# “Not all things in the real world can be done by the book”: A self-study examination of teaching practice in sport science.

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# Abstract

This thesis considers the incorporation of practice knowledge and competencies into practical class teaching through a self-study of sport science pedagogy. The growth of sport science and related education programmes continues apace despite continued criticisms of sport science practice, a dominant biomedical epistemology in academia and didactic instructional methods. Examining my teaching practice through a 'pracademic' lens (Posner, 2009) of sport science pedagogy, I focus on my interactions with my site of practice (Schatzki, 2002) to address these criticisms. This then leads me to consider how practical classes can influence the development of sport science students towards theoretically informed expertise (Benner, 1984).

My self-study methodology explores an Active Blended Learning (ABL) (Armellini & Padilla Rodriguez, 2021) approach to promoting student engagement in dialogue and reflection (Freire, 1970; Mezirow, 1997) for the development of practice knowledge and competencies. A qualitative approach incorporating self-study (Samaras, 2011) and action research (McNiff, 2002) is used to interrogate this process with feedback from students and utilised fellow pracademics as critical friends to focus my reflections.

Findings on the impact of an ABL approach are in keeping with active learning approaches in other disciplines. An ABL approach encourages reflection-on and in-action (Schön, 1983) among students which demonstrates that practitioner competencies can be developed through practical classes. Lecturers that use a pracademic lens in their teaching are uniquely placed to assist students in developing the breadth of knowledge necessary in sport science practice.

In gaining insight into my pedagogy, my research argues that a pracademic-focused pedagogy emphasises the development of applied practice knowledge. This can be achieved by incorporating elements of ABL, creating constructive learning experiences for students that go beyond didactic teaching and scaffolding the development of practice-focused competencies alongside traditional forms of theoretical knowledge. A framing of higher education as a foundation for developing future expertise may assist educators in developing programmes that improve the effectiveness of sport science practitioners at later stages of their careers.

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# List of Acronyms

| | | |
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| ABL | - | Active Blended Learning |
| BL | - | Blended Learning |
| BSc | - | Bachelor of Science |
| CAO | - | Central Applications Office |
| CBL | - | Context Based Learning |
| COVID-19 | - | Coronavirus disease caused by the SARS-CoV-2 virus |
| DCU | - | Dublin City University |
| DHAE | - | Doctorate in Higher and Adult Education (Maynooth University) |
| EBM | - | Evidence Based Medicine |
| EC | - | Explosive Conditioning module |
| ELC | - | Epistemological Learning Chain |
| EPA | - | entrustable professional activities |
| GAA | - | Gaelic Athletic Association |
| HE | - | higher education |
| KPI | - | key performance indicator |
| LTE | - | Learning and Teaching Enhancement (University of Northampton) |
| mcq | - | multiple choice questionnaire |
| MSc | - | Master of Science |
| MU | - | Maynooth University |
| NSCA | - | National Strength and Conditioning Association |
| PBL | - | Problem Based Learning |
| S&C | - | strength and conditioning |
| S-STEP | - | self-study of teacher education practices |
| STEM | - | Science, Technology, Engineering and Maths |
| UK | - | United Kingdom |
| USA | - | United States of America |
| UKSCA | - | United Kingdom Strength and Conditioning Association |
| VLE | - | Virtual Learning Environment |

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# Prologue - Welcome to My Practical Classroom

It is 2pm on a Friday afternoon in a cavernous sports hall and the students are probably already tired from a full morning. They are chatting amongst themselves though and that is usually a good sign. "*OK, let's go*," I call out to signify that it is time to start today's practical class. Everyone huddles around me, forgoing the vast space.

"*How's everyone doing today, what did you cover with David this morning*," I ask. "*Snatch lifts*," says Brian. "R*ather you than me*," I reply. "*Did anyone dislocate their shoulder?*" I ask with a certain glee, knowing nobody did as the entire group is standing before me. "*We usually get one or two a year teaching snatch*," – they look at me with a mix of wonder and disgust. "*If you look at bad Snatch technique*," I begin to explain, "*you can see how the load pushes the shoulder girdle anteriorly, to where its weakest. It all comes from the first phase of the lift and if that's not correct, the final catch is usually off.*" I adopt the odd and ungainly position of someone trying to demonstrate a poor overhead squat position without a bar. Nobody comments or makes a remark and so I move on. "*OK… did you all get a chance to view the video I put up?*"

I find myself doing this a lot.

I begin a class by trying to engage the group in conversation and then going off on some minor tangent about a topic that is not directly related to my class but is somewhat interesting and often process driven. What I mean by 'process driven' is that I am trying to help students understand the thought process behind the outcome – how theory and logic can be interpreted to inform practice. It is easy to conceptualise the link between being weak and getting injured, but it is not as easy to work through a process that begins well in advance and culminates in a final event. This process is essentially what the practice of being a sport scientist entails. Process here refers to what Woods and Davids (2022, p. 3) characterise as the "art of inquiry" in sport science or "thinking through making and doing". This reflects reality in which sport scientists require careful attentiveness and selective responsiveness in their practice that cannot be fully informed by traditional hypothetico-deductive theories of science that dominate the field (Wood & Davids, 2022). Like all practices, being a sport scientist involves knowledge that is inseparable from action and context (Schatzki, 2002; 2005). This reflects conceptualisation of learning as being inseparable from doing and place (Woods et al., 2021b). These topics are explored in detail in chapter 2.

As sport scientists we are support staff. We are there to support the work of the sports coaches and help to optimise an athlete's or team's performance but ultimately, we have limited control over the final outcomes so we must look at the process the athlete goes through to be effective in preparing them for success. This means knowing where the athlete is at on their athletic journey as well as knowing what the journey might look like in its entirety.

"*I thought the video was good, yeah…*," says Kate. "*It was interesting to see how those exercises are done in real life,*" says Michelle. We are now discussing videos that relate to today's class topic which were made available to students earlier in the week. What Michelle says gets to the heart of the aims of these practical classes. It should be practical, meaning it should focus on elements of practice that will be applicable to their future expertise. It is driven by theory, but applied practice orientated. The end goal should be for students to be able to produce some tangible understanding of the concepts of the day – one that they can bring with them and employ in their own future practice or perhaps some understanding that will become a catalyst for future inquiry. "*Did you notice the alignment of the spine as the athlete started initially*?" I ask later in the conversation and immediately I wonder should I have interjected or not.

This is always the dilemma.

How can I support the students' learning whilst also teaching? How can I help students to reflect on their own thoughts and practices in a manner that is evidence informed but also cognisant of the limits of this evidence? What is the balance of student-centred inquiry and teacher-driven discussion? How much allowance should I give for students giving their opinions and insights when they largely seem to want to hear my opinion and insights?

We have gone from the students giving their opinion of what they saw to my espousing my belief of what is important. I find there is a delicate balance in trying to develop learning that I think is required and knowing I am there to facilitate their learning. I want my practical classes to be student-centred and exploratory, but I also acknowledge that I have expertise in the subject and the students look to me to share that expertise. They have chosen to learn about sport science from people who know and understand the field.

On this particular Friday we are discussing the alignment of the spine in sprint accelerations. I provide some demonstrations of the movement and invite discussion. Correct alignment is often termed a neutral spine. A neutral spine is the healthiest position

for the spine to be in and its importance is repeated ad nauseam to students throughout exercise science programmes. However, it is more of a heuristic than a prescriptive rule. I explain to the students that in sprint accelerations, the spine may be allowed some flexion away from neutral to assist force production in the first few steps and this is what is shown in the video on acceleration that I asked the students about but what happens when these students are coaching a rugby player instead of sprinter? Both need to accelerate as quickly as possible but the rugby player will likely be hit with a collision early in their acceleration - in which case they certainly do not want their spine to be in a disadvantaged position - whereas the sprinter can focus on optimal acceleration. Both athletes need to accelerate in their sport and the students need to understand good acceleration mechanics, but the context of the accelerations and the constraints imposed by their sports are quite different. Students need to know and understand the day's topic, but they also need to bring that knowledge and understanding with them when they start to work with people in their own contexts and constraints.

# Chapter 1 - Introduction

## 1.1 What is my research about?

> There is only one corner of the universe you can be certain of improving, and that is your own self… So you have to begin there, not outside, not on other people. That comes afterwards, when you have worked on your own corner.
>
> - Aldous Huxley (1945)

My research explores the complex process I went through as I set about examining my field of practice, my pedagogy, and the resources I use as a lecturer in sport science. This thesis investigates how applied sport science and self-reflective practices can be incorporated into practical sport science classes in order to facilitate an effective learning environment for students as future practitioners. Initially my research was based on a personal desire to change what I saw as limited technical instruction in sport science practical classes. However, it became clear early in this process that, in order to influence such transformation, I first had to acknowledge the site (Schatzki, 2002) and conditions of my teaching practice, of which I had been only tangentially aware until I engaged in deep reflection (Casey, 2012). According to Schatzki (2002), the everyday actions we take in our practices are tied to the contexts in which they take place, and this is referred to as my site throughout this thesis. Awareness of these influences led to deeper interrogation of them and the pedagogical approaches that could be used in response to them. In interrogating my site of practice - sport science education - I began to see features of education and applied sport science practice that constrained my teaching. I then began to question the 'how' and 'why' (McNiff, 2015) of the types of knowledge that I deemed appropriate to develop in my practical classes. Rather than simply identifying the issues and attempting to correct them, I found a need to better articulate them to understand them. This thesis then became a self-study of my teaching practice as a way of interrogating sport science education. My motivation developed from trying to 'fix' practical classes to a more nuanced response to the repeated call to improve the provision of sport science services, and in particular address the gap between education and practice (Reade et al., 2008; Finch, 2011; Martindale & Nash, 2013; Fullagar et al., 2019b; Bartlett & Drust; 2020). Associated with this was a desire to challenge what I saw as criticisms of sport science and how we develop sport science practitioners in third level education (for example, James, 2011; Bacon, 2019; Spillane, 2022; Fullagar et al., 2019b; Ingham, 2022). A dominant biomedical epistemology in academia is associated with sport science

despite applied sport science being a biopsychosocial practice (Schneider, 2016; Jeffreys 2017; Petrovic et al., 2017; Ross et al., 2018; Woods et al., 2022b). Furthermore, didactic instructional methods have previously been criticised in sport science education and similar fields (Ladyshewsky, 2002; Weeks & Horan, 2013; Manley et al., 2016). Despite these criticisms sometimes coming from non-sport scientists or lacking academic rigour and substantive critical analysis, I believe they are worthy of interrogation. This is particularly the case when viewed in an Irish context where there are no accrediting bodies in sport science and very few established roles in elite level sport. What I have found has implications for both sport science pedagogy and my teaching practice and adds to a growing body of literature on the development of sport science practitioner competencies.

From a sport science pedagogy perspective, my research supports the used of active learning approaches in teaching practical classes. Methods - such as the Active Blended Learning (ABL) approach that I took – facilitate the development of a range of knowledge through effective learning spaces, dialogue and reflection-on and in-action (Schön, 1983). My research demonstrates that practical class settings can be used to develop this range of knowledge in students which supports them in the early stages of their learning journey and helps to develop psychosocial and practitioner competencies that are associated with more effective practice (Szedlak et al., 2019a; Gearity et al., 2021). The in-depth examination of my teaching practice has focused my appreciation of the social and historical contexts of sport science and better informed my understanding of the field. In particular, my teaching practice has been influenced by developing a greater understanding of a praxis (Freire, 1970) view of personal inquiry and an appreciation of qualitative inquiry. A key development in my teaching practice has been development of my own critical reflective practice and the process through which I go to better understand my teaching practice. In this thesis I identify as a pracademic, someone who concurrently works in academia and practice (Posner, 2009; McDonald & Mooney, 2011). My research supports the notion of a pracademic in sport science education and highlights the value of lecturers who hold this position from both a pedagogy and a student's perspective. A framing of higher education as a foundation for the development of sport science students towards theoretically informed expertise (Benner, 1984) may assist educators in developing programmes that improve the effectiveness of sport science practitioners at later stages of their careers. Furthermore, my research offers a methodological example of self-study of sport science education practices.

Self-study is characterized by an examination of the space between the self and practice which provides educators with a means to research and write about their teaching in a reflective manner (Bullough & Pinnegar, 2001; Kitchen & Stevens, 2008; Samaras, 2011; Samaras et al., 2019). Additionally, my understanding of my practice is central to my self-study. The concepts of a self-study methodology and practice theory are discussed in more detail in chapter 3. However, both concepts are important elements of why I am undertaking this research. I refer to the work I do as my practice and, in doing so, try to convey more than the job description of being a lecturer. In this thesis I refer to my 'practice', 'teaching practice' and 'lecturing practice' synonymously but 'practice' is the key word. My practice is about more than the acts of lesson planning, assessment setting, examination grading and administration that come with the role of lecturer at an Irish university. My job involves all of this but it in practice it is much more. In this regard I am influenced by the work of Schatzki (2002) who posits that the work we do in society is firmly tied to its context or 'site ontology'. Therefore, as well as all the acts associated with my job, my teaching practice is influenced by the site in which I work – sport science education. In referring to the work I do as a practice, I am acknowledging that my practice coexists with the practice of those who are also working in sport science but with whom I may not have direct interactions (Schatzki, 2002). Central to this practice lens is the idea that the social world around me is an ongoing production that emerges through the recurrent actions of sport science practitioners, including me (Feldman & Orlikowski, 2011).

Examining one's own practice; describing what was done and analysing why; offering what others might learn from it – these concepts will be familiar to other sport science practitioners. This process describes much of how professional development takes place in the field. Conferences and symposiums are centred around practitioners offering insight into their own practice as a way of self-interrogation and as a means of developing social learning. This thesis can therefore be considered as me standing up in front of my peers and saying, 'this is what I do, this is why I do it and this is what I have learned in the process.' In doing so I hope to add to my field of practice in a constructive and meaningful manner. Many of the conversations that I have with my academic colleagues reflect the topics that I explore in my research. The interaction of these topics invariably ask us to approach our education from both a pragmatic and idealistic standpoint. Such questions as deep introspection and analysis to develop operational actions, questions such as: is the practice of a sport scientist a science or an art?; how can I ensure improve

the practice of sport scientists through education?; what does good pedagogy look like?; can practical classes and pracademic knowledge be leveraged to improve sport science education?; and how can we progress from traditional didactic teaching towards a more constructive learning approach? Only by acknowledging and understanding my own practice can I hope to have a meaningful impact on the practice of others (Schön, 1983; Whitehead, 1989; Samaras & Freese, 2006; Samaras, 2011; Casey, 2012; McNiff, 2013). However, there is an additional motivation for carrying out this research.

I began lecturing on a part-time, fixed term contract in September 2016 with no teacher training. When I began, I was working as a self-employed sport scientist/ strength and conditioning (S&C) coach with a range of small-scale contracts with national governing bodies and high-level sports teams. I also worked with some athletes on a one-to-one basis. Previously, I had completed a Bachelor of Science (BSc) in Sport Science and Health in 2011, and a Master of Science (MSc) in Strength and Conditioning in 2016. I developed a range of practical skills and knowledge, as well as professional qualifications, in the years leading up to that fixed term contract and was able to draw on these when I began teaching. However, I knew nothing of concepts such as pedagogy, ontology, or epistemology. In 2018, as I began to look to advance my teaching practice, I became aware of the Doctorate in Higher and Adult Education (DHAE) programme at Maynooth University (MU). This programme offered a route to a level 10 qualification through professional doctoral research. A professional doctorate allows for the practical development of work-based skills and knowledge, which then impact upon practice (Fulton et al., 2012). I was attracted to the programme as it appeared to offer a broader learning experience than a PhD route, and could offer potential avenues for learning that my education to date had not. My DHAE research has thus become my teacher training.

This thesis began with a fictional vignette of what one of my practical classes is like. Vignettes into my teaching practice and anecdotes on sport science are included to give insight into the reality of my practice and how I view sport science practice. They are intended to serve as fictional or real-world scenarios that invite the reader to reflect and respond from their own practice perspective (Braun & Clarke, 2013). The vignettes concerning my practical class teaching convey a typical practical class and follow the lead of Gearity and Mills (2012) in presenting a fictional account of practice based on factual events. They are designed to offer clarity on my perspective and offer insight into how I experience and interpret classroom events. The use of anecdotes reflects a tool I often use in teaching. I often ‘storify’ (Aura et al., 2021) theoretical information in my

classroom to illustrate points to my students or to try to contextualise theory within practice scenarios. This type of biography-based learning has been shown to be effective in other modes of teaching, such as language learning (Luzerne-Oi & Korschenmann, 2018). An additional 'device' is utilized in this thesis. Sections of text concerning vignettes of my personal practice are aligned to the left of the page. This is to distinguish personal perspective from a more traditional style of academic writing, which utilizes a justified margin format.

## 1.2 What did my research entail?

With my research I am examining my own teaching practice by exploring the learning environment I construct with students. I planned the 12-week delivery of a module, sought formative feedback from students throughout and summative feedback at the end of the semester in an effort to improve my own teaching practice and contribute to the body of knowledge on sport science educations practices. Student feedback focused on how the students interacted with the module delivery and perceived its effectiveness in developing their professional practice competencies. I also consulted fellow sport science lecturers on their approach and sought responses on my initial findings. Practical classes cannot develop all of the skills and knowledge required by sport science practitioners, but there are context specific requirements that have to be lived to be learned and practical classes can be effective in developing the foundations for this type of learning. Having a research approach that allows me to examine my own practice yet remains rooted in my field of practice is important. This research project may end with the submission of a final thesis but my enquiry into my practice will hopefully last much, much longer. A self-study approach permits me to examine my teaching practice whilst allowing my teaching to be carried out in an authentic manner.

This process of self-study research is very similar to how I would reflect on my own sport science practice. For example, if I am working with a team and I develop a training programme, I will constantly liaise with players to get feedback on how they are finding it, what tweaks can be made and how it can be improved. This will then be followed by a final review at the end of the season. I will often take this further by discussing my programming and implementation with fellow sport scientists to evaluate effectiveness as a practitioner. As with my sport science practice, I hope that the process of examining my teaching practice will develop and improve it. I also hope the documenting of this

process will assist other sport science educators in examining their own practice – in the same way that I share my sport science practice with others. There is also a need for more research on the student perspective of the teaching of sport science practical classes. There is a general absence of inquiry into sport science education at higher level in published literature. Research concerning sport science education lacks context of how sport science functions as a field of education and practice. In instances where sport science students participate in research, they could often be supplanted by students from any other scientific field without any methodological concerns. Furthermore, there is a lack of interrogation into the teaching of sport science despite criticisms of both applied practices in the field and academic research. In outlining the main themes of my discussions with others I provide a platform for these voices to the body of knowledge and offer a methodological example to other sport science educators.

The idea of authentic research is important to me as a researcher. I did not want to impose some sort of intervention on my teaching practice that would dissolve and discontinue once data collection was completed. I wanted to look at my teaching practice, highlight areas for development and give structure to my ongoing professional development process as a lecturer and researcher. The ABL approach that is outlined in chapters 2 and 3 of this thesis has continued beyond the data collection phase and the learnings I have taken from my research will continue to inform my teaching practice moving forward. ABL can be described as a pedagogical approach combining sense-making activities and focused student interactions in appropriate learning settings; inside and outside the classroom (Armellini & Padilla Rodriguez, 2021). It is distinct from a blended learning (BL) approach, which is characterised by a one-way delivery of content (Oliver & Trigwell, 2005). Among the key differences between ABL and BL, is that for BL 'content is King', whereas in ABL 'context is King'. In ABL, the content is important, but the 'application in context is what really matters' (Learning and Teaching Enhancement [LTE], 2021).

I describe my research as self-study and this approach is a combination of self-study and action research methods, through a practice theory lens to examine my teaching practice. The self-study and action research components share common themes of planning, enactment, and critical self-reflection. Self-study is a personally situated inquiry of teaching practice. It requires critical personal and collaborative reflection for the advancement of personal professional development and domain specific knowledge (Samaras, 2011). Action research can be considered a paradigm and not a method (Pine,

2008). It is viewed as "a particular way of looking at your practice to check whether it is as you feel it should be" (McNiff, 2013, p. 38). Action research can therefore act as a philosophical, social, and conceptual framework for carrying out research; one which "embraces a variety of research methodologies" (Pine 2008, p. 67). Central to both self-study and action research is being critically reflective. To me being critically reflective means active, persistent, and careful consideration of my beliefs, actions and understandings by challenging the grounds that support the conclusions to which it tends (Dewey, 1910). Through a practice theory lens, I have been able to examine my practice with a clear sense of what my site ontology is (Schatzki, 2002) and self-study, action research and reflective practices have facilitated this examination.

## 1.3 Who am I, the researcher?

The idea that I should interrogate my practice demonstrates that I believe I have agency over my own actions and the ability to influence my practice and, through my practice, influence others. My personal and professional lives have helped to shape this perspective. I am the second of four children who grew up in Wicklow town. My father worked in the finance department of Wicklow County Council and had no formal education beyond second level that I am aware of. My mother spent most of her working life as a public health nurse, having trained as a general nurse prior to it becoming a degree programme. Like many parents they made sacrifices to give their children the best chance they could, and education was central to this.

My mother is kind, loving and caring, yet utterly pragmatic and unsympathetic as required. In classic Irish Mammy fashion, she instilled in me a belief that I can do almost anything that I put my mind to – the greatest gift that anyone could receive. As a public health nurse, I often noted the esteem in which she was held as someone who could and would help others. From my mother I learned the importance of being considerate and empathetic to others, but also that helping others does not mean pandering to them. She can be stern and critical in helping, but never in a malicious manner. Her nursing education was centred around an apprenticeship-like model, and she engaged in numerous professional development courses over the years. She still speaks of lessons she learned from various doctors and fellow nurses around Wicklow, and it is clear to me that she values learning from and among others.

My father died, unexpectedly, when I was 16. This had a profound impact on my formative years. I was not aware of this in the immediate aftermath and my memory of this time is hazy. His untimely death pushed me to be independent and I continue to see his influence on how I try to live my life. My father was a doer. He worked a full-time job and on evenings and weekends would put on either his tracksuit to go coaching football or his 'work' clothes to engage in whatever bit of DIY needed to be done. Whether it really needed to be done or not was often another matter. He did night courses on woodwork, learning the skills to run a small side business in picture framing. As a sports coach he learned to teach my brother and I soccer skills from videos, and generally sought out education wherever he could – no matter how formal or informal. He learned by doing. He upcycled reclaimed furniture before it became fashionable, figuring it all out step-by-step. A beautiful fireplace takes centre stage in the sitting room of my family home. My mother saw it was being thrown out of a renovated health centre and despite years of apathy and dodgy paint jobs, she saw potential. My father did too, and he restored it; learning and figuring out each step as he went along. My parents showed me the value of deeper interrogation, endeavouring to find solutions to complex problems and seeing education as more than just passing formal exams. Together, they are the best teachers I ever had.

The first higher education course I enrolled in was a BSc in Electronic Engineering at Dublin City University (DCU) and I hated every minute of it. My father passed away during my senior cycle of secondary school and it probably had more of an impact on my final two years than I realised at the time. I had not achieved the Leaving Certificate examination results that I had aimed for and was utterly crestfallen not be offered my first or second choice course at university. I turned down offers to study sport science in other institutions in favour of going to DCU. I had insisted on going to DCU on account of their athletics team and I was offered a part scholarship due to my own running achievements. I do not regret my decision to go to DCU, but the benefit of hindsight has shown me that I could have achieved my goals by a different path. By the middle of that first academic year, I was a floundering engineer and considered dropping out. I spoke to some people in the athletics club, and they encouraged me to apply to start again the following academic year but this time in the BSc in Sport Science and Health programme – my original first choice. Luckily, all that was required was to pass my engineering course work and, thanks to my athletic achievements, I was allowed to transfer. I worked for the

entire intervening summer to pay for some of the first-year fees but once I was studying sport science, I loved every minute of it.

