rugby teams with an age and experience profile greater than the U19 players in the squad. It was pleasing to hear Rob using Vygotskian language in relation to players' learning, suggesting full internalisation of the concepts. In addition to the 15v15 match related scenarios, there were also evidence of contextual drill like practices and small sided conditioned games within both coaches' practice. Despite Rob initially being reticent about more closed type activities he was beginning to see some value in them, when used in relation to the context of the game:

¹¹ The speed at which an organised defensive line of players move forward towards the oncoming attack.

I have been very games-based driven in the previous weeks. In order to get these new concepts across to the players I will dial it back to the middle of the continuum using semi-closed practise with multiple outcomes and a lot of decision making. We are all striving to win this Youth (U19's) Cup semi-final in the next 4 weeks, so we have time to dial it down to then dial it back up (game-based) closer to the final. (Rob's cycle 3 reflection, 16/2/18)

This demonstrates that Rob, was thinking about game-based situations and, what he called, semi closed practices. The continuum he was referring to was consistent with the Vygotskian planning framework (Appendix 1) that I encouraged the coaches to use when developing their sessions. It was pleasing to read Rob was still using this as a mediation tool to inform his practice. Neil was also successfully using small sided conditioned games in order to develop the players' scientific concepts, as I observed:

There was a focus on high intensity games e.g., offload touch and drop off touch. The energy and engagement from players and coaches was high, with a focus on decision making. There were teams of six or seven to maximize participant numbers to promote learning opportunities. Two games transitioned into one large 15v15 game of three pass touch. There was a break where the players were given time together to discuss what they needed to work on. Little intervention from coaches. (Cycle 4 observation field notes, 23/3/19)

This observation highlighted the progress Neil had made in relation to working on larger more open, game like activities. It was also interesting to note how there was more pressure put on players in terms of intensity within the initial small sided games. In these instances, fatigue and its impact on decision making was challenged, before progressing into more match-like scenario-based 15v15 games. Also, the discussion time meant engagement with the players' higher mental functioning, providing opportunities for players to rectify any process errors, or reinforce good practice. Furthermore, the fact that there was little intervention from the coaches suggested that the players were problem solving amongst themselves. I felt this session was a culmination of factors and was the best I had seen at that point:

Significant improvements in both coaches tonight. Neil is like a different coach in the larger match-based scenarios. Far more confident with more energy. Players responding exceptionally well to the practices and the scenarios set. Lots of ideas and solutions from a variety of players in the discussions, a real energy within the group. You can see they have a far greater understanding of the processes and are able to articulate this to each other and the coaches. (Cycle 4 observation field notes, 23/3/19)

4.4.4 Discussion – Context, procedures and scenario based coaching

The goal at the beginning of these two cycles 3 & 4 was for the further development of the players' scientific concepts, through the coaches providing context rich practices that related to instances found within a match. Furthermore, the coaches were tasked with utilising the PA provision to review progress on a week-to-week basis. After the PA review process, evidence suggested that through AR cycles three and four, scenario-based learning was increasingly used by both coaches. Nelson et al., (2016) deemed scientific concepts as being related to various team strategies and individual or group tactics, which allow players to think abstractly and act purposefully with regard to particular aspects of their individual and collective sporting performances. Scenario-based coaching aligns with such thinking and has been described as an empowering and powerful approach where performers are presented with contextual problems, to which they must collectively present a solution (Meldrum, 2011). Numerous examples exist of the coaches using scenarios within AR cycles 3 & 4, whereby pressure was exerted on players in relation to intensity, time and space which meant the development of technical scientific concepts were evident. Additionally, by providing opposition players with specific roles, what Rob deemed 'games within games', players' tactical scientific concepts were also challenged. Furthermore, there was evidence from both coaches demonstrating a reticence to stop a practice and intervene when the players struggled for success, this situation meant the players had to problem solve themselves, not only through internally questioning their own skills and processes but also through communication with one another in order to seek solutions to various scenarios.

At this juncture, a possible criticism of this study is that many of the practices related to the scenario based coaching could be viewed as GCA in nature and therefore reproducing existing pedagogies under a different guise. Additionally, despite the coaches not being introduced to specific games based models, many of the common features of GCA's as highlighted by Light (2013) are also associated with this thesis. These features include (1) the design and manipulation of practice games and activities, (2) the use of questioning, (3) the provision of opportunities for dialogue, and (4) building a supportive sociomoral environment. While, this thesis could not be deemed a GCA nor does it want to be considered as such, it can be argued that Vygotskian notions utilised within this thesis could support

coaches, when they utilise a GCA. Contextual understanding and procedural knowledge, related to context rich practice design aligns with first point related the design and manipulation of practice games and activities. Additionally, how coaches use the semiotic mediator of language relates to points 2 and 3 related to questioning and the provision of opportunities for dialogue. Finally, in relation to point 4; building a supportive environment relates to the players being encouraged to take risks, be creative, challenge the coaches and engage in active learning, through peer review and critical discussion. These final points relate, to both scientific concept formation and higher mental functioning. However, to elaborate on the earlier point as to why this thesis is not a GCA, relates to the aim of the thesis and how this action research allowed the coaches to interpret and utilise the concepts provided to them as opposed to the use of a restrictive GCA model (Oslin & Mitchell, 2006). Furthermore, the dialectical approach related to concept formation and the interplay of everyday and scientific concepts and the practical application of these theoretical concepts delineate this from GCA's and make it a unique contribution to field of sports coaching.

Finally, adding weight to the claim of this thesis being unique within sports coaching, is the attempt to practically implement and utilise the notion of the ZPD. As suggested earlier the ZPD is a challenging concept to implement across a squad of fifty players or so. Nevertheless, it focussed the coaches' attention on the learning needs of the players by creating practice situations that placed the players with that zone. In relation to GCA's, criticisms of the approach include little evidence to support technical skill development (Harvey & Jarrett, 2014; Oslin & Mitchell, 2006). Also Renshaw et al., (2015) highlighted that Thorpe (2015) stated, a perfect GCA would be one where the coach has little or no input within the session and the 'game acts as the teacher'. In a Vygotskian sense this 'implicit' learning and subsequent knowledge could be deemed 'everyday' or basic in nature (Hattie, 2009; Phillips 1995; Vygotsky, 1978). A final criticism identified relating to GCA's was that coaches found implementing small sided contextual games challenging particularly without appropriate support (Evans, 2006; Harvey et al., 2010a; Thomas et al., 2013). Such a criticism could be levelled at this thesis, particularly if the notion of contextual understanding and context rich practice design were utilised by coaches without the support of a MKO or a critical friend. Studies by (Cushion et al., 2003; Cushion, Ford, & Williams, 2012; Lynch & Mallett, 2006) found such issues were overcome through the use of CAR, which they found

provided a suitable framework where coaching knowledge and practice could be developed through experiential learning and mentoring. This research suggests that CAR is a useful tool in supporting coach education, thus adding weight to the call for more additional support to be provided for coaches as part of their development journey (Reid and Harvey, 2014).

In relation to rugby union, AR has been used previously by Ahlberg, Mallett and Tinning (2008) and more recently Chapron and Morgan, (2019) and Clements and Morgan (2016). In support of earlier claims, all researchers suggested that AR was an appropriate methodology to assist the development of coaching practice within rugby union. In relation to this thesis, the findings could be of value to researchers, coach educators and coaches by providing a greater insight into how a MKO can influence change within a coaching and playing group. The technical CAR approach provided the opportunity for the coaches to draw on the Vygotskian concepts presented and apply them to their coaching practice. Data suggested that technical CAR was a noteworthy vehicle to elicit change and support the development of coaches' praxis and the players' practice. As the AR cycles developed, the social interactions related to learning, central to Vygotsky's cultural historical theory became apparent between me and the coaches, the coaches themselves and the coaches and the players. The cyclical, iterative nature of CAR provided time for the internalisation of the concepts, which enabled the coaches to demonstrate significant improvement in their ability to apply the Vygotskian notions. Furthermore, the developments in the coaches' pedagogical practice in relation to contextual understanding, procedural knowledge and how they used language had the cumulative effect of developing the players' scientific concepts.

As AR cycles 3&4 progressed, there was a noticeable transfer of responsibility of learning from the coach to the players with far less direct instruction in evidence from the coaches. Such a move saw the players respond positively to the increased autonomy and empowerment afforded by the coaches, points that are supported by the previous work of Koekoek, Van Der Kamp, Walinga, and Van Hilvoorde (2014). The use of such pedagogies suggested that the players' technical and tactical development was enhanced along with their problem solving, logical thought and causal thinking, which are all elements of cognition related to scientific concept formation and higher mental functioning (Vygotsky, 1978). This situation aligns with Croad and Vinson (2018) who observed coaches' practice and discovered a strategy for potential cognitive development was to allow players time to reflect and discuss

any solutions and problems between themselves. They found that the discussions were player led and not a result of prompts or questions from the coach. However, despite some positive reflective discussions, they felt the lack of direction or guidance from the coaches resulted in the players feeling unsupported and lacking in direction. Such findings have numerous implications that contribute to existing body of sports coaching knowledge. Firstly, time and space should be provided to the coaches for them to internalise and implement any new ideas and theories. The sense making process associated with internal speech should also be facilitated by the MKO to prevent misinterpretations that could lead to the dissemination of information that could be wrong (Karpov, 2007). Additionally, in relation to players, the internalisation of scientific concepts related to higher mental functioning i.e., problem solving, logical thought that improves decision making, all takes time and support from MKO's (coaches). These higher mental functions were initiated within AR cycles 1&2 and developed and refined in AR cycles 3&4. A criticism of Vygotsky is he provided limited guidance on the specific social assistance given to learners, although he did stress the importance of mediation and conceptual development (Vygotsky, 1978). Therefore, the interpretation of these Vygotskian notions and how they were applied in practice provides a unique contribution to sports coaching from both a coach education perspective and a player development standpoint.

V. CONCLUSION

5.1 Introduction

The purpose of this chapter is to summarise the key findings of this thesis, demonstrating how the knowledge gained could contribute to the field of coach education and subsequent coaching practice. Furthermore, I will present suggestions for future research and the limitations of this study.

The aim of this thesis was to enhance rugby union coaches' theoretical understanding and application of Vygotskian and neo-Vygotskian concepts to improve athletes' scientific concept formation.

Objectives

1. To facilitate the coaches' application of the neo-Vygotskian theoretical concepts of contextual learning and procedural knowledge within their practice.
2. To ensure that the coaches understand and apply the use of language as the key semiotic mediator of learning within the development of athletes' scientific concept formation.
3. To develop in coaches an understanding and application of the interrelationship between the use of language, contextual learning and procedural knowledge to maximise learning opportunities for athletes.

By addressing these objectives, this thesis adds new research regarding the use of Lev Vygotsky's writings within the realm of sports coaching. Until recently, Vygotsky's work has been largely focused on how it 'could' be applied to coaching practice rather than empirically utilising his work as a lens to develop specific coaches' practice. This thesis focusses on the impact of Vygotskian notions on the coaches' and players' development of scientific concepts and subsequent learning. The remainder of the chapter will provide a summary of findings relating to the Vygotskian notions of how the coaches used language, followed by how the coaches developed and used their contextual understanding and procedural knowledge to provide context rich practice design for the players. The remaining sub sections will initially demonstrate how the findings could have potential implications for coaching practice, provide suggestions for future research before finally, limitations of the study will be highlighted.

5.2 Summary of findings

5.2.1 Coaches' use of language

Language is deemed by Vygotsky as the most important mediation tool for learning. The main findings saw a noteworthy development in the use of questioning and metaphor to advance players' decision making, tactical understanding and critical analysis. The increased use of questioning and metaphor was evident within both PA and practical coaching sessions.

Within the baseline data collection phase, prior to the AR process, it was evident from the observations and initial interviews that both coaches understood the importance of language in player learning. Their use of open and probing questions was a strength of both coaches, but interestingly they highlighted very different experiences that had impacted on their questioning ability. Neil identified being challenged by his WRU level 2 coach education tutor and Rob viewed working with two to seven-year olds in Rugby Tots as being instrumental in developing his questioning approach. Language is considered as the most important semiotic mediator in learning (Vygotsky, 1978). Vygotsky considered language to have a dual mediating role. Firstly, as a way of creating meaning through social interaction, often with a more capable other and secondly, making sense of that interaction through inner speech, whereby the individual internalises and makes sense of the situation (Hasan 2002; Kozulin, 2003). Subsequently, because the coaches were in charge of an under 19's youth rugby team within Milgard university RFC (pseudonym), made up of freshers, one of the development goals for both coaches was to utilise and embed the use of the clubs coaching terminology and metaphors within their practice. Rob had been coaching within the university for twelve months and was familiar with much of the terminology, whereas Neil had been a recent addition to the coaching team and much of the terminology was relatively new to him.

Within AR cycles 1 & 2 the data suggested that both coaches were embracing the club terminology and metaphors as well as developing their questioning techniques further. Furthermore, data also suggested that the terminology and metaphor was not only being utilised within practical coaching sessions but also in performance analysis reviews to challenge players thinking and check tactical and technical understanding, which are associated with scientific concept formation. Additionally, the PA sessions also provided

opportunities for players to utilise club terminology and metaphor, to present clips of scenarios to the coaches and fellow players from the previous week's matches. Coaches would also aim to develop the players' higher mental functions, through questioning their actions and observations which provided a critical analysis of events. As the process moved into the 2nd AR cycle it was also evident that the players were becoming more comfortable with the language and metaphors utilised by the coaches. As well as within the PA sessions the coaches were providing more opportunities for reflection, discussion and peer review within the practical sessions, the data also suggested that the players were gaining in confidence in the way they engaged with the coaches and with each other, often utilising the club terminology and metaphors. This all suggested that the players' scientific concept formation was developing. Vygotsky (1978) believed that scientific concepts are socially constructed between a learner and a more experienced other at the interpersonal level and then internalised on an intrapersonal plane by the learner (Hasan, 2002; Kozulin, 2003). The pattern of improvement continued into AR cycle 3 with players taking a lead role in presenting more complex concepts related to the tactical and technical elements of the game. This was evident in both the PA sessions and the practical training sessions. In the practical sessions there was increased use of 15v15 scenario-based coaching which allowed coaches to facilitate discussion between groups of players, which were often led by a key player e.g., outside half, acting as the more knowledgeable other. The club's terminology and metaphors were now fully embedded within the coaches and players' language. Furthermore, throughout AR cycle 3 and into cycle 4 data suggested there was a reduction in input from the coaches with players demonstrating greater independence in relation to tactical decision making, problem solving and causal thinking. All these abilities are commensurate with scientific concept formation and higher mental functioning.