I think it is fair to characterise my transition from secondary school to undergraduate studies as being dominated by loss and determination. The loss of my father, the loss of my preferred course and probably the loss of some innocence but this loss helped foster a determination; a determination to not let the losses define me and a determination to get to where I wanted to be. Reflecting on this has helped me realise that dealing with loss and moving on with determination would not have been possible without the help of others. Amongst the losses and knock-backs, I have also come from a position of privilege. I grew up in a loving home with parents who had the desire and the means to support my siblings and I in whatever endeavour we chose. Arising from my father's death, I received a small financial stipend up until my 21st birthday. I was able to find part-time jobs to support myself through university. I am also a straight, white male with a natural affinity for sports – doors were never closed to me on account of who I was, where I grew up or what my interests were.

In my current position as a lecturer, I take two key lessons from all of this. One is that we never know where a student is coming from. A helping hand may seem innocuous to us as academics, but it could be invaluable in supporting a student. We will not always be aware when a student needs help but that should not stop us from extending our assistance to all. The second lesson is that there is usually a path to get to where you want. That path will often rely on the assistance of others but for most people there are backdoors and roundabout routes into most things – particularly when it comes to education in Ireland.

As a researcher, my current position and background are foundational to how I see the world and how I wish to examine it. I now understand that who I am and how I view things is central to my practice and therefore my research. My position in relation to my research is outlined in more detail in chapter 3. Coming from a BSc and MSc background, this was not always the case. This thesis is in part a documentation of my research journey. In examining my own teaching practice, I have had to reflect on what my values are and how I can ensure that the research process remains faithful to who I am and why I wanted to examine my practice in sport science education.

## 1.4 Why did I needed to examine sport science education?

How I perceive the field of sport science impacts my self-study research. Tertiary education pathways have great significance in sport science, but questions remain about whether students engage in higher education to develop the advanced skills and knowledge required in sport science practice (Winkelman, 2020) or to better distinguish themselves from others. Ingham (2022) estimates that 15,000 sport scientists graduate from universities in the United Kingdon (UK) every year. A further nine universities in Ireland offer BSc programmes in sport science disciplines (Central Applications Office [CAO], 2022a). Seven of these nine, plus one other offer MSc programmes related to sport science. To be accredited with Sport Ireland and work as part of their panel of sport science practitioners, a minimum MSc qualification is required (Sport Ireland Institute, 2022). Surveys of sport science practitioners show that the majority are aged 35 years or younger, have a MSc qualification or higher and do not hold professional accreditation (Sportsmith, 2021a; 2021b; 2021c; 2021d) - it should be noted that these surveys were not peer reviewed but were conducted in conjunction with a respected applied sport scientist and the published findings have been met with general agreement in the applied sport science community. This information, coupled with the sheer number of sport science graduates, highlights that a MSc level qualification is required to apply for any role, regardless of the quality of other education. When I began my MSc studies in 2011 there were only three sport science related level nine programmes in Ireland in physiology, nutrition, and psychology and none in my area of speciality – S&C. In fact, my understanding at the time was that there were only a handful of MSc programmes available in S&C worldwide. Next year there will be a least five MSc programmes in S&C in Ireland alone. Professional Doctorate programmes are now becoming the new master's qualification, with one starting in DCU last year and an additional programme starting in University of Limerick next year. The profligacy of programmes at ever increasing levels should lead sport science educators to question the processes by which they prepare students, ensure that students understand the value of different levels and better communicate this to the wider applied sport science community and associated stakeholders.

Difficulties in securing meaningful employment with an undergraduate degree alone, plus the explosion in sport science graduates, and the requirement to complete a level nine qualification to work in professional sport should be reflected upon by the wider sport science community. I think it is reasonable to argue that there are too many courses - both

undergraduate and postgraduate - for the available positions. However, if undergraduate degrees could better prepare students for applied sport science practice and crucially can better prepare students to translate the knowledge developed in their degrees to real world scenarios - as has been called for (Reade et al., 2008; Finch, 2011; Martindale & Nash, 2013; Fullagar et al., 2019b; Bartlett & Drust; 2020) - then additional opportunities in applied sport science settings may become evident. For example, the Gaelic Athletic Association (GAA) is the largest sporting body in Ireland but applied sport science roles with teams are often loosely arranged, without the need for qualifications or professional accreditation. The impact of applied practitioners varies greatly, and the value placed on such practitioners is also variable. Sport science lecturers could emphasise the importance of practical teaching and support graduates by promoting the knowledge that is developed in such scenarios. Highlighting the good work we educators do may benefit our students, even after they have graduated. Sport science academia already does this to an extent by engaging with ranking competitions that are based purely on published scientific outputs (Shanghai, 2019a; 2019b) – acknowledging and championing other ways of knowing would further support our sport science graduates.

In evaluating the field of sport science for this thesis, it has become apparent that sport science academics have explored almost every facet of the field yet how it is taught at higher level has received little attention. It is also apparent that how sport science perceives and presents itself impacts on teaching practices at higher education institution (HEI) level. As will be discussed in detail in chapter 2, the social and cultural contexts of sport science have led to a dominant disciplinary culture of philosophical positivism influencing sport science education (Petrovic et al., 2017). This same culture also pervades sport science practice either through strict adherence to it or deliberate disregard for it. This is often referred to as the ‘art or science’ debate. Given the complex and hyperdynamic nature of sports performance environments it is unlikely that any one approach, tool or even paradigm at a practitioner’s disposal will be appropriate in every context (Collins et al., 2022). The caveat of ‘it depends’ is often posited as the answer to all questions in sport science and, whilst this is true, it should also not be used a “mere copout” to ignore research findings (Collins et al., 2022). Research can provide new knowledge, but this evidence must be treated as contingent, always within the context of what works best in a set of circumstances. Theory must therefore be interrogated whilst being put into practice and sport science students need to develop the knowledge required to achieve effective practice in a theoretically informed manner. This range of knowledge

is discussed further in chapter 2. It is evident that sport science has a lot to learn from similar fields such as sports coaching and adult education where established practices offer examples to develop education practice.

There is currently limited research on how sport science practical classes are delivered. Thus far, research in this area has focused on novel teaching interventions that could be broadly applicable in any programme (for example, Keogh et al., 2017; Knudson, 2020; Wallace & Knudson, 2020; Navandar et al., 2021). Whilst important in its own right, this type of research is devoid of the specific factors that influence sport science teaching. These factors include the biopsychosocial model of sports practice (Schneider, 2016), ensuring opportunities for developing new knowledge, a recognition of a student's inherent sporting expertise, the influence of lecturer's experience of applied practice and the difficulties that newly qualified sport scientists experience upon graduation. The DHAE programme at MU has led me to question the methods by which we teach sport science students and develop the range of knowledge that practitioners require. In particular I refer to a prevalence of what I see as the dominance of what Freire (1970) refers to as a 'banking concept of education'. I locate these factors within the micro context of my teaching practice and also within the wider, more macro context of sport science.

## 1.5 What is my pracademic identity?

As previously mentioned, this is a self-study of my teaching practice through the lens of my site of sport science education. I identify as a pracademic and will now address some of the key factors that influence my position on sport science education.

Words, labels, nomenclature and how we describe what we do matters because this shapes our perspectives. Questioning what I do in my practice inevitably leads me to question the labels that I place on what I do. For example, the term 'coach' in the English language is believed to have been derived from the French word 'coche', which was a large horse-drawn carriage, but was also colloquially used to describe a private tutor who prepared candidates for exams (Day, 2016). According to Day (2016), coach as a term, transferred to sporting nomenclature during the nineteenth century and became associated with preparation for competitive events. This is a natural evolution given the role a tutor played in preparing a student for exams was similar to that of a trainer helping athletes prepare for competition. Day (2016, p. 13) highlights the influence of "social, cultural, temporal

and geographic parameters" on the meaning of words like 'coach' and 'coaching' - for example, the word 'trainer' may be more appropriate in certain sports, like boxing, or the role of the 'soigneur' in cycling. Such intricacies can be found throughout sport science practice and highlight the need to locate practice with the wider field.

As will be discussed in chapter 2, people have always been interested in sport and how the human body performs. Sport science, in an academic sense, applies engineering and biology principles to conceptualise human performance. Multi-faceted movements and systems are collated into simplified concepts with limbs outlined as a collection of levers and pulleys and complex physiology divided into constituent systems (Aaberg, 2006; Bompa & Haff, 2009; Kenney et al., 2015). Sport science is therefore an umbrella term used to describe the amalgamation of several distinct but inter-related disciplines and focuses primarily on the scientific principles behind exercise performance. In a practical sense, this includes work in areas such as biomechanics, exercise physiology, sports nutrition, performance analysis and S&C. Each area has its own distinct research practice with dedicated professional bodies, journals, and communities. Each area also has a specific label for applied practitioners which is based on analysing some portion of the internal mechanics of the athlete (Woods & Davids, 2022). This leads to an inherent bias, whereby researchers seeking explanation for performance and behaviour, base findings on a defined internal mechanism or referent (Davids & Araújo, 2010). This fails to account for the context in which the performance took place. The favoured methodology of research enquiry in sport science research is philosophical positivism (Uehara et al., 2016) which is based in the hypothetic-deductive theory of scientific method (Woods & Davids, 2022). This contrasts with the practical world of developing athletes which is primarily rooted in experience from a practice-oriented standpoint (Barker et al., 2012). Given the extensive cross-over between researchers and teaching academics, it is somewhat inevitable that the dominant research epistemology will transfer to pedagogy.

The branch of sport science that I feel most connected with is S&C. My MSc qualification is in S&C, and in practice, I have assumed the role of S&C coach with teams and athletes for over a decade. Given broad range of teams, athletes, and contexts in which I have worked, I personally think that the term 'sport scientist' is a more accurate term for this role. Nevertheless, S&C is the more accepted term and given the cultural cachet of the 'coach' described above, I hold on to the S&C moniker. In Ireland, compared to other nations, there are few professional sports teams and even fewer roles that are given the title 'sport scientist'. The title of S&C coach is far more widespread and, in my opinion,

the title of S&C coach in Ireland has subsumed roles that would be ascribed to the sport scientist such as nutritional planning and advice, physiological and physical testing, load management and data analysis in addition to the programming and instructional roles of the S&C coach. As a result of the amalgamation of responsibilities and crossover in terms, I find that scholarship on the development of S&C practitioners is appropriate when examining how Irish sport scientists should be developed. My work as a S&C coach and sport scientist strongly informs the site in which I practice as a lecturer.

A practice-focused orientation is reflected in how applied sport science practitioners or sport scientists are defined as an 'on the ground' member of any performance staff group and are often expected to work with a range of other professionals and stakeholders (Fullagar et al., 2019b; Bartlett & Drust, 2020). Often data in sport science is collected on performance within narrow parameters but it is influenced by, and required to contribute to, a much wider context. Sport scientists must act as the conduit in the dissemination of information to stakeholders such as athletes, coaches, and other support staff (Bartlett & Drust, 2020). Jeffreys (2020, p. 4) offers the following opinion on how S&C - a branch of sport science - is limited by theory that lacks 'real world' context and application:

> Given the complex nature of human performance, and the requirements for local solutions, perhaps we too need to consider a shift of focus from theoretical 'planning' to strategy. If there is one phrase that highlights the disconnect between our theoretical approaches and the reality of application, it has to be 'real world solutions'. The fact that we even need to use this term in itself indicates that there is a discord between theoretical plans and applied strategies. To address this, we need to move from the theoretically sound to the practically possible. However, as strength and conditioning has increasingly become an academic domain, with an emphasis on theoretical but often facile analysis, planning has become a predominantly left-brain activity. Here the sophisticated, but potentially impractical, solution will be rewarded over the unsophisticated but workable solution – so it could be argued that this discord has been exacerbated.

This discord can be extended to all facets of sport science practice and risks the creation of a duality between siloed academic scientific method, and the requirement for practical application to be carried out in conjunction with other people (Woods & Davids, 2022; 2023). However, there is an alternative way of looking at this, a way of viewing the dualism as a continuum or complimentary components of one whole (Sandbakk, 2021).

When viewed through the lens of a continuum between 'art and science', sport science education may be more effective.

As previously mentioned, I work concurrently in both academic teaching and applied practice and I identify as a 'pracademic' (Posner, 2009; McDonald & Mooney, 2011; Collins & Collins, 2019). In this portmanteau, practice refers to my position as an applied sport scientist working primarily in Gaelic games and endurance sports, and academic refers to my position as a lecturer on sport science programmes at a Technological University. Being a pracademic, I do not see myself separately as an academic and a practitioner. To me they merge and mesh and congeal, informing the site of my teaching practice. I wear the same tracksuits and use the same tools in both situations. I interact with the same demographics in similar ways. I try to focus on my role to help, advise and assist rather than lecture, research and dictate. Woods and Davids (2022) posit the idea of sport scientists conceptualising themselves as artisans and this is something I identify with. Artisanal practice means working with materials - or in my case information, research findings, athletes and team culture - to actively participate with them through attentiveness and selective responsiveness (Woods & Davids, 2022). This means the sport science practitioner will have to make theoretically informed decisions but within the parameters of their specific real word context. This conceptualisation fits in with Posner's (2009, p. 15) description of a pracademic as someone with "deep exposure to both theory and practice" that is "ideally positioned to make singular contributions to both enterprises". Whilst I agree with this sentiment, I see myself as making collaborative, rather than individual contributions to both academia and sport science practice. For example, if I teach a class on the use of some technology in tracking athletic performance, I am then able to draw upon my practice and implicit knowledge and experience to convey key ideas to students. I can conversely then utilise my theoretical and explicit-declarative knowledge to inform the athletes about the use of the tracking technology. The topic of knowledge development in sport science students is discussed in more detail in chapter 2.

## 1.6 A pracademic's contribution to knowledge

My research was developed to address dilemmas in my own teaching practice as a pracademic and to make a wider contribution to the field of sport science. These dilemmas included how to support the specific types of knowledge development that are sought in

practical classes; what is the practice environment that I am helping sport science students to prepare for; and fundamentally, how do I assess whether or not I am doing a good job (Whitehead, 1989). I seek to contribute to scholarship through a unique self-study of my own teaching practice as a sport science educator. As will be discussed in chapter 2, the vast majority of research within the field of sport science to date has been quantitative and positivist in nature, focusing on the technical-rational components of sport science, with little exploration of the experiences of those who study and practice the discipline. This novel approach to exploring the intersections of sport science practice and education offers a unique contribution to knowledge in both domains. From a sport science practice perspective, it offers insight into how students are prepared for practitioner roles and how conceptualisations of effective practice influence this. From an educational perspective, my research offers a unique insight into the development of a range of knowledge applicable to practice. This is done through an active learning approach to practical class teaching that is located within the field of sport science.

In sport science academia, there is scope to develop our understanding of how lecturers deliver their modules and how students interact with their learning environment. As previously mentioned, published research on sport science education tends to lack specific sport science context. Within the wider sport science literature, there is scope for more attention to be paid to how best support undergraduate or recently graduated practitioners in their professional development. This is despite difficulties in teaching sport scientists being identified in academia, such as avoiding didactic teaching methods (Ladyshewsky, 2002; Weeks & Horan, 2013), ineffective practice and knowledge translation in graduates (Finch, 2011; Martindale & Nash, 2013; Ardern et al., 2019; Fullagar et al., 2019b; Taberner et al., 2019; Bartlett & Drust, 2020; Woods & Davids, 2022) and issues with aligning programmes to professional accreditation competencies (Bradley et al., 2022). My research seeks to address some of these gaps in knowledge and offer a methodological and pedagogical example of how I approach these complex issues. Specifically, my research seeks to address a gap in knowledge surrounding sport science practical teaching, and how applied sport science practice can help to inform and enhance sport science practical teaching.

My thesis offers a unique perspective on balancing the theoretical and practical sides of developing competent sport science practitioners and offers a contribution to knowledge and understanding in this domain.

## 1.7 What is my research question?

Two main questions serve as an anchor for this inquiry:

1) How can I incorporate applied sport science practices into practical sport science classes in order to facilitate an effective student learning environment; and 2) how can I use practical class content to enable students to engage in theoretically informed self-reflective practice?

How I teach sport science practical classes will have a direct impact on the students learning experience and can impact on their future learning journey. The process of planning classes, delivering them, observing what happens in class and then reflecting in and on the entire process is ripe for interrogation if I wish to improve my teaching practice and better support the students at the centre of that practice.

## 1.8 How is this thesis structured?

This chapter has outlined an introduction to my research and to my positionality as a researcher. The context of my research has been identified in relation to developing my own professional practice as a sport science educator and developing the wider field of sport science education. A rationale has been identified in relation to the significance of the research and the contribution that it seeks to make. I have identified the research questions that are integral to exploring this professional practice.

A review of literature is outlined in chapter 2, and this tracks the influences on my professional practice as a lecturer in sport science. I explore what sport science is and how sport science education has developed to where it currently is. I outline the dominant art or science discourse within the field and highlight the research orthodoxies that influence the sport science academy. I further explore theories of education that frame my research and outline the influences on my approach to developing pedagogy.

The methodology for my research is outlined in chapter 3. Here I develop the approach taken and methods used to explore the research questions. The conceptual framework of my self-study research, my ontological and epistemological positions, study setting, and methods are outlined in detail. I also address issues concerning the validity, reliability, and ethics of my research.

The findings from the fieldwork portion of my research are presented in chapter 4. The findings chapter seeks to provide a broad overview of the key themes of my discussions with students and fellow lecturers. I have taken the approach of presenting a findings chapter with rich descriptions of themes to give insight into my self-study interrogation as well as to give a voice to previously unpublished perspectives of sport science students and academics on how sport science students are taught. The three overarching themes in this particular chapter are: 'Knowledge and Critical Thinking'; 'The Art and Science of Sport Science Practice'; and 'Reflections on the ABL approach'.

Chapter 5 includes the analysis of findings from participants who took part in my research to assist me in exploring my own practice. Here I reflect upon being part of the process of data collection and analysis. I use this interwoven approach to critically reflect on my own practice as a sport science educator. This analysis chapter therefore seeks to offer a more interpretive and reflective element to the research and situate my findings within the micro and macro contexts – my practice and teaching and learning in sport science.

Chapter 6 concludes my thesis. This chapter focuses on the key elements of my research as they relate to my teaching practice. The implications of my research in terms of pedagogy and practice - in relation both my own and wider sport science field - are presented along with a description of how I continue to develop my teaching practice. The limitations of my research and recommendations on future research topics arising from my research are also outlined.

# Chapter 2 - Review of Literature

## Prologue

Back in the practical class, we are still working on acceleration mechanics. Our discussion has moved somewhat beyond the content of the video that the students viewed before the class and now they are asking how much influence we can have over an athlete's acceleration ability. Mark makes the point that track and field sprinters have ample time and opportunity to work on the finer aspects of sprinting – it is all they train for. Two full training sessions per week might focus exclusively on acceleration. However, he rightly compares this to team sport athletes who may have 15 minutes per week to focus on acceleration alone.

So, we have the same physical quality but two completely different contexts. How does sport science education account for this? Do we split them into two completely different qualities or allow one to inform the other?

Then again, what is sport science?

On the one hand sport science is about writing training programmes, measuring and monitoring performance, and looking at peer reviewed literature to guide all of this. It is about numbers, data, spreadsheets, targets, and KPI's (key performance indicators). Trying to put some control on the chaos that is sport.

Sport science is also about people and relationships and chance, and the intangible culture that develops among sports teams – something that is true whether we are dealing with team sports with large playing squads and backroom staff or working with an individual athlete and their coach. Can I set up my practical classes to develop this range of knowledge? Can I develop pedagogy that allows students to develop their practice competencies in a theoretically informed manner, rather than a theoretically dictated manner?

## 2.1 Introduction

My research seeks to explore my own practice as a sport science lecturer as I consider the incorporation of practice knowledge and competencies into practical class teaching through a self-study of sport science pedagogy. The growth of sport science and the number of related education programmes continues apace, and clarity on what should be

included in and focused on within sport science courses is less clear than ever. As an educator this presents a clear challenge –

What matters to me and my practice?

This question is similar in sentiment to that posed by Whitehead (1989) in his development of living educational theory. As Whitehead (1989, p. 1) asks "How do I improve my practice?", my self-inquiry examines my teaching practice to improve it and to make a wider contribution to the field of sport science – as outlined in the previous chapter. As will be discussed in chapter 3, my self-study conceptual framework incorporates elements of self-study (Samaras, 2011), action research (McNiff, 2002) and reflective practice (Schön, 1983; 1987) through a pracademic site lens (Schatzki, 2002; Posner, 2009; McDonald & Mooney, 2011). A self-study of my practice to improve the field of sport science carries a certain contradiction – in examining 'I', I aim to improve 'us' (Whitehead, 1989). In studying myself, I must confront questions of how I interpret and give meaning to theory that can only be clarified in the course of their emergence within my site of practice (Whitehead, 1989) but I do this to improve the wider field of sport science education. In examining the following literature, I have assessed the validity and legitimacy of theory in my context, as well as questioning the generalisability of this theory to sport science education (Whitehead, 1989). In this chapter I demonstrate my deep engagement with the theoretical influences on my practice so that I can analyse my practice in a theoretically informed manner. Conceptualising my research and learning as self-study allows me to inform subsequent actions in my examination of practice and to build educational theory to influence sport science education (Moon, 1999).

A key focus of this engagement is to explore the historical, social, and educational contexts of sport science, and adult education in general and how these inform my teaching. As most applied sport science practitioners are introduced to the field in a meaningful way during undergraduate programmes, this may be seen as a site for laying a foundation for the wider growth and development of the field. There may also be opportunities to improve our understanding of the knowledge required for more effective sport science practice and to develop curricula more attuned to active student participation in the learning process, in keeping with the agency of modern higher-level students (Dawson et al., 2014; Gros & López, 2016; Bradley et al., 2022). The objective of this review of literature is to contextualise the teaching of sport science in the wider field of sport science and to outline the key influences on my practice. What follows is a brief

mapping of the journey that sport science has taken to date and an outline of possible areas for development that may be targeted through formal education.

There are numerous criticisms of sport science with an academic reliance on positivist research methodologies (for example, Nash & Collins, 2006; Balagué et al., 2016; Szedlak et al., 2019a; Gamble et al., 2020; Jeffreys 2020; Bradley et al. 2022) and a practitioner reliance on tacit knowledge or non-evidence supported sources (for example, Thompson et al., 2009; Jeffreys, 2017; 2020; Winkelman, 2018). However, the current state of play in the field of sport science offers numerous avenues for positive growth and development within the field. Sport science has grown rapidly in recent years, from primitive beginnings to the global industry that it is today (Guttman, 1978; Robertson & Joyce, 2019; Gamble, 2020) and this, naturally has implications. In particular the growth of data and technology in sport challenges the role of the sport scientist (Robertson & Joyce, 2019; Gamble et al., 2020).

This chapter begins with a brief outline of the social and historical contexts through which sport science has developed. This is important to contextualise how the field has developed to where it is today and how this context influences my practice. An outline is then presented of how education in sport science has evolved and what the available literature says about how the subject is delivered at higher education (HE) level. This discussion highlights the influence of a biomedical model of research on academia, despite sport being influenced by a biopsychosocial model (Schneider, 2016). The available literature on teaching practices in sport science could be considered sparse but there is potentially a wealth of knowledge available in adjacent fields, and this is addressed. A focus is then placed on how sports coaching - a strand of sport science, but also a distinct academic discipline in its own right - and in particular research on sports coach education can inform research into sport science education. Next, ways of knowing as they relate to sport science practice is explored. This is an area of ongoing development in sport science with some disciplines examining epistemology more than others. The sixth section of this literature review focuses on being a pracademic – as previously discussed, in chapter 1, I position myself as an academic who also practices as an applied sport scientist. This lens is influential in how I assess the field and it strongly informs my pedagogy. Influences on what I deem to be good teaching practice are then outlined. Finally, I outline the ABL approach to education that is central to this self-study of my teaching practice. As part of this doctoral programme, I have been exposed to a range of theories and paradigms in adult education. It is important to acknowledge how these have

influenced my teaching practice and how this feeds into my approach to teaching practical classes to sport science students and my analysis of my that practice.

## 2.2 Historical and Social Contexts

In seeking to understand my own practice I feel it is necessary to trace my understanding of the field of sport science, how I interpret it and how this interpretation influences my teaching practice. My approach to developing this understanding is influenced by Michel Foucault's 'Archaeology of Knowledge' (2002). An archaeology of knowledge (Foucault, 2002) is an exploration around how a field - such as sport science - functions. It is important to state that I have not undertaken a Foucauldian analysis of sport science or of my teaching practice. Rather I am using the archaeology concept to frame how I have tried to understand the field of sport science in a practical and academic sense. Foucault (2002, p. 197) tells us that such "Archaeology does not describe disciplines" but rather it will "serve as starting-points for the description of positivities", referring to that which can be described as positive or verifiably within the discourse. The work of Foucault encourages proximity to past experiences so as to trace how power relations operate in the contemporary world. This is done by examining the relationships between historical practices and scientific disciplines such as medicine, economics, and criminology (Markula & Pringle, 2006). Foucault's work in this sense has encouraged my tracing of the evolution of sport science practice and academia to where it is today to better understand how the field functions. In doing so I endeavour to locate my teaching practice within the field and contribute to its advancement.

Humans have always been interested in how the human body functions (Carter, 2014) but the foundational ideas about these functions with regard to sport were generally negative. Galen - a 2nd century Roman physician, surgeon, and philosopher who was heavily influenced by the ideas and theories of the 'founder of medicine', Hippocrates - is believed to be the first known scholar to have dedicated writings on the importance of exercise for human health (Berryman, 1992; Marketos & Skiadas, 1999). According to Berryman (2012), Galen held a negative view on strenuous athletic pursuits. In 'Exhortation to Study the Arts, Especially Medicine', Galen claimed that it was inappropriate for the human body to "exceed the proper measure in exertion" and that to engage to athletic competition is "neglecting the old rule of health which prescribes moderation in all things" (Berryman 2012, p. 211). Later, a revival of interest in Greco-

Roman scholarship during the fifteenth-sixteenth century Renaissance led physicians and anatomists to challenge the established epistemologies of how the body functions (O'Malley, 1964; Stefanadis et al., 2009). This led to developments in understanding the anatomical (O'Malley, 1964) and physiological functions of the human body (Stefanadis et al., 2009), but despite this interest and increased understanding of how the body functions, Galen's views on athletic endeavour remained influential among physicians well into the late nineteenth century (Marketos & Skiadas, 1999; Berryman, 2012; Carter, 2014). Galen's position on strenuous exercise form what I see as the basis of a somewhat negative or disparaging view of sport science that pervaded early society. It was not until the advent of formal competitive sports in the late nineteenth century that views changed (Speed & Jaques, 2011). However, the undertones of these galenic views have permeated through to the field's current social context.

What we now know as modern sport has developed considerably from the recreational activities of primitive, Greco-Roman, and medieval societies (Guttman, 1978; Carter, 2014; Heggie, 2016). With formal amateur sports taking hold from about the 1840s, traditional sports were appropriated, codified, and formalised through organised regulatory bodies and the power of colonialism to spread such organisational reforms across the world (Horne et al., 2012; Mangan, 2012). For the next 100 years or more the sporting world slowly became less about participatory enjoyment at local fairs, as it was in Medieval times, and more about competition at organised events (Horne et al., 2012). Modern competitive sport has been largely shaped by the ideals of the British public school system of the nineteenth century (Horne et al., 2012). For example, the promotion of the ideal of athleticism. Horne et al. (2012, p. 30), highlight the substantial importance that was placed on the "ideology of athleticism" within the British education system – "the rhetoric of athleticism took such a hold that it could resonate across the British Empire". This competitive rhetoric was used to develop sport into something beyond an innocent past-time. Competitive sport was engineered to become a tool of the establishment, allowing it to transmit culture, values, and moralities of so-called 'manly' virtues and, as the nineteenth century progressed, "the gospel of athleticism" was spread through amateur sport (Horne et al., 2012, p. 35).

With organisation came rules, and with rules came winning and losing, leading to an increased specialisation in particular sports and a pressure to perform. Specialisation and pressure to perform enhanced the corporeality of sport – sports began to be organised around what people could do with their bodies, with and without implements (Horne et

al., 2012). Sport science can therefore be said to have formed at the nexus between the need to win and the increased corporeality of sport. Advances in technology have highlighted this emphasis on the body, as equipment becomes regulated in response to technology-assisted jumps in performance (Carter, 2014). Huge improvements due to technology do not sit well with modern sports where the body is central to the performance (for examples of this discussion see, Rintala, 1995; Crouse, 2009; Runciman, 2010; Filocca, 2018; Usborne, 2020; Taylor, 2021; Warne, 2021). Sport science is at the heart of many of these technological advances and this, coupled with historical reticence to improving performance for performance sake, has led to sport science having an ill-defined role in modern sport.

Sport science is a discipline striving for legitimacy. Fears that intensive training could have serious adverse physical and physiological consequences (Speed & Jaques, 2011) have led to some of the many myths about the impacts of strenuous exercise (Shurley et al., 2021; Bagley et al., 2022). Some such myths have been perpetuated by social norms. For example, society has been enculturated to view weightlifting as masculine, causing some females to be reticent about this form of training (Holloway & Baechle, 1990). Others have perpetuated due to poor sport science. For example, poorly designed research by Ariel (1974) on squatting biomechanics led to the notion that the knees should not travel beyond a vertical line above the toes. This is a myth that I continue to hear from sport science students, despite them having no idea where this information came from, and more valid findings to the contrary (for example, Fry et al., 2003). Part of the reason for such myths is that until the nineteenth century there was no obvious interest in examining the upper capabilities of the human body outside of those measured to determine who won sporting events (Carter, 2014). There was interest in how bodies performed, but this was primarily to develop ‘manly’ virtues (Horne et al., 2012) and, coupled with negative attitudes towards the pursuit of athletic excellence for excellence’s sake, has led to sports medicine not being viewed as ‘real medicine’ (Hoberman, 1992).

There is evidence that the eschewing of sports medicines as not being real medicine left its mark. In particular this is represented in how most sports and exercise literature aligns itself to the biomedical model of research which has a largely positivist ‘cause and effect’ position; perhaps in search of scientific legitimacy (Olivier & Fishwick, 2003; Koca & Hünük, 2018). In doing so the scope of sport science research has become ever narrower (Hristovski et al., 2016). Champely et al. (2017) point out that a variety of distinct conformations have emerged in sport science as a result. This leads to a form of

‘organismic asymmetry’ whereby sport scientists seek explanation for performance and behaviour based on a defined internal mechanism or referent (Davids & Araújo, 2010). The outcome of such narrowing lenses, whether intentional or not, has been to neglect the complex interplay of physical, physiological, psychological, and behavioural variations that can influence performance in human beings (Robertson & Joyce, 2019; Rothwell et al., 2020; Callary et al., 2022; Woods et al., 2022b). This reductionist approach to applied sport science is now embedded in sport science research and academia, leading to individual experts only teaching or measuring discrete components (Rothwell et al., 2020). Decontextualized research and learning ‘silos’, however, have led to poorer knowledge translation with fellow stakeholders and poorer athlete preparation (Glazier, 2017; Bartlett & Drust, 2020; Holweck et al., 2021; Rothwell et al., 2020; Woods et al., 2022b) and poorer learning experiences for sport science. This is an important point that is supported by Balagué et al. (2016) who remarks that sport science “is still an ill-defined discipline” (p. 1) and one “that has moved quickly towards specialisation” (p. 9). Balagué et al. (2016) argue that because of the field’s relative youth and exponential growth, specialisation has become the dominant mode of research and practice. By focusing on the constituent elements of the internal mechanics of the body to legitimise it as a ‘real science’, sport science risks reducing and fragmenting knowledge to the point where it is no longer answering the questions being asked of it (Davids & Araújo, 2010; Balagué et al., 2016). Transdisciplinary methodologies have been called for to improve sport science research (Rothwell et al., 2020) and a similar intention is required in sport science education.

Sport science’s identity crisis about being a real science leaves it in a peculiar position at times. It is clear that interest in how the human body operates is as old as civilisation itself. Although ancient interests in how to prepare the body for competitive sport appear to have waned in the Middle Ages, they have been revived in modern times. Interest in what could be termed sport science followed the ideals of modern sport as developed in the nineteenth century. A strong emphasis on the corporeality of sports performance has become pervasive and this has narrowed sport science’s scope of enquiry, as will be discussed later. In trying to legitimise itself as valid scientific mode of enquiry, sport science has adopted a particular position, similar to the medical model of science. The development of sport science has mirrored trends in medicine, health, and society throughout the twentieth century (Carter, 2014). Like all parts of society, sport - and by extension sport science - has developed under the influence of the times and this has led

to some interesting peculiarities in the field as it functions today which in turn influence sport science education.

## 2.3 Evolution of Education

Sport science is an umbrella term used to describe the amalgamation of several distinct but inter-related disciplines and focuses primarily on understanding scientific processes to guide practice with the aim of improving human performance (Bishop, 2008; McCunn, 2019). In an academic sense this means applying engineering and biology principles to conceptualise physical movements. Multi-faceted movements and systems are collated into simplified concepts – limbs are outlined as a collection of levers and pulleys, and complex physiological systems are divided into constituent systems (Aaberg, 2006; Bompa & Haff, 2009; Kenney et al., 2015). As discussed in the previous section, sport science has sought to legitimise itself as a scientific mode of inquiry by focusing on the constituent elements that make up the field. In a practical sense, this includes sub-disciplines such as biomechanics, exercise physiology, sports nutrition, performance analysis, and S&C. Each area has its own distinct persona with dedicated professional bodies, research norms, journals, and communities. As referred to previously, this siloing of disciplines and attempts to legitimise these disciplines through research practices have led to philosophical positivism becoming the favoured methodology of enquiry in sport science research due to its roots in the hypothetic-deductive theory of scientific method (Olivier & Fishwick, 2003; Uehara et al., 2016; Koca & Hünük, 2018; Woods & Davids, 2022). This is then contrasted by the applied work of developing athletes, which is primarily rooted in experience from a practice-oriented standpoint (Thompson et al., 2009; Barker et al., 2012). Recently Maulini et al. (2022) pointed out that sports degree programmes primarily focus on technical and biomedical skills associated with sport science practice and this limits the development of transversal, soft and critical-reflexive skills which are equally important. It is important for sport science programmes to focus on developing the knowledge associated with these skills to prepare students for practice (Maulini, 2022).

To conceptualise how sport science has developed as an academic discipline it is useful to outline how subjects are broadly delivered to undergraduate students in Ireland. Students typically begin their undergraduate studies with foundational science modules such as psychology, anatomy, biology, physiology, physics, and chemistry. These

modules are then generally followed by ones with more of a sport and exercise focus such as sport psychology, exercise physiology, pathophysiology, biomechanics, and sports nutrition. This second stage of modules is intended to build on the scientific foundations of the first stage and introduces students to the various disciplines that make up sport science. The third and final stages involve bringing together the disciplines in modules such as performance analysis, exercise as medicine, advanced practices in sport science and professional skills in sport science. This structure is broadly followed by the HEIs in Ireland that deliver sport science programmes – for example see, Atlantic Technological University (2022); Dublin City University (2022); South East Technological University (2022); Technological University of the Shannon (2022); University of Limerick (2022). Research methods modules are often delivered in the latter half of programmes as students prepare for final dissertations and future research. However, sport science lecturers and students both admit to having limited understanding of qualitative methods, and report less confidence in designing, implementing, and analysing qualitative methods (Burton & Schofield, 2011; Schofield & Burton, 2011). This is not surprising given the often-dismissive attitude towards qualitative methods in science degrees programmes (Runciman, 2002).

As a result, a sport science student's foundation is based firmly within the natural sciences via a positivist paradigm, which is then reinforced through a promotion of quantitative methodologies above others (Petrovic et al., 2017). Whilst subjects such as physics and chemistry are undoubtedly important, the early focus on such modules removes the curiosity about sport that influences students to choose sport science (Spittle et al., 2021). This layering also leads to the more social or nuanced factors that make up sports performance being viewed through the lens of the natural sciences. It is my experience that focusing on natural science modules early in programmes can impact on sport science students' engagement with their course and may lead to disinterest in the programme and poor attendance. Low attendance in year one has been shown to be negatively associated with academic performance among sport science students (Gough et al., 2021). Another implication is that it will have an impact on the student's journey to expertise.

Beginning a sport scientist's education with a focus on the natural sciences promotes a conceptualising of humans as machines. This seems logical, given that it allows novice sport scientists to focus on constituent parts and simplify their understanding of performance (Downes & Collins, 2022). However, such a foundational understanding could be detrimental to future practice. The notion of treating athletes like machines has

been around for as long as scientists have had the technology to measure athletic performance (Carter, 2014). Heggie (2016) cites multiple instances of scholars conceptualising the sporting body as a machine or motor (for example, pp. 177-179, 181). Early sport science research on measuring performance by Hill (1927) questions 'Are Athletes Machines?'. This idea may have built on the aforementioned ideology of athleticism (Horne et al., 2012). The idea of the body as a machine took root and, in some ways, has only been exacerbated with modern professional sports where data analytics is used to dictate numerous elements of strategy and preparation (for example, Cintia et al., 2015). This is the vista we paint for our students based on how we structure education. Treat athletes as numbers - test, assess, re-programme. What gets lost is often the other side of being a sport scientist, the socio-relational components like conversations about weather that end up influencing a training plan.

Australia, and in particular the Australian Institute of Sport, was long regarded as a pioneer in sport science (Blood, 2020). According to Stevens et al. (2021), the first sport science education in Australia began at the University of Western Australia in 1968 and in 1981 the Australian Institute of Sport employed its first applied sport science practitioners (Bloomfield, 2002). It is likely that as sport science developed worldwide in the 1980s and early 1990s, it sought to mirror the emerging medical treatment model of Evidence Based Medicine (EBM) to help legitimise itself as a biomedical science. EBM sought to provide validation for medical teaching practices that were based on published research rather than expert opinion, as had previously been the case, and surfaced in the late 1980s-early 1990s (Guyatt et al., 1992). This validation therefore leaned heavily on the science side of the discipline with research output forming a key element of a 'good' academic's identity (Woods et al., 2022b). Sport science has not escaped the pressures to specialise in a narrow discipline, as previously mentioned, and this becomes problematic because of the opaque nature of the field, the changing nature of sport and sport science due to social, physical, regulatory, and technological advances, and the limited impact of evidence bases (Ross et al., 2018; Woods et al., 2021a; Fullagar et al, 2019a). For example, Jeffreys (2017, p. 25) calls for approaches to sport science practice that avoid "evidence-based practice straightjacket". Based on my experiences and on the evidence presented here, the field of sport science is still strongly influenced by its foundational biomedical understanding, and this has implications for its education.

In practice, to improve performance, sport scientists must combine a largely socially constructed understanding of people with a largely positivist-research-driven

understanding of performance (Petrovic et al., 2017; Woods & Davids, 2022). This can make practice challenging given sport science support often informs decision making among other team stakeholders (Bartlett & Drust, 2020). Having two clearly definable components means that some describe a duality of sport science delivery - 'art and science' (Nash & Collins, 2006; Allen et al., 2021; Woods & Davids, 2022). This duality inevitably leads to a lazy dichotomising of the two components, or - at the very least - a desire to divide into categories, and arguments that try to place applied sport scientists at a given point along a linear line. The ability to deduce and describe elements of performance leads sport science to ignore the importance of an integrated approach to practice (Glazier, 2017) as is the case for teaching and learning in sport science. It is important to lay out this practice landscape as there are now specifically designed educational programmes, developed by practitioners to fill gaps that they see in how HEIs address the more vocational or artistic knowledge required in sport science practice (for example, Ingham, 2022; Art of Coaching, 2023). Courses such as these are valuable but they fail to acknowledge the important role that tertiary education plays in developing the foundations for such knowledge and seek to commodify a particular type of knowledge based on a misrepresentation of the requirements of practice.

Applied sport science practice is an interpersonal, interactive, and relational vocation (Woods & Davids, 2022) and understanding behavioural factors will help both research and practice (Fullagar et al., 2019b). This is termed the biopsychosocial model of sport (Schneider, 2016). The biopsychosocial model was first put forth by Dr. George Engel (1977). Engel (1977) posited that psychological and social factors influence biological function and play a greater role in health and illness than the established biomedical model allows for. Psychosocial competencies are an important component of sport science practice that are viewed by practitioners as an essential part of their approach to practice by focusing on the all-round well-being of an athlete, rather than athletic performance alone (Szedlak et al., 2019a; Downes & Collins, 2021; Callary et al., 2022; Szedlak et al., 2022). There is a wealth of research and understanding on what could be termed the biophysical-technological aspects of sport science practice (Gamble et al., 2018; Szedlak et al., 2022), but less acknowledged within the literature is what Le Meur and Torres-Ronda (2019, p. 1) describe as the "*submerged part of the iceberg* [emphasis in original], which involves complex human relationships, doubts, personalities, mistakes, resilience or educating the sporting community". Applied sport scientists are required to demonstrate practical skills that are aligned with job requirements where poor

or ineffective practice may result in a waste of time, a lack of stakeholder trust, or worse, competitive elimination or a career-limiting injury (Bradley et al., 2022; Le Meur & Torres-Ronda, 2019). The development of knowledge and competencies related to biophysical-technological factors are well established at HE level, the development of psychosocial knowledge and competencies - such as, pedagogy, philosophy, psychology, and sociocultural factors - are not as well defined, understood or established in sport science education (Szedlak et al., 2022).

The development of skills and knowledge in this area has only recently come to prominence in sport science (for example, Szedlak et al., 2019a; Gearity et al., 2021; Bradley et al., 2022; Callary et al., 2022) but is a well-established element of sports coaching education scholarship (Cassidy et al., 2008). As outlined in the previous chapter, sports coaching can be seen as a discipline of sport science or a distinct field of practice in its own right. Côté and Gilbert (2009, p. 316) proposed the following integrative definition of sports coaching effectiveness - "consistent application of integrated professional, interpersonal, and intrapersonal knowledge to improve athletes' competence, confidence, connection, and character in specific coaching contexts". The same quotation is used by Szedlak et al. (2019a) in their recommendation that S&C coaches embrace the development of psychosocial behaviours in their education. The premise behind this recommendation is that psychosocial contexts influence the practice of S&C, and practitioners should look to develop skills and knowledge in these areas to complement their understanding of physical contexts (Szedlak et al., 2019a). S&C is a sub-discipline of sport science, and it is my view that the same recommendation could be made to all disciplines under the sport science umbrella. Szedlak et al. (2019a) conclude that more attention be brought by the S&C community to the development of psychosocial skills through constructivist learning approaches at professional conferences and I believe this could be extended to all disciplines of sport science.

More recent research has highlighted a lack of understanding about what psychosocial skills are in S&C and how they can be defined – which will inevitably impact on education in this area. Callary et al. (2022) recruited 13 researchers and 30 stakeholders from within the United Kingdom Strength and Conditioning Association (UKSCA) to use a form of participatory action research to derive a definition of psychosocial competencies in S&C practice. The definition incorporates pedagogical, psychological, philosophical, and sociocultural competencies. However, there were significant differences between

researcher and practitioner definitions of these terms (Callary et al., 2022). The authors conclude that S&C practitioners would likely benefit from a deeper understanding of these psychosocial terms to better appreciate the "depth, breadth, and nuances of these ways of knowing" (Callary et al., 2022, p. 9). Furthermore, the authors state that the "rather significant gap" between the researchers and practitioners understanding of knowledge bases on the topic of psychosocial competencies makes research and development in this area difficult, thereby further hindering progress (Callary et al., 2022, p. 9). Callary et al. (2022) further point out that a shared language and scientific debate are indicative of a mature scientific discipline but as has been discussed, the field of sport science cannot be considered mature. Sandbakk (2021) argues that the oft described duality of research and academia on one side and practice on the other are actually complementary. Part of my research is about acknowledging both the theoretical and practical sides of sport science and how both can be viewed on a continuum of effective practice – a continuum which can be developed in practical class settings but only if we acknowledge student and academic conceptualisations of the continuum. This reflects the work of Lave and Wenger (1991) and Wenger (1998), who describe how professional communities nurture professional and learner identities within participants.

The concepts of Lave and Wenger's (1991) and Wenger's (1998) seminal work on communities of practice highlight the importance of shared identities and practices. The importance of discourse among academics in general has previously been shown by Pilkington (2014) and Asghar and Pilkington (2018). According to Ferman (2002) when lecturing strategies are considered collaborative in nature, they are preferred for developing professional expertise. Despite an obvious need for developing psychosocial skills required for practice, there is an underappreciation of the types of knowledge required to begin this process. Scholarship and enquiry into psychosocial skill development among sports and S&C coaches can serve as an example to all of sport science as to define, combine and integrate these types of knowledge into education programmes. However, as Callary et al. (2022) show, fundamental understanding of concepts is still required. Szedlak et al. (2019a) advocates for the inclusion of psychosocial competencies in professional development programmes. I argue that the foundations of this type of practitioner development need to begin earlier in the learning journey and should begin or at least be fostered during undergraduate degree programmes. Such an approach would give both researchers and practitioners a somewhat level foundation, given their common educational starting point.

An over-emphasis on largely positivist research output as an indicator of educational excellence - as happens in sport science (Shanghai Ranking, 2019a; 2019b) - fails to acknowledge that such excellence in research relies on supporting excellence in the classroom (Boyer, 1995). As functionalist and bioscientific theories have dominated sport science, students and applied sport scientists are presented a view of the world where human behaviour follows law-like patterns (Mills & Gearity, 2016). The central discussion on sport science centres around what research is valid, practical, and implementable. A lecturer may feel pressure from university structures (Sparkes, 2021) or the sport science academy (Woods et al., 2022a; 2022b) to be disciplined to publish research. Research also allows sport science academics to develop and maintain a particular professional identity by specialising in a particular area (Woods et al., 2022b). From my perspective, the disciplinary power of quantitative research on sport science and the impositions placed on lecturing staff in modern universities can be seen in HEIs in Ireland. In particular, sport science academics feel pressure to engage in quantitative research in the positivist tradition which is far more dominant than qualitative and mixed methodological approaches (Schofield & Burton, 2011; Petrovic et al., 2017). This is a pressure that I feel, and something my colleagues have also confessed to, but individual agency is always within the context of wider society and sport science educators are fully aware of "aphorisms like 'publish or perish'" that perfuse all academic disciplines (Woods et al., 2022b, p. 2). In science truth claims by the powerful - those who control publications, in-vogue research topics, status, knowledge claims, and so forth - are given legitimacy while other views or discourses are subjugated and marginalised (Cleather, 2020).

In this light sport science research practices can be seen a regulating power that function between the individual lecturer who requires research outputs to advance or even maintain their position and the institute which fetishizes publications and research grants primarily. If there is a focus on producing verifiable evidence to satisfy evidence-based practice and the focus is primarily on rational quantification, then it may be inevitable that a similar emphasis develops in teaching practice. Woods et al. (2022b) question if there is another way that we sport science lecturers can examine our relationship with knowledge and skills. I am bringing this a step further and asking how such a re-examining might impact our pedagogy in practical classes.

The disciplinary power held by research on sport science academia is countered by a second type of disciplinary power that is held by sport science practice. That is the 'art of

coaching'. Connolly (2016, p. 39) points out that successful applied practice in sport is "is about much more than just the "science" and the quantifiable". Rather, it is an amalgamation of less quantifiable factors such as the ability to engage, motivate, manage expectations, and develop relationships with stakeholders – this is the "art" of practice in sport (Connolly, 2016, p. 39). There are obvious links between these factors and the aforementioned need to develop psychosocial competencies in practitioners. Discussion about the nature of sport science is dominated by the question: is sport science practice an art or a science? – for example, Haff, 2010; Ingham, 2016; Bartholomew, 2017; 2018; Gamble, 2018; Szedlak & Gearity, 2020; Woods & Davids, 2022. This debate is primarily driven by what practitioners in the field see as a lack of meaningful or applicable research findings. As far back as 1980, Burke recognised the need for better communication between research and practice if the field was to offer any value. It has been over 30 years since Burke's (1980) article entitled 'Bridging the gap in sports science' and as Coutts' (2020) editorial entitled 'Building a bridge between research and practice – the importance of the practical application' shows, little progress has been made. Bishop (2008), Pyne (2014), Buccheit (2017), Fullagar et al. (2019a) and Sandbakk (2021) all offer similar perspectives on the need for sport science to better impact real world performance. Woods et al. (2022b, p. 3) refers to much of sport science academic outputs as being "blinkered or un-responsive" to the needs of applied practice.