5.2.2 Contextual understanding and procedural knowledge

The evidence suggested that there was a significant improvement in both coaches' contextual understanding and procedural knowledge resulting in an improved application of context rich practice design. However, the greatest improvement came from Neil, whose coaching prior to the AR process, was more drill like focussing on set piece and closed practice design.

Contextual understanding and procedural knowledge are both factors in the development of scientific concepts. For the purpose of this thesis contextual understanding related to the coaches providing contextual situations that were related to specific aspects found within the game. Procedural knowledge was associated with the practices that coaches developed e.g., small sided conditioned games. Subsequently, because of the connection between context and procedure I decided to integrate the two and form the term context rich practice design, which was more akin to coaching practice. Despite Neil suggesting in his initial interview that his coaching was game related by utilising scenario-based coaching there was little evidence in my observation of his practice to suggest this. Hence, a development goal for Neil was to provide context rich, game related practices linked to the contact area, which was one of his areas of responsibility. Neil initially was in the imitation phase of learning and struggled to provide context rich practices particularly outside of set piece, often placing too much physical pressure on the players, which at times led to injury. At the end of AR cycle 1, the challenge for Neil was to move the players through their ZPD and develop their higher mental functions through varying pressure, while also being sensitive to player welfare. Evidence suggested that this did happen as Neil's context rich practice design improved significantly within AR cycle 2. The improvements began after me and Neil observed a fellow coach, with me questioning Neil and guiding him to observe a number of situations that did not relate to the context of the game. Furthermore, conversations reinforcing the Vygostkian concepts prior to sessions, and within the end of cycle group discussions supported Neil's contextual understanding that led to his scientific concepts being developed.

The baseline data for Rob, suggested that context rich practice design was at the forefront of his thinking when delivering sessions. High speed, game like practices were a feature of my initial observation and I was confident that Rob would flourish within AR cycle 1. However, his initial sessions, based on defence, were by his own admission disappointing. He failed to provide contextually relevant situations to his games-based practices where the amount of players in a given space was too great, providing an unrealistic scenario. The result was players were being insufficiently challenged and not working within their ZPD's, meaning everyday concepts and not the intended scientific concepts associated with higher mental functions were utilised. Rob's disappointment had a significant impact on the remaining AR cycles, whereby he used PA as a mediation tool to observe the number of players within a

space for a given scenario. He would view multiple games to ensure his coaching reflected what would happen within a given situation, something that other coaches within the club also embraced. This observation of practice improved Rob's contextual understanding of a scenario, which meant his scientific concept formation had developed, which enabled the production of appropriate context rich practices that potentially placed players within their ZPD.

As previously mentioned, the role of PA was being increasingly utilised by the coaches to review not only the team's performance but also as a mediation tool to develop their own coaching practice. Hence, PA became a form of cyclical mediation tool within AR cycle 3 & 4, where the coaches would use it to identify areas of weakness from the previous weekend's match, set learning outcomes based on these issues and then review the following weeks match to assess if progress had been made. This process, coupled with the coaches focussing on reaching a national cup final saw a rise in 15v15 scenario-based coaching, whereby specific game related quandaries were posed for the players and they had to come up with a set play or solution e.g., There are 2 minutes of the game remaining, we have a four point lead and lineout just inside our 22, what do we do? The improvement in the players' tactical decision making, problem solving and evaluation of situations was noticeable within AR cycle 3 but by cycle 4 the team were almost independent in their decision making on the field of play where evidence suggested that many of the scientific concepts associated with tactical and technical aspects of the game were now embedded within the players. Similarly, the coaches use of context rich practices were a feature of their coaching, with evidence suggesting that these concepts were fully internalised. Subsequently, their sessions were regularly providing optimal learning opportunities for the players through context rich practice design and how they utilised language. Data also suggested that the AR process had a transformative effect, particularly in the case of Neil, whom by his own admission, thought about the game, and the way he coached in a very different manner from the beginning of AR cycle 1.

5.3 Key moments in the coaches' learning journeys

5.3.1 Neil's learning journey

It was apparent from the baseline data that Neil thought carefully about the learning environment he created and how he explained key points and used questioning to promote thinking and develop technical understanding in his players. Despite Neil stating within his initial interview that he used game based coaching, it became apparent that he was more comfortable coaching closed practices predominantly based around scrum and lineout. In fact there was an admission by Neil in an early reflection (6/11/18) that he had limited experience and understanding of game based coaching and adopting such an approach was proving a challenge. At this early stage of AR cycle 1 it became apparent that Neil was struggling to implement the concepts of contextual understanding and procedural knowledge within his coaching. This led to me and Neil to observing another coach delivering a session and me questioning him on what he was observing when he focussed on the other coach's delivery and how the practices related to the context of the game. I believe this was the first key moment in Neil's learning, something that he acknowledged in the group discussion on the 11/12/18.

It was also in this end of AR cycle 1 group discussion that the second significant moment took place in Neil's learning journey. After he observed the other coach there was a significant improvement in how he applied game related contextual practices, albeit in a small sided activity focussing on the tackle and contact area. However, Neil's interpretation of contextual understanding led to an additional issue related to player welfare, almost all his sessions were full contact. Hence, this led to a discussion, which I initially facilitated, regarding how we were able to vary pressure on the players without always going into full contact. Rob offered some excellent advice and examples of varying the amount of pressure placed on the players through modifying the amount of space, time and the level of contact. He suggested that contact shields could be used for many of Neil's practices and this would potentially reduce the risk of injury to the players. Finally, within the end of cycle group discussion, I asked Neil to take a greater role in leading some of the full team practices and games within AR cycle 2. This extra responsibility resulted in significant improvements in his context rich practice design throughout the AR cycle 2.

Throughout AR cycles 1&2 the use of performance analysis was becoming more prevalent as a learning tool for the players and the coaches in order to develop their coaching practices. Despite there not being a key date that accelerated Neil's learning, it became apparent that he was using PA to develop context rich practices related to the game. PA was also used to reinforce the language and metaphors utilised within the club and to ensure players understood the meaning behind the metaphors and how they related to the various technical and tactical elements of the game. The use of performance analysis continued into AR cycles 3&4, which saw a significant increase in the use of scenario based coaching. I felt this was an extension of the Neil's understanding and development of context rich practice design and while there wasn't a key moment in the cycles that accelerated Neil's learning there was a gradual improvement in his practice as he began to internalise the concepts and became more confident in applying them in practice. Overall, I felt the significant developments in the application of the Vygotskian concepts occurred in AR cycle 1&2 and Neil refined and adapted their use in AR cycles 3&4 as he became more confident in their use.