The limited impact of research on practice leads to a perceived dichotomy between those who research and practice sport science. Fullagar et al. (2019b) highlight the need to further integrate research on human performance within the context in which it takes place. Furthermore, the Fullagar et al. (2019b, p. 1817) state:

> focus on coaching education/science exposure in academic settings [university courses] may benefit students [future practitioners] ability to understand context surrounding coaches' perceptions surrounding research application… educational strategies that focus on real-world context and promote social interaction between coaches, practitioners, organisational personnel and researchers would likely benefit all stakeholders.

It is through this lens that sport science teaching informs my practice. Rather than advocating for one side of this discussion, my teaching practice centres around undoing the unhelpful dichotomy that is framed as the science versus the art of sport science implementation and transcending the binary – this is particularly the case in practical class settings. The requirement for strong theoretical and practical knowledge presents a

challenge for those educating sport science students (Keogh et al., 2017). Woods et al. (2021a) point out that the field of sport science has a fixation with analysis which comes at the expense of synthesis. Analysis allows sport scientists to magnify and deconstruct elements for understanding, but this then limits their ability to step back and interweave elements for greater understanding (Woods et al., 2021a). Sport science is not alone in this issue, it impacts all of science that includes the study of humans or nature (Constanza, 2003) and leads to education programmes that "conflate analysis over synthesis, creating an unbalanced bias between the two, which inadvertently drives a dualism" (Woods et al., 2021a, p. 4).

'How can educational strategies be designed to better prepare sport science practitioners for the real world?' is the question that I find myself returning to. Decision making in sport science practice is influenced by a multitude of factors which are designed to contextualise evidence and make it practically applicable (Ardern et al., 2019; Taberner et al., 2019; Bartlett & Drust, 2020; Woods & Davids, 2022a; 2022b). Efforts have been made to encourage sport scientist researchers to embrace this complexity and move away from purely hypothetico-deductive practices that largely dominate the field (for example, Mills & Gearity, 2016; Fullagar et al, 2019b; Robertson & Joyce, 2019; Bartlett & Drust, 2020; Woods et al., 2021a; 2021b; 2022a; 2022b; Woods & Davids, 2022). Literature suggests that the sport science community is aware of the need for change in how research and applied processes are conceptualised, scaffolded, and examined, and other fields may offer examples on how to do this. However, to date there is limited research examining how HE level teaching strategies can be designed to contribute to this change.

## 2.4 Teaching Strategies in Sport Science Education

It is important to locate my teaching practice within the fields of pedagogy and sport science. Whilst there is a wealth of published research on teaching practical classes, particularly on the benefits of learner-centred approaches to teaching versus traditional lecturing styles for Science, Technology, Engineering and Mathematics (STEM) students, little has been published by sport science educators. In trying to add to the body of knowledge on sport science education, it is therefore pertinent to look to fields that are similar in nature to sport science such as physiotherapy, nursing, and physical education to gain a better understanding of teaching practices.

Educators in practical settings are challenged with providing learning experiences that emphasise opportunities to construct new knowledge rather than lessons being delivered in a didactic fashion (Ladyshewsky, 2002; Weeks & Horan, 2013). One such approach to the construction of new knowledge is active learning, which has developed from cognitive, constructivist, experiential, and social theories associated with the work of Vygotsky, Kolb and Wenger (Lomer & Palmer, 2021). Active learning is the use of instructional methods aimed at engaging students in the learning process (Prince, 2004). Active learning strategies include a range of teaching tools that require students to participate in various meaningful student-centred activities and importantly, to pay active attention to what they are doing by challenging them to apply their learning in an active manner (Prince, 2004; Huda et al., 2016; Lomer & Palmer, 2021). Activities can include informal small groups, case studies, problem-solving discussions, simulations, and collective projects (Meyers & Jones, 1993). Bradely et al. (2022) point towards active learning approaches may be beneficial in sport science education as such approaches can be aligned to day-to-day practices and specific skills of sport scientists. Reviews of active learning literature by Prince (2004) and Freeman et al. (2014) highlight that active learning approaches can be successful in engaging students in the learning process and are effective in creating positive programme outcomes. Students have shown positive perceptions towards active learning strategies compared to traditional learning strategies (Huda et al., 2016). It has also been suggested that peer-based components of active learning strategies are more effective in helping students to know and understand, rather than simply remember what is being taught in practical classes (Weeks & Horan, 2013). However, as Prince (2004) points out, teaching should not be reduced to formulaic methods and active learning should not be seen as a pedagogical panacea. This view is supported by Lomer and Palmer (2021) who advocate the use of active learning strategies that are collaborative, practical, task-oriented, and experimental whilst highlighting the benefits of reflecting on such activities. This requires strong engagement from the lecturer as well as the student. Academics need to be aware of a range of instructional methods and ensure their teaching is informed by scholarship on teaching and learning (Prince, 2004).

Video-based learning activities to develop practical skills and knowledge have been shown to be effective in fields with similar practical components to sport science such as physiotherapy (Coffee & Hillier, 2008; Weeks & Horan, 2013) and nursing (Kelly et al., 2009). Research by Weeks and Horan (2013) showed that students found the use of video-

based active learning to be supportive and accessible, by improving understanding of theory and reducing anxiety about content. However, students were critical of the predictable nature of some videos highlighting that it was too easy to identify good and bad practice in each (Weeks & Horan, 2013). This shows that students welcome challenging scenarios in active learning. The timing of video-based activities and the affordance of space for reflection was deemed fundamental by the researchers in facilitating the desired learning (Weeks & Horan, 2013). Ladyshewsky (2002) highlighted that recreating quasi-real-world scenarios is useful when developing practitioner competencies as it is difficult for instructors to consistently explore clinical reasoning processes without creating such scenarios due to time pressures and heavy teacher workloads.

The benefits of multi-media tools as part of active learning promotion have long been acknowledged but as Coffee and Hillier (2008) point out, this often stems from a perceived need to provide increased access to teaching content. With programmes like sport science there should be an onus on utilising methods that "promote the life long [sic] learning and reflection skills and improve student engagement in our students we should be using instructional designs that intrinsically promote these skills" (Coffee & Hillier, 2008, p. 274). The benefits of active learning on such skills are less known. Coffee and Hillier (2008, p. 275) advocate promotion of such approaches early in a student's education journey, "before less effective teacher centred behaviour becomes entrenched". This point is important given the previously discussed early emphasis on the positivism-informed natural sciences in sport science degree structures. Despite research showing the benefit of a constructivist versus exposition-centred approach to teaching in STEM disciplines, the potential for mediums such as video to assist active learning and the importance of embedding such strategies early, very little is known about how sport science educators develop or implement such approaches in their practical classrooms.

In relation to sport science education specifically, literature from Keogh et al. (2017; 2021) and Navandar et al. (2021) supports the use of active learning material when teaching biomechanics and demonstrates sport science students' openness to active learning methods. Keogh et al. (2021) highlighted the potential benefits of using game-based activities in promoting learning of biomechanical concepts. Navandar et al. (2021) found that the use of Instagram as a medium for learning was shown to have a positive impact on biomechanics students. Most students nowadays can be considered digital natives who use devices such as smartphones frequently in daily life. Incorporating this

nativism facilitated the identification, contextualising and sharing of biomechanics information (Navandar et al., 2021). Keogh et al. (2017) found that sport science students were broadly positive about the implementation of approaches that combined face-to-face and online learning experiences, and they highlighted the need for material to be interactive, engaging, and for it to complement face-to-face teaching.

As discussed previously, integration of online materials and face-to-face discussion appears crucial in successful active learning methods. This is further supported by Knudson (2020), who compared eight weeks of normal face-to-face instruction with active learning techniques, to six weeks of online biomechanics instruction. Findings showed that students preferred the face-to-face learning experience more while active learning was deemed to significantly improve mastery of biomechanics concepts above levels previously reported for lecture alone (Knudson, 2020). However, it must be noted that the online instruction in this research was COVID-19 enforced and this may have impacted students' perception of online learning. Similar findings were shown in a comparison of student-centred active learning and content-centred lecturing in undergraduate biomechanics courses (Wallace & Knudson, 2020). Overall, there is evidence of sport science students' openness to active learning methods that incorporate online content delivery, provided it is accompanied with face-to-face active discussion in class. However, none of the cited research contextualises interventions or findings as a response to the needs of sport science practice. All focus on the delivery of teaching methods to engage students and improve their learning outcomes. What is missing from literature on sport science research is a focus on how teaching strategies can help prepare students for the complexities of practice. This is also evident in other research that uses sport science students as research participants – the focus is on the 'what' of the teaching strategy without regard for the 'why' (for example, Papastergiou, 2010; Karaca & Ilkim, 2021; Sukendro et al., 2020).

Szedlak et al. (2019b), however, provides an example of an educational intervention that is placed within the context of a sport science field. Here the authors examined the use of written, audio, and video vignettes to translate practice knowledge to professional S&C coaches. The participants were provided with vignettes of practitioner behaviour through the different media and were asked to provide reflections on their utility. The video vignette was found to the preferred medium for learning due to its ability to convey emotional, verbal, and non-verbal behaviours. This research showed that vignettes - whereby real-world type scenarios are played out - provide effective knowledge

translation to practitioners, and further support the use of multi-media artefacts in the teaching of sport science practitioners. In this research the authors take care to address the types of practice knowledge they are trying to develop and why these are considered important. With Szedlak et al. (2019b), the focus is on the 'what' and the 'why' of the teaching strategy. This is particularly instructive to me as a sport science educator as it allows for the unique context of sport science. However, as professional practitioners were used as subjects, it remains to be seen whether or not sport scientists students would embrace such methods. Recent research by Bradley et al. (2022), as outlined in section 2.8.2, suggests that this may be the case.

The use of video content to facilitate an active learning approach to teach sport science practical classes has been discussed. However, there is more to practical classes than content; consideration must also be given to the tasks being taught. The teaching of movements in a practical class setting can be viewed as having theoretical basis in the cognitive approach and in a prescriptive pedagogy – for example, lecturers demonstrate jumping movements and then talk about the intricacies of them (Raiola & Tafuri, 2015; Raiola & Di Tore, 2017). Such a cognitive approach implies specific psychological models of motor learning whereby instructors demonstrate, allow time for practice, and then give feedback for error correction to students. This differs from how we teach such movements to athletes which follows a more ecological-dynamic approach such that a learning environment is created to allow spontaneous solutions to movement problems to be found – such as laying out hurdles for athletes to jump over (Raiola & Di Tore, 2017). Raiola and Di Tore (2017) argue that educators' practices invariably develop out of unexamined beliefs about learning which are rarely articulated. The difficulty with the former approach as described, the cognitive approach, is that it assumes knowledge as external to the student and fails to account for lived experience and importance of perception of experiences (Light, 2008). Sport science students are interested in sport and have most likely performed the movements we are teaching them about (Spittle et al., 2021). Raiola and Di Tore (2017) advocate a more transdisciplinary approach to teaching movements to sport science students, one which acknowledges the centrality of the body in the learning process rather than focusing on didactic cognitive methods alone. This mirrors some of the discussion above on the need to promote transdisciplinary knowledge in sport scientists (Woods et al., 2021a). The authors propose more ecological approaches to learning such as peer education, focus groups and cooperative learning in teaching situations such as practical classes (Raiola & Di Tore, 2017). This reflects the discussion

on active learning strategies above and builds on an earlier publication by Raiola and Tafuri (2015, p. S379) which emphasises the "invasive" role of the instructor in the cognitive approach compared to the non-invasive role in the ecological approach.

The complexities of sport science practice and the need for more transdisciplinary research to combat disciplinary silos have previously been discussed. However, to date there has been very little questioning of how sport science education - a process which all practitioners and academics follow - can lay the foundations for such complex analytical skills. Sudibyo et al. (2016) highlighted that the analytical thinking skills of undergraduate sport science students is still relatively low in the context of sports performance. Students understand concepts related to sports performance but struggle to understand when, why and how to implement strategies to influence these competencies. Sudibyo et al. (2016) examined the effectiveness of a Context Based Learning (CBL) model for teaching physics to sport science students and found improvements in the analytical thinking skills of students across two universities. The use of CBL models has been around for many years and in particular has been advocated for the teaching of physics where it is easy to get caught up in teaching abstract principles alone (Whitelegg & Parry, 1999). Success has also been reported in pedagogical approaches to teaching engineering through sport contexts (Kadlowec & Navvab, 2012). Mroczkowski (2009) outlines the reverse whereby biomechanics principles are used to improve the teaching of Aikido to athletes. Meier (2021) found that prior sporting experience was associated with an improved ability to instruct others and make content comprehensible. The ability to instruct exercise and synthesise information are important practitioner skills in sport science, particularly given the educational role that sport scientists play with stakeholders (Martindale & Nash, 2013; Le Meur & Torres-Ronda, 2019; Bartlett & Drust, 2020). The available evidence demonstrates that combining theoretical concepts with practice scenarios and sporting contexts is beneficial to a student's learning. Therefore, it is appropriate to question if prior sporting experience - as a potential reservoir of context that sport students possess - improves learning? Furthermore, if it is the case that prior sporting experience is valuable in this regard, can it be amplified through HE pedagogical approaches?

Practice-based learning focuses on the development of knowledge and skills in a practice environment. Whilst most sport science students undertake at least a semester of work placement, the important role that practice-based learning plays in teaching health related science students such as medicine or nursing is not reflected in sport science curricula. It

is therefore beneficial to have an understanding of the benefits of practice-based learning approaches so that implementable factors can be included in sport science practical classes. Strati (2007) highlights the polysemic nature of the word practice in this sense. For example, the term 'practice' can refer to local knowledge about an organisation or situation, performative expertise in a given skill or action, elements of constantly interrelated tacit and explicit knowledge and aesthetic understanding, the importance of materials of practice or the communication of knowledge in a given set of circumstances or organisation. As with other areas of scholarship that are explored in this thesis, this concept is likely to be familiar to sport science educators given the differences in practices between sports and even disciplines within sports. The dynamics, organisation and culture of hurling teams are quite different from those of Gaelic football teams for example despite them sharing resources like pitches, club affiliations and often players. Smigiel et al. (2015), however, highlights some of the strategic and operational difficulties associated with real-world practice-based learning opportunities. In lieu of actual real-world practice-based scenarios, higher education institutions have developed workshop or workplace type experiences - such as practical classes - which are often quite useful in developing "specific procedural skills and provide an important incremental step towards engaging in practice settings and practice work" (Kennedy, et al., 2015 p. 2). Kennedy et al. (2015) emphasise the important role that lecturers play in drafting the objectives for their students' experiences in practice environments and activities, and subsequently putting those objectives into practice. Vitteritti (2015) posit that laboratory classes, which are synonymous of practical classes, are used to develop ways in which novices may learn through practice, in context and with others. In particular, the point is made that laboratory classes in science help to link lecture based learning a more practice-based learning environment. Kennedy et al. (2015, p. 11) sum up this process:

> The pedagogy of practice, activated in the scientific laboratory context fosters the co-existence of learning practices and academic interests, producing tension amongst codified knowledge and unstable expertise in evolution, the procedural standards and artisan skills incorporated by both novices and experts.

The research findings outlined above are valuable as they give an insight into a student-centred approach to sport science teaching and the use of technology that is already native to students in achieving this. I would argue that research exploring a sport science lecturer's practice in a reflective manner would complement such research findings. The

next section outlines literature from sports coaching which offers examples of how to examine education practices in a sporting realm.

## 2.5 What We Can Learn from Sports Coaching

Although coaching can be considered a discipline within sport science, the applied practice of sports coaching is distinct from the work of an applied sport scientist. Both share similarities in terms of working with athletes within a biopsychosocial model (Schneider, 2016) and seeking to improve sporting performance, but there are differences in the dominant research epistemologies and practices, and the historical and sociological constructs of the roles. Whereas quantitative methodologies dominate sport science research (Bernards et al., 2017; Petrovic et al., 2017), qualitative methodologies pervade sports coaching literature (Côté & Gilbert, 2009; Cassidy et al., 2008). In practice sports coaches work on the technical and tactical elements of the sport to improve performance (Jones et al., 2004) and elite level coaches are often former elite athletes that are fast-tracked into the roles and exempted from entry-level qualifications (Rynne, 2014; Blackett et al., 2017). Sport scientists, on the other hand, come almost exclusively through science focused HE and certification routes (Sportsmith, 2021a; 2021b; 2021c; 2021d).

Coaching science has developed primarily from analysing coaches in practice (Gilbert & Trudel, 2004), and is typically associated with teaching and pedagogy (Drewe, 2000), and behavioural science (Gilbert & Trudel, 2004; Glen & Lavalee, 2019). The focus for sport science is on understanding scientific processes that influence performance (Bishop, 2008; Haff, 2010; McCunn, 2019) and applied sport science practitioners focus on developing contextual performance solutions for a range of stakeholders, including sports coaches (Bartlett & Drust, 2020). Despite these differences, because of the link to teaching, pedagogy and behavioural science, sport science education can look to coaching science literature as a rich source of information. Developments in sports coaching education in recent years have allowed programmes become more learner-centred and constructivist in nature (Paquette & Trudel, 2018). This has resulted from scholars examining the shortcomings of traditional teaching practices and their epistemological traditions. Some coaching scholarship is more useful than others regarding sport science education (Paquette & Trudel, 2018). For example, some textbooks such as ‘Sports Coaching Cultures: From Practice to Theory’ (Jones et al., 2004) offer insightful examples on the implementation of the “intuition” or “art of coaching” (p. 1) required for

successful coach-athlete interactions. Whilst it will be argued later in this chapter that such knowledge is important for sport scientists and that they should inform curriculum design, the foundations of this knowledge in sports coaches will be very different to those of sport scientists. Texts such as Jones et al.'s (2004) that are focused on the personalities that dominate sports coaching - successful technical coaches - are less pertinent to my research than peer-reviewed scholarship on sports coaching education, which is more likely to offer examples of what may be effective practice in a sport science education environment.

Looking at sports coaching literature, it is clear that examining education and pedagogy practices in the field is a priority for researchers and practitioners. This makes intuitive sense to me, given the pedagogical requirements of coaching but applied sport science practitioners face similar requirements to 'teach' stakeholders (Haff, 2010; Martindale & Nash, 2013; Bartlett & Drust, 2020). Jones and Turner (2006) state that there is general agreement that the complex interplay of teaching, guiding, and managing others in sports coaching "precludes any paint-by-number plans" (p. 181). One avenue for addressing this is education. Jones and Turner (2006) point out that much of sports coaching education takes place in a traditional didactic manner which mirrors the delivery of practical classes to sport science students. Cassidy et al. (2006) tells us that student involvement in coach education programmes is often limited to brief self-reflection exercises, which again can mirror the delivery of practical classes to sport science students. As a result, information is rarely delivered to students in a manner that is contextually relevant in coaching practice and therefore graduates are not able to develop the pedagogical skills required when working with athletes and other stakeholders (Morgan et al., 2013). This view is supported by the work of Knowles et al. (2005; 2006) who examined perceptions of sports coaching students in HEIs and reported on the gulf between the theories that try to explain coaching practice and the reality of such applied practice. Similarly, Roberts and Ryrie (2014) advocate that sport related education programmes move beyond an 'instruction' focus, towards more of a 'learning' focus. The limitations of instructional focused approaches in coach development are that depth of critical analysis is lacking, students are held back by pre-existing knowledge rather than using it to scaffold concepts, and importantly, theory and practice are divorced from one another (Jones et al., 2012) – reflecting my experience of sport science education as both a student and lecturer.

Jones et al. (2012) attempted to address this issue by challenging students to develop communities of practice through which the integration theory and practice knowledge

would be possible. In this research, the MSc students were introduced to theory prior to being asked to carry out tasks based around that theory and then share experiences through group discussions. Student participants were positive about the pedagogical approach, specifically that they were stimulated to combine existing tacit knowledge with new insights. Lecturing staff on the module were similarly positive about the approach, citing improved student engagement in tasks. Morgan et al. (2013) also tried to address the didactic nature of sports coach education and help coaches avoid the paint-by-numbers approach. Here the authors argue for a move away from the normal competencies-based approach to education and more towards developing a "quality of mind" (p. 219) that will allow for agile problem solving required due to the dynamic nature of coaching practice (Morgan et al., 2013). Furthermore, some of sports coaches knowledge has been shown to originate in their experiences as athletes and it is deemed pertinent to leverage this during educational programmes (Irwin et al., 2004; Gilbert al., 2006).

Morgan et al. (2013) looked to problem-based learning (PBL) - which is a form of active learning that tries to use real-world scenarios and facilitative tutor questioning to challenge students' critical thinking (Lacuesta et al., 2009) - to focus on developing a more conducive learning environment rather than a chance for lecturers to show off their content knowledge (Jones & Turner, 2006). Such approaches encourage student participation and reflection on prior experiences (Lomer & Palmer, 2021). Jones and Turner (2006) highlight the benefits of such situated learning approaches, such as PBL, in allowing students to apply theory to practice, engage with the perspectives of others and appreciate some of the complexities of practice. However, the authors point out that some of the students were defensive when asked to participate or dismissive of such a collaborative approach and future research may look to examine this (Jones & Turner 2006). Araya et al. (2015) had similar findings among postgraduate sports coaching students in developing practitioner knowledge through active learning situations. In reference to my own practice, these interventions highlight that providing students with a foundational understanding of theory before facilitating them to put it into action, and then using their community of practice to reflect, can be a successful method in combining theoretical and practical knowledge. This suggests that active learning approaches to education, as previously outlined, can be used to develop the types of knowledge required in sports related practice.

From a sport science perspective, Szedlak et al. (2019b; 2020; 2021) also uses sports coaching literature to make similar points in relation to the teaching of standardised competency-based curricula by professional accreditation bodies in S&C. Here the authors are critical of an over-emphasis on the linear instruction of technical aspects of what a practitioner should know. Rather S&C education should consider more novel and innovative, constructivist-based approaches such as those employed by Szedlak et al. (2019b; 2020) to include why and when to implement what they know. Szedlak et al. (2020) showed the effectiveness of guided reflection through the use of video vignettes in developing S&C practitioners. Szedlak et al. (2021) found that a composite letter stemming from the experiences of 13 elite coaches writing to their 'younger-selves' resonated with participants in a MSc Strength and Conditioning programme. The letter focused on themes such as willingness to learn, appreciating the contribution of others, understanding, reflection, behaving in line with values, embracing uncertainty and challenges, and creating and maintaining a work–life balance – all knowledge that would be considered very different to the standard competency-based curricula that pervade professional certification in S&C (Szedlak et al., 2021) and sport science education in HEIs. The work of Szedlak and associates (Szedlak et al., 2019b; 2020; 2021) in recent years has offered me an insight into the type of pedagogies that can be successful with the students that I work with and supports the notion that sports coach education scholarship offers examples of this.

Additionally sports coaching research can offer insight into potential research methodologies and pedagogical pitfalls. Cronin and Lowes (2016) highlight criticisms of coach education programmes as delivered by both HEIs and national sports governing bodies. The authors explored the delivery of an applied coaching module to coaching students by the first author, Cronin. The delivery included a mix of theoretical instruction, practical implementation, and peer reflective practices among students. Furthermore, a critical friend - the second author, Lowes, in this instance - provided feedback on the implementation, reflection cycles and analysis of the data. In this research, the authors used action research to examine their pedagogy and noted that the use of such an approach to examine sports coaching education was novel. The authors further highlight the importance of including both student and educator voices in examining the effectiveness of the module. Final conclusions include the benefits of this type of experiential learning pedagogy but also a warning against viewing such approaches as a panacea against traditional direct instruction methods. Successful implementation of such methods

requires organisation, teacher self-reflection and integration with traditional direct instruction as a means of effectively supporting students (Cronin & Lowes, 2016). This research is instructive to my teaching practice as it highlights a need to not only interrogate my methods of teaching, but also to interrogate me as a teacher in a comprehensive manner.

Collectively, the above research on sports coaching education exemplifies the shift from a teacher and content focus to a more learner and context focus within sports coach education at HE level. This is a shift that is being broadly seen across the sports coach education sector (Milistetd et al., 2019). A similar shift in education is also evident in professional development among S&C practitioners, as shown in the work of Szedlak and associates (2019b; 2020; 2021). Bradley et al. (2022) offer an example in sport science education, but could a broader shift be warranted in sport science education at HE level?