5.3.2 Rob's learning journey

From the baseline data it was apparent that Rob was confident in delivering games based practices that related to the context of the game. His initial interview suggested that player learning was at the forefront of his coaching and the way he used language to promote tactical understanding and technical development was also a key consideration. I felt the single most significant event in Rob's learning occurred early on within AR cycle 1 when he delivered a session based on defence and moved between a more drill based activity into a 14v13 conditioned game. It was apparent from his reflections that he was extremely disappointed with the way he had delivered the session and the limited amount of progress that had taken place in relation to player learning. The main issues within the drill based practice centred around him either not having enough players within the practice to achieve his desired outcomes. Additionally, within the conditioned game, the space in terms of width he allowed for the practice was insufficient and bore little resemblance to what would take place within the context of the game. These points were highlighted in a feedback email on the 10/11/18 and there was a significant improvement in the subsequent sessions throughout

AR cycle 1. However, it wasn't until the end of the AR cycle 1 group discussion on the 11/12/18 that it became apparent how Rob had acted on the feedback in order to provide practices that related to the context of the game. Within the discussion he explained how he acted on the advice by watching large numbers of televised matches and pausing the play on specific instances relating to defence and counting the number of players and their locations within a given space. Additionally, he also utilised the PA provision from previous matches his team had played to find out if similar occurrences in relation to time and space were evident. Such information resulted in his practices being more related to the context of the game, which suggested that the players learning was also accelerated. As with Neil, the PA provision had a cumulative impact on Rob's development rather than any further key individual moments. As well as matches being recorded Rob also sought to have training sessions videoed, which provided further feedback not only for player development but also for his own practice, another key learning element.

Within AR cycle 3&4 there was a significant rise in his use of scenario based coaching and, through the PA provision, Rob developed ever more challenging situations for the players. He referred to such situations as games within games, whereby he would condition players to do certain things e.g. shoot out of the defensive line to challenge the attack, or deliberately leave space in different areas of the field to observe if the attack could take advantage of the situations. This development of Rob's coaching practice was related to the concept of contextual understanding and procedural knowledge, suggesting he had internalised the notions early in the AR cycles. Additionally, how he used language and set up learning situations for the players also saw significant development in AR cycles 3&4. Questioning had been an apparent strength throughout AR cycles 1&2 but within AR cycles 3&4, the use of peer review became more common. This provided more opportunities for players to take the lead in the discussions in order to provide solutions to the game related scenarios that were being setup. These learning situations developed the players' scientific concept formation and higher mental functioning by improving their problem solving, independent learning and critical thinking skills.

These instances provide an insight into the original nature of this study in relation to the pedagogy, coach education and development. This section highlights how each coach had differing knowledge and understanding regarding technical and tactical elements of the game

and how they applied pedagogical principles. Additionally, the same coaches interpreted different information differently and attributed different meaning to similar notions and concepts. Subsequently, the interactions between me and the coaches took into account the unique nature of their cultural and historical backgrounds, with appropriate strategies for their improvement being set out at suitable times. Within coach education, this data suggests that ways should be found to allow coaches to construct their own ideas that suit their needs whilst at the same time ensuring the players under their tutelage are provided with learning opportunities that allow them to flourish. The evidence therefore suggests a need for an individualised approach to coach education, with time being spent understanding the individual identity of each coach in order to provide the appropriate strategies for learning.

5.4 Implication for coaching practice and coach education

5.4.1 Implications for Coaching practice

The aim and objectives of this thesis associated with the use of language and metaphor and context rich practice design, provides a unique contribution to the field of sports coaching. The study answers the calls from many academics to provide empirical research related to the use of Vygotsky's work within the realm of sports coaching (Jones et al., 2014; Jones & Thomas, 2015; Vinson & Parker 2019; Vinson et al., 2016). Until now no other research has used the Vygotskian notions as a lens to develop players concept formation and subsequent learning. All too often many coaches still adopt coach led, linear practices (Harvey & Light, 2014; Jones et al., 2014), the results from this thesis, particularly in the case of Neil, offer coaches an alternative approach to the development of their practice. One of the many original features of this thesis is the utilisation of CAR to guide coaches through their thought processes by utilising the Vygotskian notions related to context rich practice design and how language is used as a mediation tool. Furthermore, the dialectical approach related to concept formation and the interplay of everyday and scientific concepts and the practical application of these theoretical concepts also provides a unique contribution to field of sports coaching. The result of increased scientific concept formation, meant players' tactical decision making, self organisation, problem solving and position specific technical development all saw

significant progress as the AR cycles progressed. Such progression, ultimately resulted in the team winning the national cup by a record margin, furthermore 16 of the 22 players involved in the cup final progressed to the university 1st team squad and went on to play National Championship rugby the following season. A raw metric, but one that nonetheless demonstrates the progress these players made as a result of the AR process.

In addition to the development of scientific concepts, the attempt to practically implement and utilise the notion of the ZPD within sports coaching is a further original feature of this thesis. Data suggested that the pedagogies employed moved players along their ZPD at a significant rate, leading to improved scientific concept formation. In relation to coach education, this data suggests that coaches need to spend more time planning on how to place players within the ZPD's and accelerate learning further. Nevertheless, as highlighted in Chapter 4 the challenge for any coach is understanding the learning needs of all players, something that can prove a considerable challenge when coaching thirty to fifty players. It is a criticism of Vygotsky's cultural, historical theory that it focusses purely on the individual learning and fails to recognise the importance of the group. The work of Engeström (2001) around activity systems analysis (ASA) focusses far more on how group interacts, develops and ultimately learns. His concept of ASA potentially aligns with how the coaches interacted with me, with each other and the players to promote learning.

This thesis also reinforced the views of the Vygotsky around the importance of language as a key mediation tool for learning. Hence, this study highlights and provides a unique insight into how coaches should carefully consider the language used to mediate player learning whilst also providing time and space for the learners to internalise new knowledge before it can be applied in practice. Within such interactions the specific language used needs to be carefully thought through and scrutinised. If misconceptions do occur then the MKO needs to address these through a series of intervention strategies.

5.4.2 Implications for coach education

As stated in Chapter 1, the primary aim of this thesis was to investigate how coaches interpreted and utilised Vygotskian concepts in order to develop player learning. But there was also a recognition of my role within this process in developing and supporting the

coaches' practice. Subsequently, my experience and a facilitator of learning and the research drawn from this has implications for coach education. In relation to the development of the coaches' practice it became clear during AR cycles 1 & 2 that both coaches had very different learning needs. Subsequently, in order to develop their individual knowledge and understanding, they needed individualised support to ensure they both developed, which drew attention to how I differentiated the support for each coach. Such events led me to conclude that one size does not fit all in relation to coach education and subsequent learning. One of the strategies utilised to develop coaching practice was for the coaches to observe other coaches, as well as each other, while I was present. Within this thesis and drawing on the work of Corsby and Jones (2020), the act of observation and the socially negotiated task of 'seeing', between a MKO and coaches under their tutelage, is possibly a unique within sports coaching research. The interactions between me and the coaches and how I sought to develop their practice, points towards a new appreciation of the need for both coaches and coach educators to make themselves coherent to aid the internalisation of information. Additionally, this study also highlights how a coach educator and coach learn off each other and search for that coherence and subsequent sense making within a given situation.

5.5 Future research

As previously stated, there is currently very little empirical research within sports coaching related to the work of Lev Vygotsky. Hence, despite the relative success of this research it was only completed with two coaches, within a favourable university setting with large numbers of players enthusiastic to learn and progress in their rugby journey. Therefore, such an approach may not transfer into other rugby settings and hence, further research in the area is required. Also, within this study, the views of the players relating to how this pedagogical approach developed their performance was not investigated. Despite witnessing significant improvement in performance through observation, at no point were the players views obtained, which could be beneficial in future research. Additionally, it was a lengthy, time consuming process and one that would be challenging to implement with large numbers of coaches within a coach education structure. Therefore, it would be beneficial to research if the tutor acting as a more knowledgeable other could reduce the contact time and support with the coaches and still obtain similar results. Finally, this research was carried out in rugby

union, an invasion game setting, with an ever changing environment within the field of play. It would be interesting to research if such a pedagogical approach transfers to other more individualised sports that are more closed and technique focussed such as athletics, gymnastic and swimming as well as other games including net/wall and striking.

5.6 Limitations of study

Overall, the study ran relatively smoothly, however, with the data collection lasting over six months it was inevitable that difficulties would arise. From a pragmatic perspective the process was very intense and time consuming for both me as the researcher and the coaches. Subsequently, some of the planned observations were missed because of unavoidable external influences. These factors included the unavailability of the coaches due primarily to work commitments. One of the coaches was a volunteer within the club and it was inevitable that some sessions would be missed. Also, due to my own work and coaching commitments I was unable to attend a small number of observations, hence I relied on the coaches to complete their reflective logs in order to provide an overview of the session. In relation to the reflective logs, initially, all were completed in detail and in a timely manner. However, as the AR process progressed, a greater degree of encouragement was required in order for the coaches to keep up with the reflective process. Finally, at the beginning of the fourth and last AR cycle, there was an outbreak of mumps within the club and subsequently all social interactions and training was postponed for a number of weeks to reduce the chance of infection. This resulted in reduced data from the last cycle.

From a theoretical perspective, the fact that this is a small study only involving two coaches means significant claims cannot be made in relation to the transferability of such practice to the wider realm of sports coaching. Additionally, given the untimely death of Vygotsky and the fact that he never stated how his work should be implemented meant I used my own interpretation of how I thought it should be used. While this could be deemed a strength of Vygotsky's work others could claim that there could be a degree of misinterpretation to suit the needs of the research. Finally, it was my selection of data to 'tell the story' of the thesis, which means that I've dictated the narrative from my perspective. Whilst I utilised a variety of tools to ensure quality and trustworthiness within the data analysis including reflexivity

and the use of a number of critical friends, it nevertheless remains my interpretation of the data.

5.7 The influence of Vygotsky

As stated in the introduction chapter, Lev Vygotsky was not a name I was familiar with, much less his innovative work. However, after spending twenty one years as a PE teacher and slightly less as a rugby union coach, it was inevitable that learning was at the forefront of my mind when teaching or coaching. Through this time, I explored a variety of pedagogical approaches from what are deemed teacher centred to more learner centred, particularly within competitive games. Hence, through experience I began to notice that the enjoyment, engagement and motivation levels of the learners increased when they were provided with tasks or problems within modified small sided games. Setting up learning situations that promoted discussion, exploration and guidance, rather than direct instruction, seemed a fruitful ground for learning. Subsequently, being exposed to the writings of Vygotsky both clarified and developed my thinking in relation to learning, particularly the collaborative and social nature of it. Therefore, with teaching and coaching being a fundamental part of my life, it seemed an obvious choice to research pedagogy and learning. Therefore my own lived experience, my identity and philosophy as a pedagogue, along with the conceptual framework provided by Vygotsky formed the basis of my research. Such musings continue to this day and pervade both my rugby union coaching and academic lecturing.

When coaching and lecturing within the university, my thought process when planning sessions is based around how to place the students within their ZPD. In order to support the student's learning, I also attempt to set up situations and learning experiences that are contextual and related to everyday life. An example within this thesis is that practices should always relate to a specific context or situation found within the game. My own experience as a teacher and a coach, as well as the research from this thesis, suggest that providing relatable context to a situation is a key tenant to learning. A further influence Vygotsky has had on my teaching is related to the amount of support (mediation) provided to the students, whether that be an academic task, new tactic, or technique on the training ground (scientific concept). Within rugby coaching or academic lecturing, in order to accelerate learning, there is a constant balance between the level of challenge or pressure placed on the students and the

degree of support provided (scaffolding). The degree of challenge can come through both cognitive or physical load or a combination of both.

In addition to the contextual nature of learning and the degree of support provided to facilitate learning, Vygotsky's theorising on the use of language has also influenced my pedagogy. How Vygotsky articulated the importance of language as the key mediator of learning, cemented my view of the need for effective communication that will engage students and promote learning. The concept of internalisation and the construction of meaning, firstly through external social speech then through internal speech, again resonated with my own experiences. Hence, the clarity of message and the provision of time for the internalisation of a new concept is central to the learning process and something I am mindful of when introducing new ideas.

In addition to Vygotsky's influence on my coaching and lecturing, many of his theories underpin the coach education I provide within the university rugby programme. Currently there are sixteen coaches within the programme whom have been exposed to such concepts as ZPD, scaffolding, contextual understanding and the importance of language as a key mediation tool within player learning. Both Neil and Rob continue to be part of the rugby programme and have moved to more senior positions within coaching set up. Both continue to use the work of Vygotsky as theoretical lens for the way they approach and deliver both practical and performance analysis sessions. Since the AR process, the improvements in the coaches' practice have also been recognised by the national governing body whom have invited Neil on the Level 3 and Rob on the Level 4 coach education programmes.

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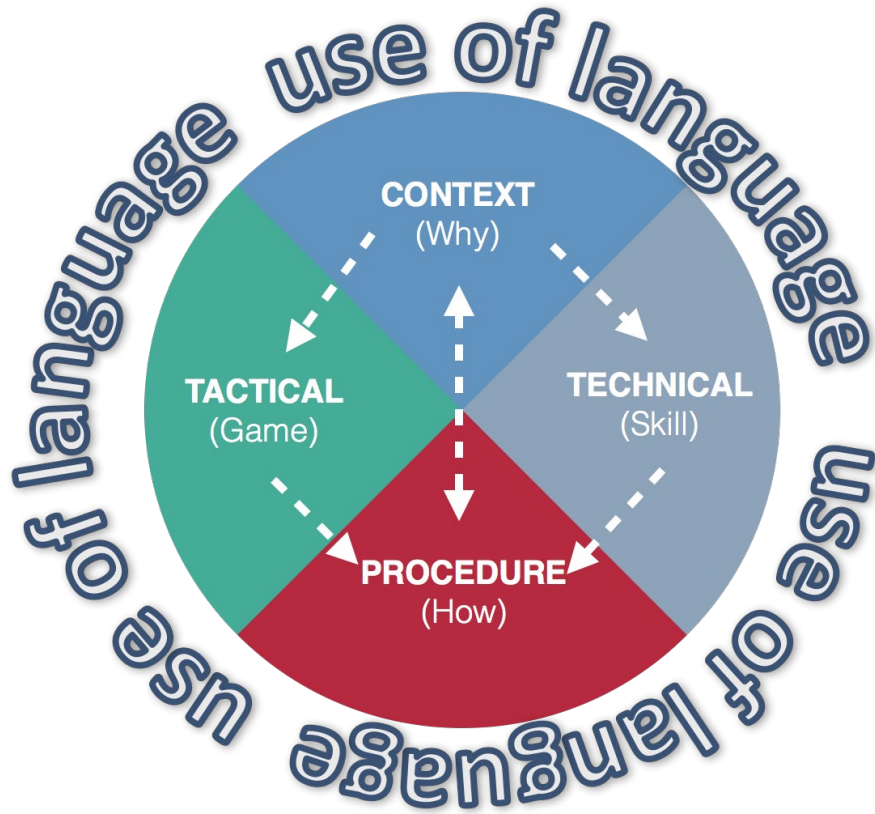
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Appendix 1