It is clear from historical and social context of sport science that a particularly narrow view of what sport science is has emerged. Furthermore, the primacy of a positivist-quantitative research paradigm has taken a form of disciplinary power over the field, and this is pervasive within sport science education. Some research has been carried out on pedagogical approaches to sport science and associated fields that aims to address these issues, but more is warranted. Sports coaching research provides fruitful examples of how to carry out research on educational practices that are student-centred and aim to provide students with opportunities to develop their knowledge and skills in a collaborative and context-rich manner. However, when trying to carry out research on the teaching of sport science it is important not only to look at examples of others but also to explore the range of knowledge that requires development.

## 2.6 Multiple Ways of Knowing

Successful sport science practice requires a range of skills and knowledge (Haff, 2010; Balagué et al., 2016; Bartlett & Drust, 2020; Gearity et al., 2021; Callary et al., 2022; Woods & Davids, 2022). Developing such a range requires greater acknowledgement, understanding and integration in sport science education. As previously outlined in section 2.3, recently published literature has attempted to define the psychosocial competencies related to S&C and highlight the important knowledge associated with these competencies. The links and commonalities between sport science practice and S&C practice in Ireland have also previously been outlined in chapter 1. The majority of

HE education and professional standards for S&C are based on the natural and physical sciences (Dorgo, 2009; Haff, 2010; Callary et al., 2022). However, a rising corpus of research on practitioner skills also emphasises psychosocial expertise and professional competencies (Szedlak et al., 2019a, 2019b; Gearity et al., 2021; Bradley et al., 2022; Callary et al., 2022). According to Gearity et al. (2021), Callary et al. (2022) and Szedlak et al. (2022) there is also an increasing concern among professional S&C accreditation bodies to promote and develop psychosocial skills and knowledge. Such concern has yet to be reflected in any meaningful developments as far as I can see.

Professional accreditation processes in S&C are still based on standardised declarative knowledge-based curricula (National Strength and Conditioning Association [NSCA], 2022; UKSCA, 2022a). To become a Certified Strength and Conditioning Specialist with the NSCA in the United States of America (USA), a candidate is required to answer 190 multiple choice questions (mcq) in 'Scientific Foundations' and 'Practical/Applied' areas (NSCA, 2022) leading to an over-emphasis on assessing declarative knowledge. This mcq exam is in addition to a requirement that candidates have a bachelor's degree or higher from an accredited institution (NSCA, 2022). Therefore, the argument could be put forth that the NSCA expects students to gain a wider range of knowledge applicable to S&C practice, and have these competencies assessed, within their HE programmes. Gearity et al. (2021) refer to a draft of the NSCA's Special Committee on Accreditation's Professional Standards and Guidelines for accrediting HE programmes on the topic (NSCA, 2019). This publication addresses the experience and qualifications required of faculty for accrediting HE programmes to the NSCA. As Gearity et al. (2021) point out, this document makes no reference to curriculum requirements relating to the many psychosocial or practitioner competency demands other than mandating 'field experience' via an array of practical or work placement requirements (NSCA, 2019). In this sense, S&C can be taken as a microcosm of how a sport science education is structured.

This, coupled with information in prior sections, exemplifies what I perceive as a gap in how sport science programmes are planned and delivered. Whilst there are references to knowledge and developing a range of practice skills, abilities, and knowledge within the S&C accreditation process, these are poorly defined or not defined at all. Furthermore, there is an assumption that such knowledge will be addressed at undergraduate level but in my experience of module development and programme design as a student, practitioner, and lecturer in sport science, this is not the case. My research sets out to

explore this issue of fostering multiple ways of knowing in sport science students in practical class settings through the lens of my own teaching practice.

The knowledge base of practitioners is made up of different types of knowledge (de Jong & Ferguson-Hessler, 1996) and sport scientists practitioners are no different (Dorgo, 2009). The development of knowledge - with a wide variety of properties and qualities - plays a pivotal role in learning and instruction (de Jong & Ferguson-Hessler, 1996). Among multiple ways of knowing described in the literature are tacit and explicit knowledge, declarative and procedural knowledge, and practice knowledge (Reif, 1987; Reif & Allen, 1992; de Jong & Ferguson-Hessler, 1996). Whilst it is beyond the scope of this review to outline each and every description of knowledge available, it is important to give an overview of some of the knowledge that is applicable to sport science practice and therefore informs my teaching practice.

In 'Personal Knowledge', Polanyi (1962) argues that science depends on a type of tacit unspecified, and unarticulated knowledge among scientists that cannot be articulated by language. We can only understand science if we acknowledge our interpretation of and contribution to it (Polanyi, 1962). According to Nonaka and Takeuchi (1995) tacit knowledge is fundamental to the skills, abilities, and habits of practitioners, and is developed through experience, practice, and interaction with others. Tacit knowledge is therefore often implicit or unconscious and is learned through interactivity. Explicit knowledge, on the other hand, is knowledge that is readily communicated through words in a manner that is more systematic, formal, and codified, and can be stored and accessed through documents, databases, or other forms of information (Nonaka & Takeuchi, 1995). Declarative knowledge refers to a practitioner's knowledge of facts and concepts and is similar to explicit knowledge in that is used to communicate information (Roediger & Karpicke, 2006). Procedural knowledge is often contrasted with declarative knowledge, which refers to the ability to perform a task or process – the knowledge of how to do things (Roediger & Karpicke, 2006). When discussing knowledge such as tacit and explicit knowledge, and declarative and procedural knowledge, it is important to note that these are not either/ or dichotomies that practitioners employ in specific situations. For example, Polanyi (1962, p. 87) tells us that "the tacit cooperates with the explicit" and argues that all knowledge has a tacit component and the ability to be made explicit if asserted.

These different types of knowledge are evident in sport science practice through selective reaction to everyday scenarios (Woods & Davids, 2022). Sport scientists will often have to make judgements on how to integrate external sources of information, such as research findings, in a manner that fits the perceived needs of the environment (Fullagar et al., 2019a). Here the tacit and the explicit are made one by the sport scientist making a theoretically informed judgements and communicate this to stakeholders as advice or direct programming (Bartlett & Drust, 2020). Formal knowledge stems from disciplinary-specific knowledge of sport science theory and are informed by "formal education and textbook learning", whilst applied knowledge is "not learned formally, but developed through years of practice" (Dorgo, 2009, p. 28). Therefore, it is useful for me to think of a range of knowledge on a continuum that need to be developed in my students to help them in a given situation. Research on sport science practice by Dorgo (2009) is instructive in this regard, as it acknowledges the range of contributions to a sport science practitioner's knowledge and advocates for the development of a range of knowledge in education rather than focusing exclusively on explicit or declarative forms as is commonly the case.

The knowledge required for practice requires learning in practice. Some of this knowledge, or elements of it, can only be developed in practice-based scenarios (Nash & Collins; Dorgo, 2009; Bartlett & Drust, 2020) and pedagogical strategies need to be developed to facilitate this (Bradley et al., 2022). Reviews of the requirements of sports practice further highlight the need to develop a range of knowledge in students and points toward practical class settings as being opportune sites for developing that range. For example, in providing a framework for knowledge translation in sport science, Bartlett and Drust (2020, p. 5), similar to Dorgo (2009), describe the use of both "peer-reviewed explicit/empirical evidence/ knowledge" and "tacit practice-based knowledge, experience and intuition" in performance delivery in high-performance sport. Fullagar et al. (2019b) makes a similar observation but fails to explicitly distinguish between different types of knowledge. From a sports coaching perspective, Nash and Collins (2006, p. 465) state that successful practice requires "many different types of knowledge to solve problems and ultimately make decisions". Nash and Collins (2006) discuss the fusing of such strands of knowledge to develop a form of tacit knowledge – which is best developed in real-word, practical settings according to the authors. Further support of the use of practical classes to develop tacit knowledge - as well as other types of knowledge - comes from McPherson and Kernodle (2002) who state that in sport, domain specific knowledge

is more beneficial for higher-order processing and performance, compared to general cognitive strategies. This supports time spent in discipline-specific domains such as practical classes.

Practical classes are not the same as real-world practice, but they can be seen as a useful conduit for developing cooperative theoretical and practice knowledge. This is particularly the case in relation to the types of practical classes that I teach, which are focused on technical exercise instruction and programming. From an epistemological standpoint, recent work by Woods and Davids (2023) is instructive in how sport science teachers can view the importance of meaningful practical classes for their students – "knowledge is not conceived as a corpus of secondary information… waiting to be applied in practice. But is grown by way of practice" (Woods & Davids, 2023). I am not advocating that practical classes replace practice for tacit knowledge development, nor am I arguing that practice knowledge can be fully developed in practical classes, rather I believe that a practitioner sensibility should inform practical class structures and lay the foundation for future practice knowledge development. This aligns with recent work by Bradley et al. (2022) on developing future expertise and employability among sport science students through active learning pedagogy.

Previously in this chapter, criticisms of an over-reliance on positivist-focused research have been outlined. To reiterate, sport scientists such as Balagué (2016) and Woods et al. (2022a) have criticised this narrow objectivity-reliant focus on knowledge development among fellow sport scientists. A greater emphasis on ways of knowing other than the dominant declarative knowledge as currently taught may help to improve the development of transversal, soft and critical-reflexive skills which sports degree programmes are currently lacking, despite their importance to practice (Maulini et al., 2022). However, as Woods et al. (2022a) have pointed out, we should be careful not to swing completely in the other direction in terms of how knowledge is developed. An over reliance on knowledge that may be described as tacit, procedural, or situational would warrant similar criticisms. This point is well illustrated by Jordan (2018) who points out he fallacy in swinging the pendulum of knowledge too far in either instinct or objectivity directions. Rather it is more useful for my practice to conceptualise knowledge from research as part of the conversation in sport science rather than the answer so as to overcome the more dominant hard empiricism pervasive to the field (Woods et al., 2022a). Woods et al. (2022b, p. 8) further point out the importance of sport science academics maintaining regular correspondence with their various sources of

“experiential” and “empirical" knowledge. This relates to my identification as a pracademic, as described in chapter 1 and is discussed in more detail in the next section. The teaching and learning experience that I can offer my students will be enhanced by “a robust correspondence with reality (the phenomena of sport performance and preparation)” rather than a professional life that is solely “dedicated to models or theories, data or their treatment” (Woods et al., 2022b, p. 8).

Criticisms of practitioners over-reliance on personal experiences and tacit knowledge are also to be found within the literature; although there is less discussion compared to academia’s reliance on research-derived knowledge. Thompson et al. (2009) found that among those considered to be elite sprint coaches, knowledge of sprinting technique was often found to be in conflict with, or largely unsubstantiated by, the admittedly limited existing literature on sprinting. Cushion et al. (2003) came to a similar conclusion regarding sports coaches, as did Jones et al. (2003) with football coaches. This reliance on personal experience and tacit knowledge is what has previously been referred to in this chapter as the art of coaching (Jones et al., 2004). Sprint coaches, such as those studied by Thompson et al. (2009) offer an interesting insight into the overlap between the knowledge required for sports coaching and sport science given that much, if not all, of the sprint coaches practice comes under the umbrella of sport science – for example, a sprint programme will account for physiology, psychology, biomechanics, and S&C. A sports coach - such as the sprints coach - needs to be able to take theoretical information and apply it practically. However, as Cushion et al. (2003), Jones et al. (2003), Thompson et al. (2009) and Brink et al. (2018) all point out, the same coaches are reticent to use what would be considered sport science sources of theoretical information; rather they prefer to rely on experiential as opposed to extrinsically presented knowledge. Part of the reason for a reluctance to engage in sport science may simply be the sheer volume of data available. Rapid technological developments and the ability to quantify a wider array of characteristics means that knowledge translation with stakeholders is becoming more and more difficult (Robertson & Joyce, 2019; Gamble et al., 2020). Such issues can be seen as constructive for the sport science practitioner. Firstly, there is a need for better and more effective knowledge translation between sport scientists and sports coaches, as pointed out by Bishop (2008), Reade et al. (2008), Finch (2011), Martindale and Nash (2013), Fullagar et al. (2019b), Bartlett and Drust (2020), and Downes and Collins (2022). Secondly – referring to what is largely missing from the literature - there is a need to better understand the range of knowledge required for successful practice and perhaps

more fundamentally, to have such a range accounted for during their foundational learning experiences.

## 2.7 A Pracademic Lens

As previously mentioned, in chapter 1, I have discussed how I see my two roles as academic, and practitioner as being amalgamated into one. I identify as a pracademic. A pracademic simultaneously fulfils academic and practical roles in a given field (Posner, 2009; Collins & Collins, 2019). There are, of course, variations on this definition. McDonald and Mooney (2011) for example, focus on academics who utilise a teaching style that is focused on the practical application of academic theory to describe pracademic work. Hollweck et al. (2021) describe a pracademic in teaching terms as someone who is simultaneously engaged in research and practice. Being a pracademic and having "multiple membership[s] of various communities and spaces" (Hollweck et al., 2021, p. 17) holds some distinct advantages. The authors point out that being a pracademic does not merely mean working at the intersection of theory and practice but rather the merging of two roles into one (Hollweck et al., 2021). Panda (2014) points out that pracademics are uniquely placed to understand and translate the jargon of academia into the language of practitioners. McCabe et al. (2016) highlights a capacity to operationalise ideas and research in both practice and policy settings. Willis (2016) tells us that pracademics do not merely work in the space between two fields but rather can uniquely offer complimentary skills, knowledge, and experience to each individual field by weaving them together. The concept of a pracademic used in my research is akin to Posner's (2009) interpretation as someone occupying simultaneous academic and applied practitioner roles and McDonald and Mooney's (2011) emphasis on conceptualising teaching practice through a practice lens.

From an educational perspective the benefits of being a pracademic are well documented. Manley et al. (2016), drawing on the work of Kolb (1984), proposes that sport and exercise science students are likely to respond well to learning through assimilation, such as abstract conceptualisation of theories and reflective observation of practice. Kolb's (1984) influential theory on experiential learning posits that students learn best by actually having experiences which facilitate knowledge creation. Here Manley et al. (2016) are referring to the positive impact that work-based learning, via placements opportunities, can have on students; teaching from a pracademic perspective may further

enable this type of learning in the university setting. This also reflects some of the earlier discussion on sports coach education research which sport science education can draw upon whereby the learning that takes place in practice can be used to inform practical class pedagogy.

The benefits of pracademic experience in lecturers has been shown in areas such as practical skill development, improving employability skills, enhanced student engagement, and linking theory to practice. Dickfos (2019) proposes that the experience of being a pracademic may also benefit students as it allows the lecturer to model, scaffold and develop practical skills in students that will be useful in postgraduate practice. According to the Dickfos (2019, p. 248),

> By reflecting on their pracademic experience, academic staff may identify not only a variety of practical issues and problems for students to resolve, but also identify core employability skills and relevant technical content to enable such resolution.

The development of core employability skills is documented to have been of concern to sport science students (Sleap & Reed, 2006) and more recently their prospective employers (Dinning 2017; Tsitskari et al., 2017). The linking of academic and practice knowledge bases facilitates a more engaging teaching practice and allows academics to be more aware of gaps in their curricula (Bushouse et al., 2011). However, academics may need to adapt the objectives of modules, their materials, and their pedagogy to ensure ongoing relevance to practice (Bushouse et al., 2011). Developing pracademic tendencies will assist in avoiding scholastic activity that is detached from the practical reality (McDonald & Mooney, 2011). The benefits of pracademic experiences have been show in areas as diverse as public administration, engineering, and tourism (Dickfos, 2019). From an education perspective, Hollweck et al. (2021) point out that a pracademic lens is useful in any field that wishes to fuse practice with scholarship. The benefits of being a pracademic support my identification as one and encourage me to further explore how this positioning influences my students' learning journey.

The pracademic construct is a particularly instructive concept when it comes to adjudicating the work that we sport science academics do. Previously, conceptualisations of sport science practice as an art or science have been outlined. Eacott (2022), argues that being a pracademic is to uncritically accept the false analytical dualism of theory and practice, hence promoting pracademic identities may perpetuate the art or science

dichotomy. Academic work is often seen by practitioners as being too narrow, too esoteric or failing to grasp the basics of real-world practice; whereas practice work when viewed by academics is often seen as out of date, opinion driven and lacking innovation (Collins & Collins, 2019). Whilst Collins and Collins (2019) - and those cited in the paragraph above - offer the role of the pracademic as being a potential solution to this dualism and highlight its benefits, care should be taken not to perpetuate such dichotomies. However, lived experience of such dualisms does not preclude them from complementing each other or becoming fused (Sandbakk, 2021).

The important role that pracademic experience plays in teaching and learning is evident across a diverse range of fields as discussed. The concept has yet to be interrogated in-depth from a sport science perspective but the primary benefits of pracademic experience for sport science lecturers are likely to be in bridging the gap between scholarly and practical perspectives and in a sense merging the two. Links between pracademic teaching and improved employability skills have also been made. Students can gain from a pracademic's experiences through experiential learning opportunities developed by the lecturer, based on their practical encounters. Whilst bridging the gap between theory and practice is one of the most important elements of pracademic work, care should be taken not to perpetuate the dualism; rather there needs to be a greater focus of developing and integrating a range of knowledge as discussed in the previous section. Implementation of pracademic knowledge in the classroom is a crucial component in facilitating an effective student learning environment to leverage pracademic experience.

## 2.8 Adult Education Influence

The influence of sport science education and practice as well as the notion of a pracademic identity have previously been discussed. In this section, I aim to highlight how various adult education influences impacted upon my pracademic identity to form what it is now. It is important to note that these influences were not stages, rather the additional influences layer upon and fuse with others to inform and enhance my pracademic identity. Figure 2.1 offers a visualisation of the development of the adult education academia influences my pracademic identity.

My pracademic identity was, originally, quite flat, and two-dimensional; I had two strands of a professional practice that were combined in a single identity. However, as I began the DHAE programme, this identity became three-dimensional through the influences of

firstly the programme, its lecturers and students; secondly, my burgeoning understanding of adult education and the literature that surrounds it; thirdly, my exposition to the types of theories, practices and methodologies that influence my research. A fourth element of this visualisation, the development of my understanding of practice theory, reflection, stages of practitioner development and how I view the field of sport science, is discussed in chapter 3. As I have interacted with the various influences on my thesis and teaching practice, I have developed the conversation between my teaching, my sport science practice and my pracademic identity through an engagement in adult education literature. This conversation and my identity as a pracademic have grown with each additional layer of understanding.

The following sections outline how an understanding of adult education literature has developed and how it influences my self-study research.

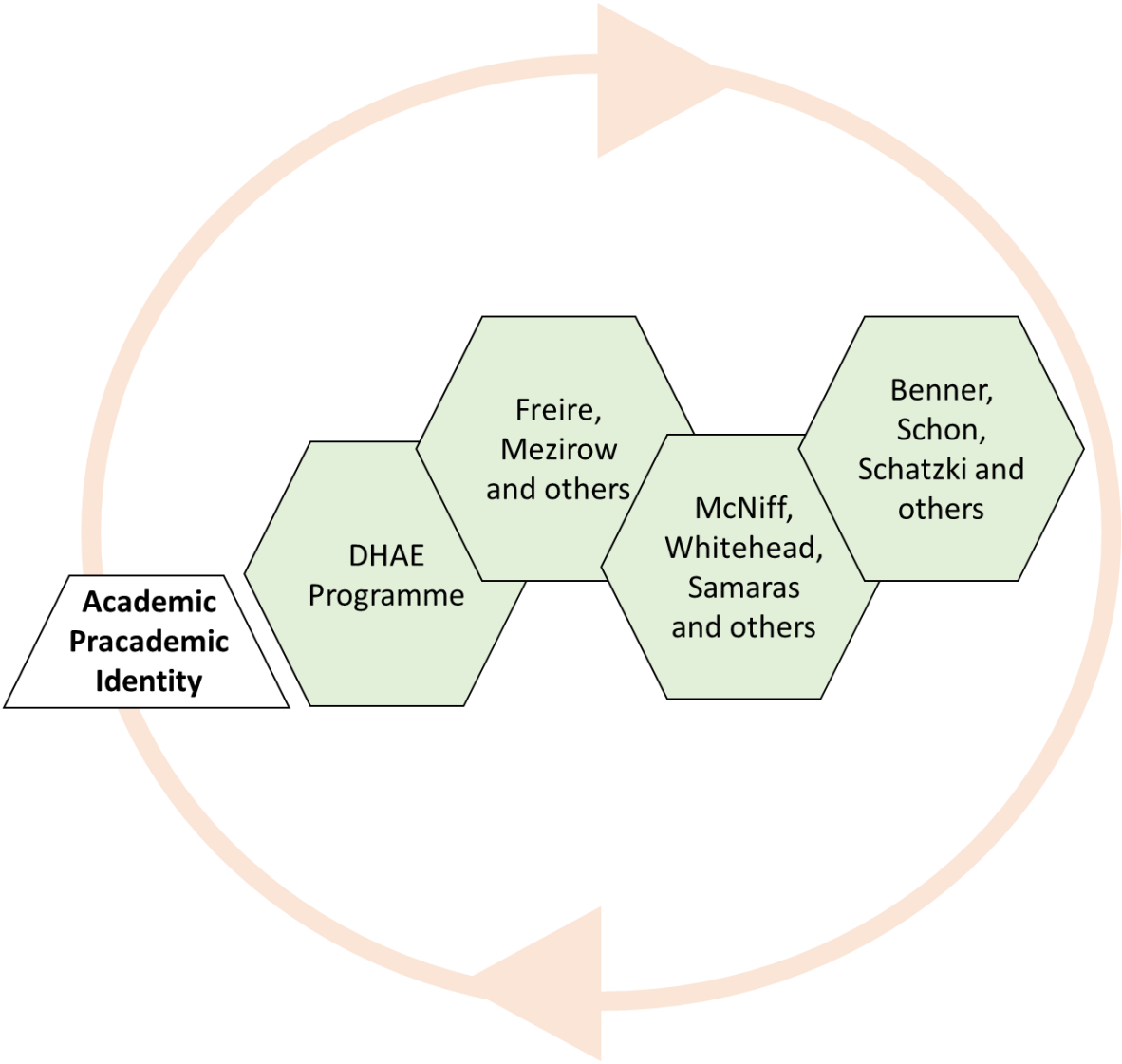



Figure 2.1: A visualisation of the recursive development of my pracademic identity through academic influences.

### 2.8.1 Dialogue and Praxis

If I wish to explore sport science education, then it follows that I should explore my own teaching practice and within that practice there are a number of influences that I draw upon. These influences interact with my position as a researcher, as outlined in chapter 1, my understanding of the field of sport science, examples from other fields, and the influence of a pracademic identity to inform my pedagogical orientation. The primary function of these influences in my research is how they allow me to interrogate and frame what I consider to be good teaching practice. In an effort to show how educational theory has shaped my practice, I will outline some key concepts that influence my pedagogical approach to teaching sport science practical classes. These are by no means the only educational influences on my teaching practice, but I feel they best capture the range of insight that I have gained through my doctoral research process. Here, I am primarily drawing on the work of two key educational theorists – Brazilian educator and author, Paulo Freire and American sociologist, John (Jack) Mezirow. In particular I would like to discuss how the work of Freire (Freire, 1970; Freire & Shor, 1987; Freire & Macedo, 1995) and Mezirow (1997; 1998; 2003) informs my understanding of student-centred pedagogy, with discourse, reflection and creating opportunities for learning at the heart of it. This scholarship in particular has allowed me to frame how I incorporate conceptualisations of sport science, the importance of active learning, foundations for multiple ways of knowing, and a pracademic lens with students.

According to the Freire Institute (2022), a Freirean approach to education focuses on active participation in the learning process by students who bring their own knowledge, experiences, and reflections to the collective learning experiences. In 'Pedagogy of the Oppressed', Freire (1970, p. 72) speaks of the dominant "banking concept of education" where knowledge is viewed as a "gift to be bestowed" upon those who know relatively less by those who consider themselves to know relatively more – for instance lecturers depositing information into a student's brain for them to withdraw at later stages. The work of Freire warns teachers against this approach and against characterising themselves as a "specialist in transferring knowledge" (Freire & Shor, 1987, p. 8). With this in mind, my approach to teaching sport science students opens up opportunities for the student to be empowered as part of the learning process. I feel I must include them in the process of learning rather than forcing learning on them. The banking concept is a criticism of formal education (Blackburn, 2000) that helps to frame my understanding of the importance of student-centred, active learning strategies, as previously discussed.

Mezirow's seminal theory on transformative learning was influenced by Freire (Kitchenham, 2008) and came about at a time when most adult education theory focused on the learning of basic skills. Mezirow focused on how education can change a student's identity (Levine, 2014). According to Mezirow (1997, p. 5) "Transformative learning is the process of effecting change in a frame of reference". That frame of reference is the lived experience. The lifetime of "associations, concepts, values, feelings and conditioned responses" (Mezirow, 1997, p. 5) that we experience forms the context influencing any interaction. This means linking pedagogy to a students' personal experience and also links to the idea of the pracademic, whereby the lecturer can use their practical experiences to develop students' frame of reference. It also supports the development of tacit and procedural focused knowledge by building on student's individual sporting experiences. Mezirow's (1997) descriptions of transformative learning particularly informs my practice regarding the use of reflection and encouraging students to reflect on their experiences to frame learning.

Freire advocates a dialogical approach to education where students empowerment is an important foundation for learning. Once again, this highlights the importance of student-centred, active learning strategies but also supports the need to ensure course content is discussed and developed with students rather than simply memorising information. The point is to allow adult learners to "develop their power to perceive critically the way they exist in the world with which and in which they find themselves; they come to see the world not as a static reality but as a reality in the process of transformation" (Freire, 1970, p. 83). According to Freire, dialogue is a way of knowing and therefore should not be simply used as a tactic to involve students – thus, dialogue is essential to learning as it encapsulates the social process of knowing (Freire & Macedo, 1995). Mezirow (2003, p. 59) also refers to dialogue as something "involving the assessment of beliefs, feelings and values". Within movement-based practical classes, such as the one I have chosen to examine, the facilitating lecturer must understand that students will generally arrive with some preconceived notion of what the class is about. This is because the movements that are taught are movements that the students have encountered previously in their own sporting lives. It is therefore incumbent on the lecturer to justify the proposition of the movement by presenting the particular frames of reference through dialogue in which the movement is applied (Mezirow, 2003). Jensen and Bennett (2016, p. 33) put a dialogical approach into practice and highlighted that it "enables academic staff to get a sense of

learner perspectives and to view students as partners and collaborators while students develop insights into the perspectives of staff".

Learners need to be facilitated in active discourse (Mezirow, 1997) and sport science lecturers are challenged with creating scenarios in which discourse is possible. Practically this means being aware of the students' prior learning and current level of understanding whilst being cognisant of the topic being developed. The key components of this practice from a lecturer's point of view will be to critically reflect on assumptions, discourse for validating contested beliefs, taking action on critical reflection, and then critically re-assessing the process (Mezirow, 1997). This has links with the Freirean concept of 'praxis'. In describing praxis, Freire (1970, p. 52) puts forth the importance of "reflection and action upon the world in order to transform it" and whilst Freire's work focuses on creating a more just world, it also relates to how we carry out teaching and research, and importantly how we implement learnings from previous teaching and research. Mezirow's notion of critical reflection includes actively and intentionally considering prior experiences so as to make meaning of them and learn from them (Mezirow, 1998). Critical reflection therefore involves challenging assumptions and perspectives and considering alternative perspectives in order to promote learning. The notion of praxis is therefore closely linked to the concept of critical reflection. Both praxis and critical reflection emphasize the importance of actively and intentionally engaging with the others in order to promote learning. In this sense, dialogue alone is not enough, genuine engagement in dialogue and reflection to promote the dialectal relationship between action (applications, activities, trials, or explorations) and reflection (inquiry, critical evaluation, advancing knowledge via reflection, understanding and wayfinding) is required (Zuber-Skerritt, 2001). Furthermore, praxis is understood to be the combining of theory and practice through action and reflection and is seen as central in countering hierarchical and oppressive education practices, such as the banking model (Blackburn, 2000). Regarding my teaching practice, this links notions of the pracademic - as discussed earlier - with ideas of critical reflection and praxis.

Accordingly, from Freire and Mezirow I have drawn two important capabilities required for adult learning. The first is critical self-reflection and the notion of praxis, and the other is the capacity to engage in critical-dialectical discourse through student-centred approaches. My task as an educator is to assist students in transforming their learning by developing the skills, insights, and dispositions that will be essential for their practice (Freire, 1970; Mezirow, 2003). Therefore, I can help students in achieving their objectives

in a manner that will foster a disposition that allows learners to be more active in their learning (Freire, 1970; Mezirow, 2003). To achieve this, adult educators are required to be critically reflective of their assumptions and challenge their own beliefs – values may remain, but it is important to remain open to reassessing assumptions and perspectives in an ongoing process of praxis.

### 2.8.2 Foundations for Expertise

In my personal experience, the most common criticism of sport science education is that we are not adequately preparing students for real-world practice. Based on the premise that a large portion of my role is to prepare students for practice, the work of Patricia Benner has been a strong influence on how my thinking has developed on this. Benner's scholarship centres around the education of nurses and in particular their progression from novices to experts. For a long time, I considered part of my role to be one of preparing students to be expert practitioners immediately upon graduation and was then disillusioned by critiques of practice that I was seeing. For example, Buccheit (2017), Fullagar et al. (2019b), Bartlett and Drust (2020), Couts (2020), and Woods and Davids (2022) all have legitimate criticisms of sport science practitioners – they have adequate knowledge of theories, concepts and paradigms but lacked knowledge on to apply them in practice. However, to expect practitioners to be experts in applying theory and knowledge immediately after graduation is unrealistic. Criticisms of the sport science graduates, such as Ingham (2022), highlights the need to interrogate sport science teaching practice. Ingham (2022) argues that studying and working require different skills. This view is not without merit but in dichotomising studying and working during a formative undergraduate programme, Ingham (2022) fails to account for the understanding that lecturers have of practice and the need to prepare students for such environments – see for example, Bradley et al. (2022).

Benner's (1984) 'novice to expert' model highlights the systematic manner in which a learner (student, new or seasoned nurse) uses a range of knowledge forms to develop skills and understanding of a practice situation over time. The model is strongly influenced by the Dreyfus model of skill acquisition (Dreyfus & Dreyfus, 1980; Benner, 2004) and is quite relevant to the teaching of practical classes in sport science. Students cannot build expertise without knowledge to base it on and practice to develop their experiences. It is therefore my role to guide their journey towards expertise rather than try to have them arrive at it by the end of the degree. Bradley et al. (2022) also draw on the work of Dreyfus and Dreyfus (1980) in advocating for pathways for skill and

competency development in sport science students which can also act as a pedagogic strategies to improve employability. Bradley et al.'s (2022) use of the Dreyfus model (Dreyfus & Dreyfus, 1980) to support the use of entrustable professional activities in sport science education is akin to Benner's model (1984; 2004) description and highlights that sport science may use such models to conceptualise sport science expertise development. In implementing EPA's in sport science pedagogy, Bradley et al. (2022) aims to equip sport science graduates with the knowledge, skills and professional competencies required for competent practice and with minimal supervision. More effective sport science practice and greater employability of graduates is therefore supported by foundational learning at HE level according to Bradley et al. (2022). This reflects my own perspective and could also be seen as supported by Benner's (1984) model. In Benner's model of nurse practitioner development (Figure 2.2), as in the Dreyfus model (Dreyfus & Dreyfus, 1980), skill is a more global term meaning the skills or competencies of a practitioner – the focus is on the ability to practice competently in employment. Benner's (1984) model is therefore useful when considering how I teach sport science's future practitioners. There are obvious similarities between nursing and sport science practice – primarily a reliance on the medical model for explicit and declarative knowledge and the requirement to combine this with knowledge that is more tacit and procedural when working with patients in context specific environments.

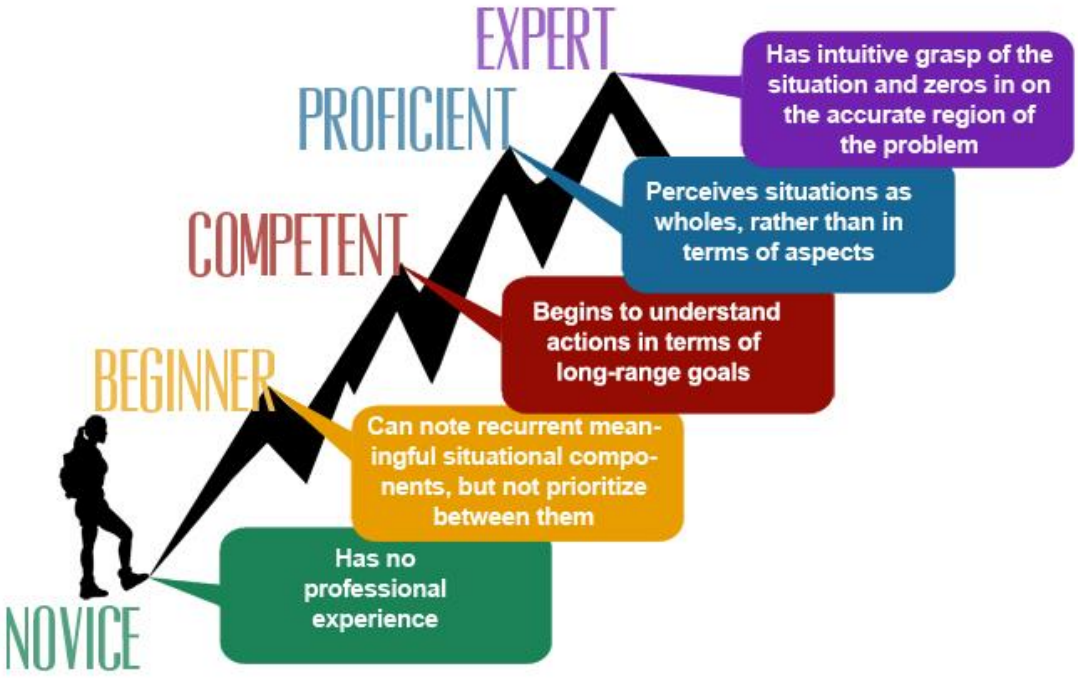



Figure 2.2: Benner's model (1984) on the journey from novice to expert (Coble, 2015)

Benner's (1984) model outlines five stages of nurse practitioner development which can be applied globally to a nurse education setting or situationally to a particular clinical skill. Undergraduate student nurses are termed 'novices' that have no experiential background to base an approach or understanding of the clinical situation. 'Advanced beginners' are nurses that are either approaching graduation or having recently graduated. They have full professional responsibilities but will only have a theoretical understanding of principles and practices. At the 'competent' stage the nurse has completed 1-2 years of professional practice and development is now dependent on experiential learning within the workplace. 'Proficiency' is the fourth phase where the nurse refines understanding of particular situations and practice through deliberate comparisons with previous experiences. Finally, the nurse becomes an 'expert' where the nurse begins integrating their understanding with their responses – the nurses experiential learning, tacit understanding of situations and practical wisdom become cumulative; as Benner (2004, p. 199) puts it, "Action, thought and feeling are fused". This is an approach to practitioner development that I have transposed onto my own teaching of potential sport science practitioners, and I use Benner's model as a framing device for the development of students both globally in terms of their professional development but also situationally in terms of developing new skills. Previously, Grant and Dorgo (2014) have found that upon graduation sport science students have good levels of declarative knowledge but require additional experience and mentorship to develop what is considered expertise in the field. This description of post-graduate practice concurs with the model that Benner (1984) presents and reflects the work expectation-reality gap which has "important and potentially destructive implications for both the new employee and the employer" (Barnett, 2012, p. 272). It is therefore incumbent on those assisting students in preparing for the working world to understand the expertise development journey.

There are, of course, criticisms and limitations to Benner's model. Gobet and Chassy (2008) criticise the model for its simplicity and inability to accommodate modern interpretations of intuitive knowledge. Cash (1995) criticises the model as being conservative by ignoring issues of power and perpetuating hegemonies of authority in the field and for the emphasis placed on intuition, which Cash (1995) posits limits the development of nurses knowledge. Benner (1984) does not specifically entertain empirical or traditional forms of knowledge apart from experts having synthesized experience and theory (Altmann, 2007). Criticisms of intuitive knowledge due to difficulties in defining the concept of intuition (English, 1993; Gobet & Chassy, 2008)

are also valid, as are criticisms of the linear model of expertise development which is linked to time and context (Hargreaves & Lane, 2001). Benner's (1984) novice to expert model further fails to explain how practitioners may become experts in one area but remain novices in others. In reality it is likely that practitioner could be considered proficient in one area but novice in another. Furthermore, expertise is difficult to determine given its context specific nature and may even go beyond descriptions of the fifth level on Benner's (1984) model (Rolfe, 1997). Although these criticisms are valid, I do not think they invalidate the central tenet of the model; that progression towards expertise is characterised by the transition from generally explicit rule-governed practice to progressively more intuitively contextual practice, and that intuitive behaviour can be taught (Altmann, 2007).

Benner (1996), in response to Cash's criticisms, points out that the emphasis on intuitive knowledge is in conjunction with other forms of knowledge and that to limit nurses to the established biomedical epistemology of medicine is inherently conservative – to force knowledge into one particular mould is wrong. Cash's (1995) criticism of nursing fails to recognise that intuition, in the sense that Benner (1984) is promoting it relies on prior knowledge and experiences, including those in the biomedical realm, which are then combined with new information through reflection to form new knowledge (Moon, 1999; 2007). Considering the criticisms outlined above and the central value of the model in conceptualising practitioner development, it may be more useful to frame it as more of a philosophy than theory. Altmann (2007) in particular makes the argument that in doing so Benner's interpretive work becomes more constructive to educators. This is particularly pertinent in relation to sport science practice where a range of sub-disciplines and ways of knowing - as previously outlined - are required. I do not view my teaching role as providing ready-made expert practitioners upon graduation, rather I see it as assisting students on their learning journey and the work of Benner (1984; 1996; 2004) helps me frame that journey.

### 2.8.3 Linking theory and understanding

It is acknowledged that the concepts and traditions of some of the scholars I draw upon are at times incongruent or at odds with each other. This review of literature chapter has so far drawn on a wide range of theorists on a range of broad educational topics such as Freire (Freire, 1970; Freire & Shor, 1987; Freire & Macedo, 1995), Mezirow (1997; 1998; 2003), Foucault (2020) and Dewey (Craig & Curtis, 2020). These theorists have given

me a way of articulating my position as an educator and a vocabulary for describing my work. The DHAE programme has brought me new ideas and better expressions of old ideas – this has helped me to connect the disciplines and influences that form my research. Other key theorists drawn upon have helped me more directly analyse my position as an educator and have given me the tools to explore my work. These theorists include, Schön (1983; 1987), Kolb (1984), Benner (1984; 2004), Whitehead (1989), Moon (1999; 2007), Schatzki (2002), Samaras (2011; et al., 2019) and Brookfield (2017). With many influences and theories to draw from, it is important to balance particular theories with particular influences on my research. For example, the work of Benner and Schön focus primarily on the individual and their individual agency to change their context, whereas Freire and Foucault focus on a more power and politicised analysis of education. This section attempts to outline how I have used these sometimes disparate theoretical commitments within my thesis by focusing on the contributions of what may be termed macro-level educational theorists Freire and Mezirow, and theorists and scholars such as Schön, Benner, Moon and Brookfield who focus on critical reflection and experiential learning.

The works of Freire (Freire, 1970; Freire & Shor, 1987; Freire & Macedo, 1995) and Mezirow (1997; 1998; 2003) are based on common concepts of adult education which Deligiannis et al. (2011) describe as cornerstones of adult education. These concepts include student-centred approaches to learning, the importance of critical reflection, dialogue, developing opportunities for creating new knowledge and the social role of the teacher (Deligiannis et al., 2011). Such concepts can be seen as broad, and allow for the use of Freire and Mezirow's theories in a creative and flexible manner, combining elements from different approaches. However, this thesis is not a Freirean analysis of sport science education which may examine critical consciousness in students or a political social turn in education. It can be viewed as Freirean informed in that concepts such as dialogue, the democratic exchange of knowledge, reflexivity and praxis are all central to the thesis (Cope et al., 2021). This thesis is also not an analysis of sport science education based on the work of Mezirow. For example, whilst transformative learning - the process by which we transform frames of reference such as assumptions and expectations (Mezirow, 2008) - is valuable in developing my understanding of higher education and framing my position on teaching, it is not a deep focus of my research.

Deligiannis et al. (2011) highlights how educators use elements of broad educational theory, such as those associated with Freire and Mezirow, to organise their understanding

of an educational issue. This allows scholars to converse with topics and subjects that may not be obviously congruent with their own but eventually educators need to break free from such broad theories and develop their own philosophy and practice (Deligiannis et al., 2011). For example, on issues of experience focused learning I find the work of Benner (1984, 1996, 2004), as previously discussed, and Kolb (1984) more instructive in developing an understanding of my pedagogy. With regard to reflection, from both a student's learning perspective and my own professional development, I draw on the work of Schön (1983; 1987), Brookfield (2017) and Moon (1999; 2007).

It will be recalled from the previous section (2.7 A Pracademic Lens) that Kolb's (1984) theory on experiential learning has been influential in my understanding that students learn best from experiences that help facilitate knowledge creation. The importance of dialogue in education as espoused in the theories of Freire and Mezirow has previously been discussed. However, dialogue alone is not sufficient. For example, Freire viewed the teacher-learner relationship as a reciprocal relationship in which teachers teach but are also learners. Whilst this is something I agree with it doesn't address the equally important role of the educator in using their knowledge and experience to guide the students learning. Kolb's (1984) cycle of reflection can be utilised to help students to conceptualise their experiences such that they can then generalise from one experience to another. In developing opportunities for creating new knowledge, Kolb's (1984) emphasis on students being actively involved in the experience, reflecting on the experience, using analytic skills to conceptualise and better understand the experience and finally, possessing the skills necessary to use the experience as a springboard to test new ideas is more instructive to the specifics of teaching practical classes than the work of Freire is. Kolb's (1984) theory on experiential learning is particularly instructive on my development of an active learning approach to practical class education.

Although Freire and Mezirow discuss reflection at length and inform my understanding of the importance of reflection in both teaching and learning, to gain a better understanding of how sport science students and pracademics leverage reflective practices to develop their knowledge and skills, I have drawn on the work of other theorists. For example, Schön's (1983) descriptions of reflection-on and in-action describes to me how those developing their practice use reflection as a primary learning resource. Given previous discussions on ways of knowing in sport science practice, this is particularly instructive to my understanding as such reflections during and after practice events allow us to organise our knowledge to reframe problems and develop cogent

solutions based on practitioner knowledge and previous experience. Similarly, Brookfield (2017) deepens my understanding of critical reflection. Though this is a common theme in the work of Freire and Mezirow, and it was their theories that first drew me to its importance, it was Brookfield's 'Becoming a critically reflective teacher' that helped me to delve deeper into what critical reflection is – that is going beyond basic reflection and remembering to incorporate a more sceptical analysis of thoughts, memories and feelings. In particular, Brookfield (2017) advocates for analysing one's reflection through four particular lenses – the students' perspective; perceptions of colleagues; personal experiences; and scholarship or theory (Brookfield, 2017). Analysing one's reflection through these lenses requires conversations with others so that the analysis becomes socially constructed. This makes it richer and more accessible to others in my opinion. Finally, the work of Moon (1999; 2007) has significantly contributed to my understanding and application of reflection in education and practitioner development. Moon emphasise the importance of linking reflection on past personal experiences with the thoughts and reflections of others. By using critical reflection in a group or co-constructive manner, richer learning may take place.

As previously mentioned, it is important to acknowledge that in some respects the broad and specific educational theories used in this thesis are incongruent. The work of Freire and Mezirow that I draw upon focuses on broad educational issues, whereas theories of experiential learning and reflective practice from Benner, Kolb, Schön, Moon, Brookfield and others facilitate analysis of specific elements related to my practice and research on sport science education. Both the broad and specific theories share an overarching goal of enhancing adult learning but it is important to acknowledge some of the incongruencies with their underlying principles and approaches. Freire (Freire, 1970; Freire & Shor, 1987; Freire & Macedo, 1995) and Mezirow (1997, 2003) emphasise the development critical reflection and transformative learning rooted in critical theory, socio-cultural event and political discourse. This leads to a focus on societal and personal structures and the questioning and challenging of established beliefs. Furthermore, the learner is positioned as the critical agent in a social context to advocate for social change and political action. In contrast to this the focus on experiential learning and reflective practice in the work of Kolb, Schon, Benner, Brookfield, and Moon is grounded in pragmatism and constructivism, with an emphasis on developing the student's concrete experience. This leads to a focus on the acquisition of knowledge through reflective observation, abstract conceptualisation, and active experimentation. Here the learner is an active

participant in their own learning process and engages with their experiences and the experiences of others to construct knowledge. It is also noted that even within the works of Freire and Mezirow there are incongruencies. While both scholars emphasise the importance of critical reflection and transformation in learning, Freire's work is focused on societal transformation through collective action and dialogue, whereas Mezirow's focus is on individual transformation through self-reflection.

An example of how broad and specific theories differ and yet inform my research is shown through my understanding of reflection. Reflection or reflective practice is evident in the work of Freire (1970), Mezirow (1997) as well as Schön (1983; 1987), Benner (1984), Moon (1999; 2007) and Brookfield (2017). However, the promotion of reflection in each differs. Freire and Mezirow emphases reflection as a means of changing society by challenging perspectives through collective reflective discourse (Deligiannis et al., 2011). The work of Schön, Benner, Moon and Brookfield focuses more on individual reflection as a means of enhancing future action and learning. Whilst this is an example of incongruencies in the theories that I employ to understand my practice, it also highlights how the two approaches may complement each other. Rather than dichotomise broad and specific educational theories I choose to use them as different lenses to through which to understand in facilitate the development of a broad range of knowledge and skills.

## 2.9 ABL - An Approach to Teaching Practical Classes

I take an ABL approach to teaching practical classes. I feel it incorporates some of the concepts previously discussed such as being a pracademic, developing transformative learning experiences through dialogue and helping students to frame their own learning journey. The influences of Freire, Mezirow and Benner highlight how conceptualising learning can shape and scaffold teaching practice. As discussed in chapter 1, I became interested in education before I really knew what it was. Soon after I started my current position as a lecturer in sport science, I realised that there had to be some way of exploring how and why people learn, and how to make this learning as effective as possible. My research has allowed me to explore this and how to combine it with what I think is important in sport science. My research is an exploration of my praxis and scholarship. Praxis refers to what I do and how I reflect on it in the classroom and scholarship refers

to how sport science, educational approaches, and my own position as a pracademic influence my teaching.

Traditional face-to-face teaching methods - which for centuries have been the dominant method of delivering education - are being replaced by online versions which are often asynchronous (Okaz, 2015), something which has likely accelerated in recent years. It has been documented for many years that both online learning (Arkorful & Abaidoo, 2015) and classroom learning (Zhang et al., 2004; Okaz, 2015) have their disadvantages that may be mediated through a combining of the two approaches; resulting in a blended approach. As outlined in chapter 1, ABL can be described as a pedagogical approach that combines sense-making activities with focused student interactions inside and outside the classroom (with content, peers, and tutors) in appropriate learning settings (in and outside the classroom) and is distinct from BL where there is a one-way delivery of the programme (Oliver & Trigwell, 2005; Armellini & Padilla Rodriguez, 2021). An example of such an approach would be the uses of a virtual learning environment (VLE) to hold content such as video, but the video is not interrogated collaboratively in or outside class, it is simply delivered via the VLE. Meaningful engagement with the content, as associated with ABL, gives it the active component. This draws on the ideals of a dialogic approach as previously discussed. The Institute of Learning and Higher Education (now Learning and Teaching Enhancement) at the University of Northampton is credited with developing ABL as a stand-alone pedagogical approach (Davies et al., 2017), which is based on developing models for student-centred, yet active online learning (Lomer & Palmer, 2013). Lomer and Palmer (2021) highlight the lack of published literature on its implementation - beyond a small number of case studies, some of which will be outlined later - and therefore the lack of an explicit definition on the topic. Among the key differences between the two pedagogical approaches is that for BL "Content is King", whereas in ABL "Context is King. Content is important, but its *application in context* [emphasis in original] is what really matters" (LTE, 2021). Within ABL there is a clear sense of avoiding the banking model in a manner that Freire (1970) would likely advocate for.