Vygotskian notions planning framework



Appendix 2

Observational Field notes with targets

8th November 2018 – 3G Weather – Cold but dry with a blustery wind

Neil

Prior to the session we spoke about how Tuesdays session went (I wasn't there) and he said he found the notion of contextual understanding a useful tool to use when planning and that was pleased with the contact area session, he developed the from the previous week. He said it was more game related. We also critiqued a defence practice that was going on in the 3rds/4ths session. And after some prompting, he began to notice that the practice didn't fit the context of the game. It was 14 defenders v 11 attackers (some with shields). However, he eventually picked up there were 14 defenders in defence frontline with everybody on their feet. He also picked up the impact on the tight spacings and the lack of role understanding of the A, B, C. This was a very useful exercise and highlighted my notions perfectly

1. Lineout Session – It was a fully opposed lineout session where Nick was trying to make it a specific to the game as possible by telling the boys to speed up the calling as they would concede a FK in a match. Varied position and where he was standing to observe.
2. Could have had more groups working on the 4 man to maximise learning opportunities,

Key points

- + When the maul didn't get set up correctly, he broke it down and explained the roles using effective questioning.
- + Did realise players didn't know the calls and showed video for them, but this was late on
- - 6 man spacings were poor and should have been rectified also there were some inconsistent lifts. There were 2 pods as there would have been in youth rugby, but the players weren't taking the free space, Nick should have questioned this and provided more detail on the calls and lifts.

Nick – Contact Area

- + Use of language was good, with a clear explanation of technique (could have shown a full demonstration because there was some initial confusion)
- - Had 3 groups working to maximise opportunities but possibly could have adjusted numbers and had 4 groups
- - No need to have the groups so spread out. This made it difficult to 'distance' coach
- + good 4v3 practice and initial game to condition defenders (overloading 3 into breakdown) to test the body position
- - However, this could have developed further with an even umbers or slightly overloaded attack game in the space relevant to the numbers.

Target for Units (lineout)

- Provide the game specific detail around the jump/lift/throw/drive techniques so there is more consistency
- Maximise LO learning opportunities when the situation allows

Target for Contact

- Think about how the practice or game can progress to challenge the players
- Develop practices that are not full contact but still have a similar intensity
- Keep reinforcing the standardised terminology e.g. winning the race, winning the head and holding space (centring over ball)

Rob

Defence drill defending a Munster with the view of the C defender getting to the attacking C runner (very difficult with initial 5v3 practice)

- + Good to have 4 areas to maximise learning opportunities
- - Had a narrow Munster, and wanted B and C to be on outside shoulders which meant spacing were to large
- - Initially had 3 defenders v 5 attackers (Inc. 1 SH) this was an immediate issue because the C defender had a 2v1 every time. Players were confused with the practice
- - However, despite questioning there were issues around the spacings and hence affected the context. = Detail – stated A to take 9 (not the case = B), Incorrect information was provided e.g. A was too wide, B being on outside shoulder meant that the gap with A was too large. Rhys did recognise this and put the SH as A defender after he passed the ball, however this wasn't ideal

Game related practice – 14 v 13 Initially in a 15m – 15m area.

- - 15m to 15m area was too small with 14 players in the front line, you complained about spacings but there was not an opportunity to have good spacings because of the lack space available
- - Wouldn't have 13/14 defenders in the frontline with the tacklers staying in game on feet
- - Questions – one question was 'what aren't we doing'. This is a very generic question

Targets

- Head Coach – Send out what you want from the week in terms of coaching on the Sunday or Monday to allow coaches to plan accordingly, if changes are made to the plan then inform the coaches at the earliest opportunity
- Really think about the procedures matching the context of the game both in a drill and game scenario

- Think about the pressure you want to put on attackers/defenders and ensure the space provided, the opposition and speed of ball reflect what you want to achieve
- Think carefully about some of the questions and demonstrations you provide in terms of detail

Appendix 3

Reflection example - AR Cycles 1&2

Evening Gards,

Please find last Thursdays coaching reflection,

How did you feel the coaching session went in relation to the application of theory? E.g. Did your practices (procedures) match the context of the game you were intending to cover?

I felt the session was one of the better sessions I've coached, the theme of the session was 'lock zone' and my aim was to reflect this theme in units and 15v15. In units both groups were given 2 scenarios 5m line and 22m line and repped attacking and defensive options in those scenarios and expand with detail. 15v15 scenario was based on playing out from our lock zone. Emphasis was playing from turnovers and scenarios associated with it, e.g a lateral attacking line putting a grubber kick in or turn over from the breakdown.

How did your use of language influence player learning? E.g. Were you happy with your explanations, demonstrations and interventions within the session.

I felt the aspects I touched upon my language used was consisted with language previously used and consistent with the Rhods and Rob sections. for e.g. scanning, lock zone, 2 pass from contact. The demonstration of the breakdown set up from a Jack & Jill was non existent - I think because we had previously touched upon - that thought process from the players would kick, - without retesting that knowledge by asking questions.

Did the players make the progress within the session that you were hoping for?

I feel the development and understanding was there because the theme and context of session was consistent throughout. Units to 15v15 rotations could be related to the same development and scenario. Players could see the development and progress themselves which needs to be taken into a Saturday. But reps, reps and more reps of these scenarios.

Would you have done anything differently and will you make any changes to your practice for the next session?

The main aspect I would have expanded on would have been greater detail. Defensive scrum 5 out from the try line, detail - can manipulate the scrum, defensive roll of the back row - 7 shooting. Secondly demonstrate the breakdown set up if using Jack & Jill - making the breakdown longer using our front row and getting the back row in the kick chase.

Appendix 4

Reflection example - AR Cycles 3&4

23rd March – Semi Final v YR

Please find my reflections below.

Q1 How has your coaching had an impact on the players performance within the match? (this can be related to your specific coaching areas e.g. Nick = contact area)

Things to consider:

- **Are players transferring training processes into matches?**
- **What aspects of the performance during the match do you consider to be the most successful?**
- **What areas from the match do you think you need to develop further?**

Reflecting on the game, two areas where I feel my coaching has had an impact on is in the 'contact area' and 'set piece'.