ABL offers a framework to build my practical class plans which incorporate applied sport science practices in order to facilitate an effective student learning environment – as has been shown in other fields. Previously, it was highlighted that lecturers are often challenged with providing opportunities to construct new knowledge in appropriate contexts, rather than being taught - particularly in practical class scenarios (Ladyshewsky,

2002; Weeks & Horan, 2013; Manley et al., 2016). Power and Cole (2017) offer the potential benefits of an ABL approach for the development of clinical skills in nurses and how traditional teaching methods can be modified to deliver learning in a more student-centred and contemporary manner. El Sadik and Al Abdulmonem (2021) had similar conclusions when examining the effectiveness of ABL among students undertaking practical classes in anatomy. By focusing on practical teaching that is collaborative and clearly linked with e-learning content, practical skills learning can become multidimensional, thereby encouraging students to develop adaptability, autonomy, and confidence - all of which should be considered important attributes in sport science graduates (Power & Cole, 2017; El Sadik & Al Abdulmonem, 2021; Maulini et al., 2022). This influences my practice by calling to mind the transformative nature of dialogue among communities of learners.

Bullock et al. (2016) supports the inclusion of interactive e-learning components in practical teaching and advocate the relative ease of implementation from both instructor and student perspectives. Positive student feedback to the implementation of an ABL-focused approach, similar to that of Power and Cole (2017) and El Sadik and Al Abdulmonem (2021) was reported (Bullock et al., 2016). Maunder (2017) outlines how she incorporates ABL into her teaching and emphasises the importance of the online blended component being integrated into activities within the classroom. Whilst student perspectives are not explicitly addressed by Maunder (2017), there is a clear sense of the importance of praxis - combining action and reflection - in the success of such approaches. Another common thread within the literature is the ease of integration into existing pedagogies. Munder (2017) emphasises the ease with which lecturers can integrate an ABL approach into their workflow. Croker et al. (2010) employed an ABL approach to teaching science laboratory practical classes and found the use of pre-engagement videos on the practical class topic enabled more autonomous and efficient learning. Higher level interactions between practical class demonstrators and students were also reported which shows the value of ABL in creating active learning environments in the classroom which allows for more analytical discussion with students (Croker et al., 2010). The authors also cite the ease of implementing this the ABL approach. Given the prevalence of online virtual learning environments and most contemporary students' native familiarity with technology (Roberts et al., 2012; Connelly & Miller, 2018) it is not a stretch to see why this may be the case.

Since 2013, the University of Northampton has worked towards a university-wide transformation of pedagogy with the core principles of ABL (Armellini & Padilla Rodriguez, 2021). Central to this development was the need to address attributes that employers were looking for such as initiation, collaboration and digital fluency, and to away from traditional approaches to teaching and learning in favour of "context-sensitive 'blend'" that are more appropriate in modern learning environments (Armellini & Padilla Rodriguez, 2021, p. 16). These attributes are in line with those found when researching what students want to get from sport science degrees (Sleap & Reed, 2006) and what employers desire in their sport science employees (Dinning, 2017; Tsitskari et al., 2017). This is an important consideration for sport science students who have reported significant difficulties in securing meaningful and well-paid employment upon graduation (York et al., 2014; Doncaster, 2018; Dwyer et al., 2019). Previously, in this section, I have discussed how ABL promotes student-centred approaches and earlier, in section 2.4, how active learning in general gives opportunities for the development of multiple ways of knowing rather than this distribution of knowledge – this builds on the adult education influences of Freire, Mezirow and Benner previously outlined. Furthermore, it is likely that approaches such as ABL are reasonably low maintenance in terms of their implementation (Maunder, 2017). Armellini and Padilla Rodriguez (2021) point out that there is an increased interest in BL methodologies in general, and ABL specifically but there is a lack of agreement on definitions of what constitutes such methodologies and a lack of awareness around them. In particular, the authors highlight that no Irish institution refers to ABL in its public documentation; there are two references to BL (Armellini & Padilla Rodriguez, 2021). ABL, as outlined in Figure 2.3, is a pedagogical framework that many lecturers use but have not fully interrogated their use of it. Overall, despite there being an interest in ABL and arguments for its effectiveness, active learning focus and student-centred nature, it is clear that more research is needed that utilizes ABL approaches to highlight its drawbacks, benefits, and potential pitfalls. In particular, Armellini and Padilla Rodriguez (2021) highlight the need for research that takes in the specific contexts and perspectives of different stakeholders and how various educational cultures conceptualise and utilise ABL approaches.

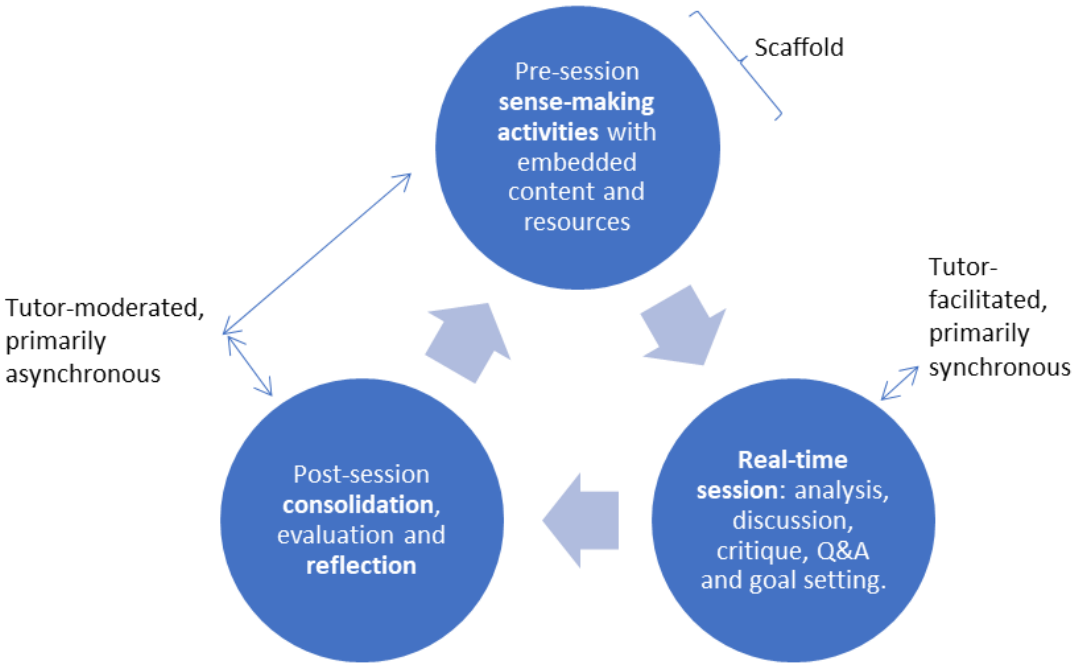



Figure 2.3: An Active Blended Learning framework - adapted from Armellini and Padilla Rodriguez (2021)

The research of Keogh et al. (2017) with sport science students has already been outlined briefly, highlighting that students perceive BL approaches to be potentially beneficial to their learning experience. When asking students about their perceptions of a potential blended approach, the authors provided a definition from Garrison and Vaughan (2008, p. 5) which defines BL as "the thoughtful fusion of face-to-face and online learning experiences", which to my mind reflects the description of ABL above. As my research also explores sport science students' views on blended approaches to learning, it is pertinent to explore the findings in more detail. As part of focus group discussions, the students point out that providing content prior to class, which outlines key theory and skills, would benefit their subsequent learning in the classroom. The students also spoke about how a blended approach would help to develop their "theory base and attaching that knowledge to what you can actually do in the practical environment" (Keogh et al., 2017, p. 14). The students were critical of long, didactic lectures and expressed that allowing multiple opportunities to engage in content would be more beneficial than a once-off didactic approach. Students further believed that face-to-face classes should be more about the practical application of theory. On the negative connotations associated with BL students were wary of anything that would add to their study workload and confessed to struggling to dedicate time to their studies outside of timetabled classes, despite also acknowledging the need to take ownership of their learning. Students were also worried about misinterpreting the online content but clarified that face-to-face

sessions with educators could clear these up. Finally, students had some concerns about access to technology such as reliable internet and the necessary accessories required to view or listen to material.

As previously discussed, the in-class discussions that follow an online introduction to a topic is an important component of an ABL approach to education. In this manner, ABL combines online and traditional classroom instruction with real-world experiences, encourages reflection, and fosters social interaction aligning it to with theories of experiential learning such as those proposed by Kolb, Schön, and Dewey. Schön (1983; 1987) emphasises the importance of reflection in the learning process. Through ABL students have opportunities to reflect on their own experiences and develop their learning from them. ABL allows sport science students to experience topics through the lens of the online content as well as their own experiences as sports people. Students may also engage in real-time reflection during interactive face-to-face activities. The work of Dewey (1910) also emphasises the importance of reflection in developing critical thinking (Lew and Schmidt, 2011). Dewey's experiential learning theory posits that everything occurs within a social environment and knowledge is socially constructed based on experiences (Roberts, 2003). This aligns with my own position as a researcher and educator, as outlined in the next chapter. Dewey's understanding that knowledge is organised in and mediated through real-life experiences is central to approaches to pedagogy such as ABL, given the importance placed on providing rich context through blended artefacts for the development of students' knowledge through face-to-face group discussion. Kolb's theory of experiential learning (Kolb, 1984; Kolb & Kolb, 2009) offers a four-stage cycle of learning, including concrete experience, reflective observation, abstract conceptualization, and active experimentation. This model of experiential learning is strongly influenced by Dewey and, although not without its critics (for example, Miettinen, 2000), in the context of ABL, it does describe much of the learning process that students go through. Learners can have concrete experiences through online activities or face-to-face discussions, reflect on these experiences either individually or in collective discussions, form abstract concepts based on their reflections and experiences of the concepts, and then actively experiment with these new concepts in a practical class setting among peers.

An ABL approach to teaching is in keeping with my epistemological position as outlined in the next chapter and allows me to explore the context of the topics I cover in class. Most if not all my students are or have been sports people and they all move their bodies

daily. Therefore, by taking an approach that incorporates ABL I can assist the students in applying the content to their own context, the contexts of their classmates and hopefully lay a foundation for future exploration and understanding. Having a range of teaching tools also allows me to better develop a student's range of knowledge. An ABL approach allows me to develop a student's learning in a manner that is in keeping with my teaching philosophy which focuses on diminishing my role as students begin to develop their own understanding. Finally, Keogh et al. (2017) showed that a blended approach to learning has been perceived as being broadly beneficial to learning by sport science students.

## 2.10 Embodied Knowing in Practical Classes

A key factor related to teaching practical classes is the notion of embodied knowing, something that is particularly relevant to sport science students as they will often be examined on their ability to physically demonstrate movements. Furthermore, the skills and knowledge associated with understanding and executing movements is often seen as an important component of practice. An understanding of embodied knowing and its importance to sport science education is an example of the requirement for students to develop a range of knowledge. Barbour (2004, p. 227) offers embodied knowing as an "alternative epistemological strategy" to traditional conceptualisations of "reasoning as the only way to 'knowledge'". Barbour (2004) argues that the mind and body are intertwined and that understanding of topics that are informed by use of the body, such as sports and athletic movements, should be based on the lived experience of the student. The arguments put forth by Barbour (2004) are particularly relative to my research given the critique of the knowledge vs experience dualism presented, suggesting that knowledge can be constructed from lived and shared experiences. Aartun (2022) supports this by asserting that an understanding of the concept of embodiment encourages an understanding of epistemology beyond traditional understandings of science. Johnson (2015) further challenges the traditional view of understanding as purely cognitive, arguing that it is profoundly embodied and involves sensory, motor, and affective processes.

Gustafson (1998) discusses the importance of embodied learning when examining how health students learn. As previously noted, there are commonalties in the biopsychosocial models of practice in health and sport science which can impact pedagogy. Gustafson (1998) explores how the body can be both the subject matter of the curriculum and the

pedagogical approach in health education. This mirrors the delivery of my practical class teaching where students use their own bodies to not only gain an understanding of movements they may prescribe in the future, but also to develop their understanding of theory. This type of learning is described by Gustafson (1998, p. 53) as an "embodied exploration of the invisible process of constructing knowledge of the body". A more holistic approach to education that goes beyond traditional didactic methods of teaching can encourage students to engage with their own bodies to deepen their knowledge.

Recently Aartun et al. (2022) carried out a review of literature on the study of embodied knowledge in relation to physical education. The review argues for the incorporation of critical reflective practices with and among students to "make up their own opinions" (Aartun et al., 2022, p. 11) about what is important in relation to the lesson and how they might apply it to their own circumstances. A second main theme of the review is the need for "embodied exploration of being *in movement*" (Aartun et al., 2022, p. 7, emphasis in original). Although this research review focuses on embodiment in physical education as a way for students to understand their own bodies and to develop a sense of empowerment, the emphasis on the importance of critical reflection and developing an embodied understanding as the movement is taking place mirrors the importance of reflection-in and on-action (Schön 1983; 1987) in educational settings that have movement at their core.

Johnson (2015, p. 7) draws on a range of disciplines such as education, philosophy and neuroscience to argue that "human understanding… is rooted in how our bodies and brains interact". This concept will be familiar to sport scientists given our understanding of how strength is developed in the moving body. Moritani and deVries (1979) were among the first to find that "neural factors" accounted for the significant improvements observed during the first 4 weeks of an 8-week resistance-training programme – that is when novices begin a weightlifting regimen, the initial primary driver of strength development is not the development of muscle, rather it is the improved ability of our brain to communicate with the muscle it began with. Practical classes with sport science students are a further demonstration of how our embodied and cognitive processes are intertwined to enhance our knowledge.

## 2.11 Summary

In this chapter I have introduced the historical and social contexts of sport science. Sport science is a field of practice which has deep historical roots, and its modern identity is a

combination of the influence of these roots and more modern scientific practice influences. It is important to outline this context to highlight the environment in which sport science practice takes place. It is also important to articulate how the academic side of sport science impacts on sport science practice. Sport science education began to develop in earnest at a time when EBM practices were becoming prominent in medical fields. It is likely that sport science then adopted a similar approach to this model to legitimise itself as a field of human scientific enquiry. However, among the perhaps unintended consequences of this approach has been the promotion of philosophical positivism in sport science research which largely fail to address much of the biopsychosocial nature of sport science provision. This influence can also be seen in how sport science education is now delivered with an emphasis on dividing sport science into constituent topics and a general failing to address the complex interplay of factors that make up athletic performance.

At this stage it should be acknowledged that I have criticised sport science's fulsome embrace of EBM practices yet advocated for another model of practice drawn from medicine, the biopsychosocial model. However, in acknowledging this I would also like to point out that the context of sport science practice is an important theme of my thesis, and this should also be applied to any adopted models or frameworks.

Research on sport science education, as I see it, has the potential to be improved in a number of ways. Firstly, there is little research that directly accounts for the experiences of those at the heart of sport science education – the students. What research I could locate on the experiences of sport science students fails to consider the specific context of sport science practice – much of the research (for example, Keogh et al., 2017; 2021; Knudson, 2020; Wallace & Knudson, 2020; Navandar et al., 2021) could likely be transposed to students in any other field. This is pointed out not to directly criticise this research but to highlight a lack of inquiry into sport science education provision through a lens of the needs of sport science practice. Secondly, where the delivery of practical classes in programmes adjacent to sport science has been explored, it is clear that there are challenges in developing student-centred, co-constructive spaces for students to develop their knowledge. In particular, sports coaching education may provide examples of how to deliver education to sports staff practitioners in a manner that is student-centred and empathetic to the requirements of practice. The development of psychosocial competencies has begun to gain prominence in S&C. This should be extended to other disciplines of sport science, whilst remaining cognisant of the discipline specific contexts.

Asking what matters in sport science education through a pracademic lens brings the potential for greater fusing of theory and practice, however, such positions should not be held uncritically. Furthermore, my journey through this DHAE programme has highlighted the range of adult education research, literature and practices that may be of benefit to sport science educators. Much of the themes described in section 2.8 are likely to be familiar to sport science lecturers, though the scholars may not be. My research tries to show how engagement in such themes may benefit teaching practice in a sport science specific context. This chapter examines what I believe is important to consider when teaching sport science students, from my own perspective. Sport science lecturers are tasked with developing a range of skills and knowledge with students as the need for strong embodied knowing shows. It has also explored key concepts and ideas about how I teach sport science practical classes via an ABL approach which aims to encapsulate much of the discussion I have presented.

In the next chapter, on my methodology, I outline in more detail my own ontological and epistemological positions. I also outline how I approached my research and detail the steps taken in the ABL approach, how students interacted with my pedagogy and how those with similar academic and practitioner backgrounds critiqued the approach.

# Chapter 3 - Methodology

Eventually in a practical class I must shut up and let them at it.
I can prepare what I want to say and plan how I want to deliver it, give them resources, and point them in certain directions but ultimately, it is the students' journey, and I must allow them to take it. This is the part that I find the most challenging and the most enjoyable. When the students are most active, that is when the teaching really begins – looking for signs of understanding, for behaviours, for improvements, for questions. From the outside it probably looks like the easiest and most relaxing portion of the class for me as the instructor, but this is my busy time, the time I cannot sequentially plan out, the time I must rely on my preparation and understanding of the group and the individuals. This requires recursive cycles of planning and reflecting on my teaching practice and, although this process has remained somewhat stable over time, what influences it has evolved.

## 3.1 Introduction

This research is about my own practice as a sport science lecturer. More precisely, it is an exploration of my practical class teaching as I examine the complexities of being a lecturer trying to prepare students for future sport science practice. This methodology was developed in response to the issues I present in chapter 2 which include questioning what sport science is, where has it come from, what are the dominant epistemologies in the field and how to examine my own teaching. How I have chosen to interrogate sport science is founded upon my own personal position - as laid out in chapter 1 - and the influences on my teaching practice as laid out in chapter 2. The methodology was developed to capture not only my own practice as a sport science lecturer, but also the experiences of those who are influences by my practice, the sport science students I teach, and those who conduct similar teaching practice, academics. In doing so it is hoped that my research can contribute to the field of sport science in a novel manner – by focusing a micro lens on my own practitioner knowledge I am trying to improve my own practice and act as a catalyst for discourse in the macro field of sport science. The aim of this chapter is to assist the reader in understanding the challenges that I faced in trying to address the research questions.

My research is based on a self-study of my teaching practice. Despite the mechanistic nature of the three phases outlined below, I am trying to articulate a cyclical journey of self-improvement as someone who teaches sport science students. This has allowed me to focus on my learning that resulted from my interactions with others in my field. Self-study framework provides me with a foundation to examine my teaching practice whilst action research methods allow me to interrogate what I do within this practice. Crucial to both of these elements are concepts of critical self-reflection.

I have scaffolded the fieldwork portion of my research into three overlapping but distinct phases, namely Phase One, Phase Two and Phase Three. Phase One incorporated the development of teaching plans for the practical component of the Explosive Conditioning (EC) module with group of MSc students. These plans followed an ABL approach to teaching. Phase Two involved the implementation the ABL approach over 11 weeks, recording weekly student feedback, logging my own reflections leading to constant and incremental development of the ABL approach. Phase Three involved a summative feedback session with students on their experiences and semi-structured interviews with five fellow pracademics about their experience of the practice-academia intersection.

## 3.2 Research Topic

As previously mentioned, my research focuses around two key inquiries - how can I support effective learning sport science students in practical classes by incorporating applied sport science practice knowledges; and how can I support students to reflect on practice in a theoretically informed way through practical classes?

Exploring my own teaching practice initially came from a desire to ‘be the best that I could be,’ and questions ‘how can I improve my teaching practice?’ to provide a framework for me and others to use in developing practical class teaching (Whitehead, 1989). I planned on researching practical class teaching, coming up with a best practice model and then conducting initial trials with my students. This could be seen as an effort on my part to ‘fulfil potential’ (Woods & Davids, 2023), but as Woods and Davids (2023) question: should the process of achieving potential be fulfilled, what happens next? Once I began the research process it soon became clear that I had to acknowledge the existence of ‘extra-individual conditions’ (Casey, 2012), that influence my teaching practice. Up until this point, I had rarely reflected on the impact of conceptualisations of sport science,

or how dominant research paradigms influence the field, or what I considered to be good teaching and learning, or what I considered knowledge to be. Once I became aware of these influences, I could choose to optimise those that facilitated my teaching and minimise those that constrained my teaching (Casey, 2012).

My teaching practice entails more practical classes than traditional lectures and I wanted to look at this setting in more detail. Originally, I wanted to come up with a framework or scheme to assist myself and others in teaching sport science practical classes. Frameworks that assist applied sport science practice are common in the literature (for example, Faulkner et al., 2006; Cushion et al., 2017; Ardern et al., 2019; Till et al., 2019; Bartlett & Drust, 2020). Recommendations on how to frame sport science research and research practice are also prevalent in published literature (for example, Costanza, 2003; Toohey et al., 2018; Maguire, 2011; Balagué et al., 2017; Ross et al., 2018). However, unlike previous dissertations and theses that I have completed, I found myself challenged on a range of issues from ontology and epistemology, to how education can be a vehicle for transformation and how society and structures influence higher education. I found that the more I was challenged the more the direction that I wanted this research to go in was crystalised. I began to realise that if I wanted to understand sport science then I needed to understand what it meant to me and if I wanted to understand how my teaching could impact students in a truly positive manner then I needed to understand my teaching better. I transitioned from the outsider looking for data to the insider within the research. Ultimately, when planning my doctoral research, I realised that if I wanted to challenge my professional practice as a lecturer, I had to gain a better understanding of the field in which I practised and the concept of knowledge in of sport science.

This form of epistemological reflection has become central to my research. It has challenged me to reflect on my assumptions of the world and what I consider to be valid knowledge. None of this development - which is ongoing - would have been possible without the DHAE programme at MU and the wonderful colleagues I have been challenged by over the past four years.

In endeavouring to understand my practice and the field in which I practised, I felt that a qualitative approach was most appropriate. Braun and Clarke (2013) identify a range of orientations or skills that lean towards a qualitative sensibility in terms of research questions and analysing data. These include a focus on process and meaning, critical reflection regarding knowledge and the world around us, and the ability to comprehend inputs from others actively and analytically (Braun & Clarke, 2013). Braun and Clarke

(2022) further develop these and add more to the range of skills and orientations such as a desire for understanding nuance, embracing the idea that knowledge comes from having a particular position, and an ability to tolerate at least some uncertainty. Braun and Clarke (2022) point out that qualitative paradigms search for meaning and interpretation in situated practices and contribute to a tapestry of understanding within a given field – as previously noted, I am not trying to tell other sport science academics what to do, rather I am presenting my self-exploration so that it will improve my and hopefully my field's practice. Qualitative research is a broad church of research design but one that I am drawn to as I seek to understand my teaching practice.

Explosive Conditioning practical classes focus on developing a student's ability to understand and coach plyometric, speed and agility exercises. The movements taught in the practical components of the module can be described as being familiar to the students before they undertake the MSc course. That is, the students know how to sprint, jump, and change the direction of their body in space. This is important to note regarding the use of an ABL approach, as the students already have a level of competence and existing theoretical and biomotor knowledge that may act as reference points. However, there is still much for us learn about human movement and in particular how to coach it. Examining sport requires a broad biopsychosocial lens (Schneider, 2016). Therefore, there is a range of knowledge that need to be developed from explicit understanding of technical models (Szedlak et al., 2020) to implicit knowing of what words to say (Winkelman, 2020). Therefore, a qualitative approach is appropriate to explore the range of knowledge development required by practical classes such as the EC module.

My research seeks to contribute to a greater understanding of the effective delivery of sport science practical classes. The project as a whole has evolved to develop that understanding through and exploration of what sport science is, how dominant discourses shape interpretations, and how to effectively prepare students to become sport science practitioners. In its simplest form my research questions how I can support sport science students in practical classes. To begin to answer this question I have previously explored the impact of the origins of sport science, the art or science of practice discourse, different pedagogical approaches, and my position but I must also consider the experiences of those I am trying to support, sport science students, and those who also work in this realm, academics. Therefore, my broader research questions seek to explore a more macro-level question about academic study and real-world practice through a micro-level exploration of my own practices and experience of the field.