'Contact Area'

Several sessions leading up to the Ystrad game, I have been highlighting two areas 1) Ball carrier work rate on the floor to create a long present scenario. 2) Support player in the 'latch' role, dealing with the threat before a threat occurs by 'winning the race' with emphasis on profile.

Reflecting on the footage from the game I felt for large parts of the game players bought into that process. Leading up to the game I highlighted the importance between our work rate in the contact area and our secondary pods scanning / work rate off the ball – increasing our overall attacking tempo. Our aim is 3 to 4 seconds maximum in the 'contact area'

We had 40 attacking contact scenarios during the game – 60% were completed in 3 seconds or less. Contact area in the 'lock zone' linked to exits averaged 6 seconds. Squad target has been 50% completion – now we are increasing that figure to 60%.

In relation to further development – I still feel hesitation creeps into our game in the 'contact area'. In respect of decision making when in the 'latch' role. Continuing the work of winning the race.

'Set Piece'

Scrum was again consistent- unfortunately 1.5m doesn't benefit us.

Our lineout both in attack and defence functioned well. Defensively we identified the opposition only had 2 lineout threats in both a 7man and 5man set up. We had been working on any defensive line outs outside the 'Lock Zone' – Pod 1 would always compete in the air – putting pressure on the throw – the idea was for us to win the race to the ball- explosive in the jump and lift. The opposition hinged and pre gripped which allow us to scan the lineout easier. Lineouts in the 'Lock Zone' we would scan and set Red 1 or Red 2.

On 3 occasions we were able to gain turnovers from defensive lineouts and regain possession. In terms of development over the next few weeks 2 aspects will be the focus. I still feel from an attacking position we can still gain more height in the jump/lift as on occasions we weren't

chest to chest and giving inches in height. Development here is out lift technique. The second aspect will be – I feel we can play off ball from 'zone 3', 'zone 4' more. However, our hookers are current short with their throwing in these areas – specifically zone 4. We will look over the next few weeks in analysing and developing throwing technique.

Q2 Briefly outline what practices you will use within the next training session to achieve your aims based on your reflections from the game.

Lineout

- Breakdown our lifting technique - in relation to our calls. Analyse – if the call is 1F are we not getting the height due to timings or is it just lazy in jump/lift. Break off into groups of 6 – 2 Pods – rep the lifting process. Live POD v POD Bring this back into a Live scenario environment.

Contact area

- Groups of 3 then into groups of 4 - looking at our contact area profile both as the ball carrier on the floor and support players. Change the angle of running as players don't always come square on in the contact area. This will then take into a conditioned game with emphasis on the above points.

Appendix 5

End of cycle feedback

Rob

Units

- Very good intervention, ensuring some pressure was put on the backline attack, unopposed is and unrealistic situation that does not always facilitate learning at the level we want. With the two coaches present, you could have also focused on the defensive aspect for that last part of the Unit segment. This would have been a very good learning opportunity for all players concerned both playing and observing.

Lock Zone Defence

- Excellent setting of the scene with high level of questioning to provide guidance and check understanding. The level of grab and the defence ensured a game like context to the practice.

Game

- Very good questioning throughout to facilitate understanding. Within these full contact sessions ensure that you have a clear aim from what you want. Also think of making more use of the other coaches to look at other areas e.g. contact area, block lines etc.

As Head Coach

- While you want to give the other coaches agency in terms of what is being delivered, it is important you consider opportunities for learning that they set up e.g. Rhod setting up unopposed practices. A discussion around this gets you all thinking about maximizing the learning opportunities in relation to player numbers, amount of space and the level of contact.

Neil

Units

- While I didn't spend too much time watching this, the opposed session meant processes were put under pressure and calls were questioned, which provided a very good learning opportunity for players. As a development, think about an outcome from each LO. Get a 9 to come with you and work on either a drive, off top to 9 or trigger delivery. This allows more detail.

Load Zone

- Very good setting of scenarios relating to what could happen in the game, but as the practice develops think about increasing the level of pressure on the processes in relation to the level of contact/grab and reducing the amount of space. This then provides a more realistic game like context that ensures greater depth of learning.

Game

- Very good questioning throughout to facilitate understanding. Within these full contact sessions ensure that you have a clear aim from what you want. Also think of

making more use of the other coaches to look at other areas e.g. contact area, block lines etc.

Overall – When planning/thinking about the session, think about almost every situation is a learning opportunity. Then gradually (if applicable) increase the level of pressure/stress on the players to ensure a scenario is as close to the game as contact/player welfare will allow.

My Reflections (Pre-feedback) – End of 2nd Cycle

Neil – Neil is far more comfortable around me and we have numerous informal chats around rugby and other things. I have sought his opinions on many of the youth players and taken on board his opinions around selection. It is apparent we have similar views on players which again has meant the connection and bond between us has grown stronger, increasing the level of trust. He now feels far more embedded within, not only the youth coaching group but also the wider 1st and 2nd team group. This has been evident on the coaches WhatsApp group where Neil now makes far more contributions regarding players and opinions. Regarding our relationship, as it has grown, I feel he always wants to impress and is keen to show that he is developing as a coach. He is more settled within the coaching group particularly since Rob has given him more autonomy to do what he wants particularly with the forwards. There has been a noticeable improvement in the practices and small sided games matching the context of the game. His communication is very good and he is far more comfortable using the club metaphors, his questioning remains at a high standard. The players take on board what he is trying to do and the processes/procedures that he has put in place. We have discussed the need for detail around some aspects of the set piece and contact area and the need for Nick to avoid going full contact in every session, he has done this but initially struggled with the concept of ZPD, with too little pressure being put on the players processes and subsequent learning. However, this is something he thought about and implemented in his next few sessions and I feel that scientific concept formation is at the forefront of his planning and thought processes. Again, this has given him more confidence and he is noticeably more relaxed in sessions where I attend.

Rob – Rob is making consistent progress in not only his coaching but also his role as a head coach in terms of managing the others. He has taken on more responsibility around ensuring player learning needs are met (Developing their scientific concepts). Rob challenges the coaches in relation to the ZPD and the amount of challenge placed on the players and the speed that new concepts are introduced. This happens more so with Rhod (attack coach) because they are both backs coaches and also close friends hence, they are more comfortable arguing or having strong opinions on the amount of challenge and subsequent pressure that is placed on the players. He does this to a much lesser extent with Neil whom he has known for a much shorter time. It is interesting that the context rich practices have steadily become more embedded in his thoughts and it is now 2nd nature within his coaching. Furthermore, it is evident that he is very keen to improve the players scientific concept formation and subsequent learning further because through the use PA. It has become increasingly apparent that PA has become a source of providing context to a session on a specific aspect of the game e.g. contact area. He is also providing the players with the clips in order that they can discuss and comment on them in a social context prior to the analysis session and the subsequent

session. As stated previously, I feel Rob values my opinion on this and is in total agreement with the way I view coaching. Finally, Rob has now devised a specific set of conditions and expectations around the 80% grab they will use in the sessions to best replicate the speed of ball from a game. It will predominantly be used in a 15 v 15 situation but can be adapted with lesser numbers. This is something we will also adopt within the 1st team. Some excellent ideas ensuring a consistent approach throughout the sessions. Rob is almost like an assistant mentor to me now.

Discussion with Rhys 12/3/19 – Related to the session the previous week 7th March

The context of the session was to get Neil to select and apply different scenarios that could occur during the game. In essence it was very game specific, but Rob felt that Neil had not prepared and planned the scenarios in enough detail. This was something he addressed with Neil after the session and they agreed that more detail was needed around the scenarios. Furthermore, Rob also felt that some of the players struggled with this concept particularly when they were asked to justify the reasons why certain decisions were made. Good for players to take them out of their comfort zone. (ZPD) – Rob believes it promoted discussion and reflection with the players and essentially made the players think.

Appendix 6

Baseline data semi structured interview questions

General Questions

- Coaching experience and why they coach?
- Areas of strength and areas for development within their practice
- Could you provide a brief overview of a session or an aspect of a session you have recently delivered? (get background idea/overview of how a session is organised)

Linked

- What are your thoughts when planning or organizing a session (Context)
- How would you organize and introduce an activity? (Procedures)
- What do you tend to observe within the session (what is the focus)?
- When would you intervene and how they provide feedback or guidance
- Do you reflect on the session, both within and after sessions?
- how is this done e.g. what do you focus on, good/bad points

Introduce Vygotskian notions

Appendix 7

End of AR cycle 4 semi structured interview questions

Questions – These are only an outline. There is potential overlap between questions. I just want to capture your honest thoughts and experiences from this mentoring programme.

- Before you began this mentoring programme, can you describe how you thought about and planned your coaching sessions (provide examples if possible)
- Has this mentoring process caused you to think differently about your coaching? If so, can you provide examples.
- From my observations and the level of performance from the players it is evident there has been a marked improvement in your coaching. What do you believe are the main reasons for this?
- Your personnel reflections were a major element of this process, can you explain how you reflected both during and after your session.
- Contextual learning and procedural knowledge (ensuring the practices match the context of the game) have been two conceptual theories that we have focused on this year.
 - a) How have you implemented these within your coaching? (use examples)
 - b) Explain if they been difficult/easy concepts to implement?
- How the coach uses language to facilitate player learning is a key aspect of coaching. How have you incorporated this into your sessions?
- Can you provide any information on any aspects of the process that you found challenging?
- What impact do you feel this process had on the players
- How do you feel role of PA had an impact on your and the players learning?

Appendix 8

PARTICIPANT CONSENT FORM

Participant name:

Title of Project: The development of Rugby Union coaches' pedagogical practice using Vygotskian and neo-Vygotskian Concepts

Name of Researcher: Ian Gardner

Participant to complete this section: Please initial each box.

I confirm that I have read and understand the information sheet for the above study and participate in everything that I am expected to. I have had the opportunity to consider the information, ask questions and have had these answered.

☐

I understand that my participation is voluntary and that if I have any issues, I can freely discuss such issues if so needs be. Furthermore, I am free to leave the study at any point.

☐

I agree to the use of anonymised quotes in publications

☐

I agree to the researcher collecting data relating to my coaching practice via observation, video recording, log books and audio recorded interviews and focus groups.

☐

I agree to take part in the above study and that all information provided will be anonymised.

☐

Signature of Participant

Date

Name of person taking consent

Date

Signature of person taking consent

When completed, 1 copy for participant & 1 copy for researcher site file

Appendix 9

Information Sheet for coaches

Project Overview

Aim - The aim of the study is to develop Rugby Union coaches' pedagogical practice using Vygotskian and Neo-Vygotskian Concepts.

Background - The purpose of the study is to improve your coaching and pedagogical practice over a period of 4 – 5 months. The study will take place within Cardiff Met RFC and data will be gathered on the usual training nights, with no extra sessions or increased commitment necessary above what is already done.

Vygotskian and Neo Vygotskian Concepts - The aim of the study is to develop your understanding of player learning by using pedagogical approaches linked to Lev Vygotsky. In order for new learning or the acquisition of scientific concepts to take place he believed that a significant other e.g. a coach was required to facilitate and aid this process. Contemporaries of Vygotsky also believed for true learning to take place, individuals must have a contextual understanding of a situation e.g. game of rugby and the procedure or learning situations must align and relate to the context i.e. hence put simply the practices you carry out must be contextual related to the game. Furthermore, Vygotsky also saw language as the key mediator in learning and the clarity of information provided by the significant other being central to the learning process.

Research Design - The research method for data collection will be Action research (AR). This will involve working through a series of cycles which focus on (a) diagnosing any areas for development; (b) planning what will be covered within the sessions; (c) delivering the training sessions; (d) reflecting and evaluating the delivery within the training session. This in turn will lead to a new cycle, following the same process, potentially leading to new objectives and further planning.

Initially I will attend a coach pre-session meeting and observe your coaching practice. The purpose of attending the coaches planning meeting and observing practice is to establish an understanding of current pedagogical practice

Within the first action research cycle the following steps will be followed:

- Individual Interviews will be carried out at the beginning of the process to gain an understanding about your coaching background and any current pedagogical understanding they may have. Furthermore, the meeting will also introduce the Vygotskian and Neo-Vygotskian notions that will be used within your coaches' practice
- Coaching targets will then be set, based on initial observations and interviews and will be agreed in collaboration with yourselves
- The session will then be delivered focusing on the agreed targets and the incorporation of the Vygotskian notion within your practice
- You will also be required to keep a reflective log based on a template provided (attached)
- Based on the observations and reflections, collaboratively, we will set new targets prior to the 2nd AR cycle and subsequent AR cycles.
- Further AR cycles will continue in a similar way, with the additional use of audio and video equipment
- A final interview will take place at the end of the final AR cycle to determine the impact of the study on your coaching practice

Why you?

You are coaching within Cardiff Met RFC and you have at least one-year coaching experience within the university, but more importantly, you are showing a willingness to develop as a coach.

What will happen if you join the study?

As explained above in the information section, there is a time commitment from you, but not a great deal more than your current duties. You will be exposed to new academic theory and literature and possibly a different way of coaching. You will not be expected to do any extra work out of the meetings and sessions, apart from writing a weekly reflection. Your sessions will also be videoed, and audio recorded on two occasions per AR cycle and you will have full access to this and it will be used to form the basis of your reflections for that AR cycle and future targets.

Can you leave the study at any time?

You are free to leave the study at any given time. However, I do not envisage you wanting to pull out of the study as you are an enthusiastic coach, eager develop your practice. However, if the commitment becomes too great then contingencies can be put in place to alleviate the hindrance.

What happens with the data gathered during the study and to the results?

I am responsible for analysing all the data gathered during the course of the study, which will be used to answer the aim of the study through addressing the objectives stated above. You will have the opportunity to read the study and will be sent any subsequent publications that come out of the study.

How will your privacy be protected?

All information obtained is strictly confidential and your privacy will of course be respected. Every effort will be made to ensure no individual will be identified from any data collected. All information will be anonymised, and no trace can be made back to you.

On completion of the study, all fieldwork notes used to gather data will be destroyed. However, due to university regulations, copies of transcripts and observation will be kept in a secure location for 7 years post study.

For any further Questions

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