## 3.3 Ontology and Epistemology

In this section I outline what I believe exists and what I believe reality to be (ontology). I will also outline what I believe knowledge to be and how it is created (epistemology). This is done to show how these factors, both individually and together, impacted on all levels of this investigation, including my choice of research subject, the conceptual framework that I use to guide the study, participant selection, data collection and data analysis, and ethics.

In outlining my personal and educational background in chapter 1, I am acknowledging that my reality - and by extension, my interpretation of reality - is socially constructed and that learning takes places in the context of social interaction (Crotty, 1998; Creswell, 2013). Social constructivism offers a view that subjective meaning is negotiated both socially and historically through interaction with others and through historical and cultural norms that have influence on and operate within individuals' lives (Creswell, 2013). Social constructivism is distinct from a social constructionism. Whereas both acknowledge the active role of the researchers developing knowledge, social constructivism is concerned with an individual's learning as a result of their interactions with a group (Braun & Clarke, 2022). Social constructionism is concerned with the artifacts produced as a result of the interactions of a group. Social constructivism counter views such as positivism, which offers that there is one measurable and objective truth to be found allowing for "an assurance of unambiguous and accurate knowledge of the world" (Crotty 1998, p. 18). As I endeavour to explore my own teaching practice, I am cognisant of the influences on me, and on my teaching practice and the field of sport science. I therefore situate my research within the worldview of social constructivism as I "seek understanding of the world in which [I] live and work" (Creswell, 2013, p. 24). A social constructivist view of the world has strongly influenced my research and I place my methodology within a constructivist paradigm. Constructivism is therefore an ontological commitment rather than a methodology in my research.

This paradigm is central to my use of self-study as a conceptual framework for my research. As will be conveyed in more detail later, self-study has allowed me to view and interrogate my field of practice. Within this framework a methodology composed of methods drawn from self-study, action research, reflective practice and a practice theory lens is employed. Within each of these areas there is a focus on improving the

effectiveness of everyday practice. This is done by challenging practice in a reflective manner to change and improve conditions. Practitioners are best suited to this type of daily research "because they 'live' the problems preventing effectiveness" (Tekin & Kotaman, 2013, p. 89).

Conducting qualitative research means trying to get as close to the participants as possible (Creswell, 2013). I refer to participants here as not only the student and pracademic participants that will be introduced later, but also to me as an 'insider' researcher (McNiff, 2013; Braun & Clarke, 2022), and my participation is influenced by my position as a pracademic. Here ongoing reflection is crucial as it links researcher and research (Gray, 2018). Reflection, in this sense, involves critically interrogating what we do in practice, how and why we do it, and what impact this has on me as researcher (Braun & Clarke, 2019). In my research, this is how knowledge is known – via a subjective interpretation of the socially constructed experiences of the participants (Creswell, 2013). Critical self-reflection is an important component of action research (Robertson, 2000) and self-study (Samaras et al., 2019) for this reason. In order to research a field of practice, the researcher must be within the field of practice so as to minimise the distance or separateness between researcher and research (Creswell, 2013). Meaning and interpretation are situated in practices and critical reflection is a tool to both interrogate and harness the value of practice (Braun & Clarke, 2022)

Accordingly, my ontology and epistemology have influenced the methods based on three key principles - (1) my practical classes were an authentic setting for me to research my practice, (2) acknowledging that knowledge is socially constructed and 3) I was an active participant in my research operating as a reflective teacher practitioner.

## 3.4 Contextual Factors - COVID-19

The first full draft of this chapter on my laptop is dated 5 March, 2020. So, the direction of this research was already substantively planned by the time the world paused in panic in mid-March, 2020. On Thursday 12 March, 2020, I was attending a DHAE session when word filtered through that all non-essential workplaces were to close; all HEIs closed that day and remained so for the remainder of the academic year (Leahy et al., 2020).

The 2020-2021 academic year brought a plan to reopen all institutions with significant restrictions on course delivery. Higher education could take place on-site with appropriate

infection control measures such as social distancing, mask wearing and hand hygiene. After consulting with my supervisor, I continued my research as planned but certain elements required alteration. For example, I had originally selected undergraduate student participants but restrictions on the number of personnel on campus at any one time meant that these class groups were split into two pods that alternated their on-site attendance – rendering participation logistically impossible. However, taught post-graduate students - ordinarily scheduled for on-site classes one day per week - were not subject to such restrictions. The decision was made to amend my application for ethical approval and ask students from the MSc Strength and Conditioning course to participate in my research within their EC module beginning autumn 2020. The pandemic also impacted my research by forcing interviews with fellow pracademics to the second term of the 2020-2021 academic year. Having originally planned on conducting interviews prior to teaching the EC module, I felt that academics were likely under enough strain with changes in personal and professional lives in the autumn of 2020 without being approached to take part in my research. Another example of how COVID-19 forced me to alter plans was the moving of a focus group discussion with student participants online. The post-Christmas 2020 wave of infection forced a complete shutdown of all on-site teaching (Horgan-Jones & O'Brien, 2021) and meant moving the student focus group online.

COVID-19 has undoubtedly had a devastating impact on all communities and HE students are no different (Yang, 2021). Although society is still, in 2023, coming to terms with the impact of COVID-19 and its associated lockdowns, some preliminary findings highlight the impact on both students and faculty. Significant disruptions to students' learning, assessments, and professional qualifications have all been reported (O'Brien et al., 2020; Tan et al., 2020; Delgado et al., 2021) and lecturers were forced to rapidly adapt both their personal and professional lives (Barton, 2020; Ní Fhloinn & Fitzmaurice, 2021). One of the main impacts on HEIs has been to encourage and accelerate innovation and advancement in digital spaces with online learning becoming the dominant teaching tool for a time (Kang, 2021; Ní Fhloinn & Fitzmaurice, 2021).

The disruptions to normal teaching and learning practices plus the rapid changes in its delivery had definitive impacts on my research. The most obvious impact was the infection control measures that had to be strictly implemented. All staff and students were required to wear face coverings which altered group interactions, facial expressions were harder to read and voices harder to hear, making communication more difficult. Social

distancing measures also moved the module delivery site from a compact practical laboratory to a cavernous sports hall. This was not an overt issue in delivering the module. However, the combination of face masks, an echoey hall and on occasion rain on a galvanised roof meant group communication was impacted and some audio recordings were imperceptible. Face masks had the greatest impact, as it took the group longer than previously to develop a coherent group dynamic.

I began the first two phases of my research in September and October 2020 without knowing if they would be completed or what further alterations would be required. As it transpired, I was fortunate to be able to implement Phase 2, which covered the teaching of the EC module, as planned. How the alterations and movement of elements to different timepoints or online impacted the research I do not think I will ever fully understand. However, it was the reality of the time, and this reflects an authentic interrogation of my teaching practice.

## 3.5 Research Design and Methodological Approach

### 3.5.1 Research Methodology

My research followed a self-study conceptual framework. As previously mentioned, my research methodology is an amalgamation of self-study, action research and reflective practice held within a self-study conceptual framework that is strongly influenced by practice theory. The concepts of practice theory are central to my understanding of the work I do and how I can interrogate it. Self-study gave me methods to examine my own practice and utilise critical friends to ensure rigour and authenticity. Action research has helped me to plan, document, and reflect upon my EC practical classes. Reflection describes the interaction between the research and the researcher (Gray, 2018) and is a concept that is seen as central to both action research (Robertson, 2020) and self-study (Samaras et al., 2019). Reflective practice literature has helped me to conceptualise my critical reflection and how I implement reflection and use it to inform my practice.

Locating a set of appropriate research paradigms that are congruent with my ontological and epistemological position, methodological choices, analytic approach, and the overall self-study nature of my research has been difficult. This difficulty stems from no single established research paradigm perfectly fitting the criteria for my research - an authentic assessment of my practice, acknowledging socially constructed knowledge and my active

participation as a reflective pracademic. The first drafts of this chapter did not specifically name a research framework but the self-examination aspect of my research has been clear from the start. As discussed elsewhere in this thesis, my intention was always to examine my teaching practice to improve it and by extension, improve sport science education and practice. Action research gave me the tools I needed to plan, document and reflect on my teaching practice. Self-study helped me to frame these reflections, particularly through the use of critical friends – as discussed later. Reflective practice then became the foundation for the research as I developed methodological choices, and active consideration of my position and teaching practice. Practice theory gave me a sense of the disciplinary location of my role as a pracademic.

Discussions with DHAE peers and my doctoral supervisor about this led me to self-study which then acted as "a kind of method guiding my choices and informing my decisions" (Alhadeff-Jones, 2013). Crafting a methodological framework meant locating interdisciplinary perspectives that were congruent with my position and research focus. I knew I wanted to examine my own teaching practice so the methods that I wanted to examine were already in place. I then felt that I needed a framework to guide the methods of how I examined the iterative process of my sport science practical classes. Crucially, from my perspective, this examination needed to account for the specific nature of sport science practice and the limits and possibilities of sport science education in Ireland. Adopting a self-study conceptual framework from an early stage provided a focus to my research as I developed a methodologically informed self-study served as an organising instrument for my research. However, self-study does not capture all of the components of my methodology and hence I have turned to elements of practice theory, action research and reflective practice along with self-study to answer the questions outlined in Chapter 1 and earlier in this chapter.

### 3.5.2 Practice Theory

I have interpreted practice theory as a moderate form of social constructivism as this informs my analysis of the multiplicity of interactions and dynamics of my site, and the ways in which these interactions and dynamics are collectively produced (Halkier & Jensen, 2011). As practice theory looks at the interaction between individual actions and the social context in which they take place, it has been useful in framing how I can examine my role as a sport science educator in the wider contexts of the sport science practice and education (Nicolini, 2012). It has allowed me to assess how I have interacted

with the objective and normative structures around my teaching practice. Practice theory, as laid out above, tells me that everyday actions and the social structures around them form a recursive cycle, whereby existing norms are reinforced, or transformative change can be catalysed (Schatzki, 2002; Feldman & Orlikowski, 2011; Feldman & Worline, 2016).

There are many forms of practice theory. For example, a diverse range of scholars such as Bourdieu, Giddens, Schatzki, and to a broader extent the work of Foucault, have all been associated with practice theory (Reckwitz, 2002). According to Nicolini (2012), practice theory: (a) emphasizes that durable features of our world are produced and reproduced, (b) forces us to rethink the role of the individual agents, (c) emphasises the importance of the body and objects in everyday practice, (d) asks us to question the nature of knowledge and discourse, and (e) highlights the centrality of interests and power in all our actions. Practice theory offers researchers a social-theoretical vocabulary or a heuristic device, a sensitizing 'framework' for research which in turn promotes a way of seeing and analysing social phenomena in interactive and socially dependent forms (Reckwitz, 2002). Furthermore, practice theory has a sceptical view of dualisms in practice - for example, art and science of practice - and allows for a mapping of the dynamic relationships that integrate concepts that have previously been dichotomised (Feldman & Orlikowski, 2011; Feldman & Worline, 2016).

Chapter 2 highlights the complex field in which sport science educators must teach. This is particularly true in my experience. Socio-cultural conceptions of sport science, conventions in sport science education and the associated dominant epistemologies imposed upon my teaching practice combine to focus notions of practice within my teaching. Additionally, my teaching is influenced by my pracademic identity and understanding of adult education. Figure 3.1 outlines a visualisation of the recursive development of my pracademic identity through sport science practice influences, this is similar to figure 2.1 which outlines academic influences. In a sense this is a combination of ways of knowing with ways of being. To try and interrogate this complex field, I required a conceptual framework that would allow me to analyse and learn from it. Initially, it was quite a struggle for me to refine and name an adequate theoretical grounding for my research. However, I have come to draw upon practice theory to allow me to frame my research. Practice theory allows me to present the focus of the research based on the inherent key factors, constructs and variables and any relationship between them (Gray, 2018). Within practice theory, a 'practice' is considered a routine of behaviour

that consists of numerous interwoven elements, such as, forms of bodily activities, forms of mental activities, 'things' and their usage, background information in the form of understanding, know-how, emotional states, and motivating knowledge (Reckwitz, 2002). There are a range of interpretations of practice theory, as previously mentioned. In particular, I reference Schatzki's (2002) 'The Site of the Social: A Philosophical Account of the Constitution of Social Life and Change', which highlights that the everyday actions we take are tied to the contexts in which they take place. Schatzki (2002) approaches practice activities from a collective, rather than an individual perspective.

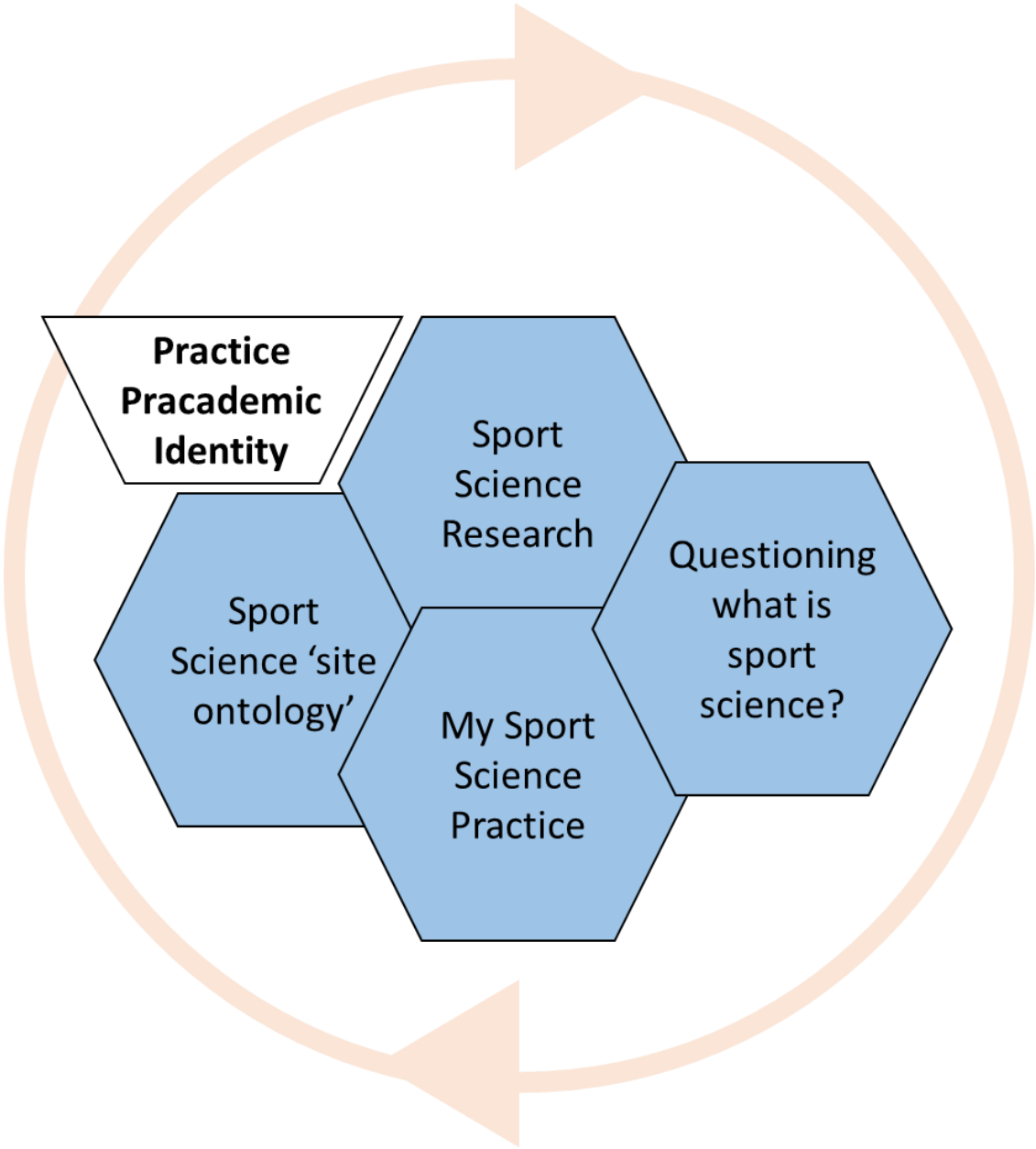



Figure 3.1: A visualisation of the recursive development of my pracademic identity through my sport science practice influences

Schatzki's version of practice theory is known as 'site ontology', which highlights how practice in society is firmly tied to the context or setting in which we act (Casey, 2012; Schatzki, 2002). A practice is not merely a set of routines or associated actions, rather it is formed by the social and material context in which they occur, including the social relations and material arrangements that make up the context. This social aspect is important as it describes how in performing a practice, such as teaching or sport science, we coexist with those we directly interact with, and importantly, those who are also performing this practice but with whom we may not have direct interactions – other teachers and sport scientists (Schatzki, 2002). This general coexistence occurs within a specific context or site (Schatzki, 2005). A site is not necessarily spatial and therefore actions occur intrinsically as part of practice and actions often depend on those of others (Casey, 2012). The site I practice in can therefore be considered as the nexus between sport science and HE teaching. Accordingly, this site which I am 'required' to work in is bounded in a recursive cycle by interactions of my teaching practice, educational norms, and sport science norms. From a teaching perspective, this may mean that undesirable practices are maintained at the expense of innovation and progress – due to the inexorable link between such practices and the site – unless I challenge them. Furthermore, Schatzki (2002) also emphasizes the importance of studying the micro-activities of the everyday to better understand the social and material aspects of our practice. Accordingly, "the organization of a practice describes the practice's frontiers" (Schatzki, 2002, p. 87) and examining my own teaching practice allows me to explore the frontiers of sport science education.

### 3.5.3 Self-Study

Within my research self-study is viewed as a both a research methodology and a method. I view my thesis as self-study research, and I am selectively drawing on components self-study in my methods. According to Bullough and Pinnegar (2001, p. 15), self-study is a methodology for examining "the space between self and the practice engaged in". Its origins come from the writings of John Dewey (Craig & Curtis, 2020). Dewey's philosophy asserts that knowledge is "a process of knowing forged from experience that is in a constant state of flux" (Craig & Curtis, 2020, p. 60). Understanding the importance of personal experience as an educator is central to self-study and self-study can be constructive in developing teaching expertise (Samaras, 2011). Samaras (2011) and others (for example, Samaras & Roberts, 2011; Sterner et al., 2019; Vanassche & Berry, 2020) have argued that self-study can go beyond enhancing expertise whereby it becomes

a transformative and emancipatory process for educators in the face of an ever-growing educational system that they feel powerless to influence. I am drawn to Breslin et al.'s (2008, p. 31) depiction of self-study methodology as one that can help achieve the researcher's objective of examining the "intersections of their personal histories of learning, cultures, professional practices, and the development of their collective knowledge". In enquiring into my own teaching practice, I am drawing upon central autobiographical nature of a self-study methodology (Lyle, 2019).

Berry (2004) outlines four primary motivations for educators to utilise a self-study methodology: (a) articulating a philosophy of practice and checking consistency between practice and beliefs, (b) investigating a particular aspect of practice, (c) developing a model of critical reflection, and (d) generating more meaningful alternatives to institutional evaluation. Loughran (2007) notes that these four factors are not intended to be the only reasons for undertaking a self-study, but they do particularly resonate with my motivations for my doctoral research. Investigating a particular aspect of practice is a key motivating factor in my research. Furthermore, Loughran (2007, p. 223) notes that among self-study researchers there is an

> overarching desire to better align theory and practice, to be more fully informed about the nature of a knowledge of practice, and to explore and build on these "learnings" in public ways that appears to be an underlying common purpose in self-study - a tacit catalyst for self-study.

Much of the available literature on self-study among educators is associated with self-study of teacher education practices (S-STEP). In a systematic review of S-STEP research literature Vanassche and Kelchtermans (2015) highlighted the following characteristics within the field: a focus on one's own practice using qualitative research methods; the central role of collaborative interactions with colleagues; and validation based on trustworthiness. Two tensions are intrinsic to self-study research, upon which researchers need to continuously position themselves. For self-study inquiries to achieve their purposes – relevance and rigour on one side, and effectiveness and understanding on the other must be balanced (Vanassche & Kelchtermans, 2015). Consequently, the main components of a self-study methodology are ensuring a transparent process of personal inquiry, whereby the transparency comes from opening oneself up to public critique, and critical reflection within our social contexts (Dinkelman, 2003; Samaras & Freese, 2006;

Hickey, 2016; Lyle, 2019). These components have been central in the planning and execution of my research.

Self-study research, like all fields of research, is not without criticism. A lack of methodological rigour and transparency has been a persistent criticism of self-study (Vanassche & Kelchtermans, 2015). Vanassche and Kelchtermans (2015) argue that much of the methodological criticism focuses on the problematic dichotomising of teaching and researching or theoretical and practice knowledge. Feldman (2003) highlights that if researchers want others to value self-study research, then there is a requirement to ensure methodological transparency and self-critique. To do this it is recommended that: researchers provide clear and detailed descriptions of data collection and how that data is represented; use triangulation methods that support and challenge each other; provide evidence of the value of changing one's own practice (Feldman, 2003). However, transparency and self-critique alone is not sufficient. Loughran (2010) suggests that researchers question how they can invite further interrogation and development of their practice beyond the initial self-study research – researchers must continuously ask themselves "*so what*" [emphasis in original] in relation to their self-study (Loughran, 2010, p. 225). Self-study researchers must therefore continually ask themselves the question 'does this matter?' in relation to their findings. These criticisms and associated recommendations are congruent with my desire to present an authentic analysis of my teaching practice.

Further criticism of self-study research is that it is often followed as a single strategy rather than integrated into a wider research programme (Vanassche & Kelchtermans, 2015). Similarly, Shulman (2002) points out that self-study often fails to build on previous research and the established chains of inquiry found in other forms of research are not present in self-study. Self-study tends to focus on a one-off research project and fails to be placed in the context of long-term development of the field. I think this is a valid criticism and hope that in placing my research firmly within the site of my field, I can build on the work of others. In a third criticism, Vanassche and Kelchtermans (2015) point to the self-critique nature of self-study as being problematic – a criticism that is common in many forms of practitioner-based research. In researching myself, my own biases about elements such as the effectiveness of my practice may hold too much weight. This point is particularly developed by Loughran (2007, p.13) who highlights the need for rigorous scholarship "to ensure that learning through self-study is not simply a

pseudonym for *rationalization* or *self-justification*" [emphasis in original]. These criticisms emphasise the important role that placing my research in the context of my field plays, being open, authentic, and detailed in my methods, and the importance of reflective practice is discussed later. It also highlights the importance, in my opinion, of having critical friends who were willing to offer honest critique.

Critical friendship is an important tool in self-study inquiry, and I have positioned the pracademic participants as a form of critical friends in my research. According to Breslin et al. (2008) a critical friend has two principal roles - to offer critique and provide support. It is also important that they can provide feedback and support in "a constructive manner" (Schuck & Russell, 2005, p.108). Deepening self-reflection through critique of practice by a critical friend is a key method within self-study (Samaras et al., 2019). Dialogue with critical friends opens opportunities to explore dilemmas and deepen awareness of the tensions and unquestioned assumptions in practice (Samaras et al., 2019). A further focus of self-study research is to make public developed understandings of practice and to ensure this is "informative for others and available for critical debate" (Vanassche & Kelchtermans, 2015, p. 509). Critical friends allow for constructive critique of methods and findings, enhanced reflection, and greater transparency in the research process.

Common practice when selecting critical friends is to ask colleagues to fulfil the role (Samaras & Freese, 2006; Schuck & Russell, 2005; Samaras, 2011; Samaras et al., 2019). What is unclear is how the term 'colleague' is being defined. For example, Schuck and Russell (2005, p. 108) give the example of someone who was asked to be a critical friend for a "colleague in another university", whereas Samaras and Roberts (2011) give an example of colleagues from the same institution acting as critical friends. Some characterise the role of a critical friend as being fulfilled by someone who is an academic peer but is also a detached outsider – someone who can understand issues and context but is not part of the research (Storey & Wang, 2017; Samaras et al., 2019). Perceptions of academic status within an institution can impact on the effectiveness of the critical friend model (Schuck & Russell, 2005). There is an assumption on the researcher that their critical friends will understand their role which is not always correct (Schuck & Russell, 2005). Based on these factors I felt that selecting critical friends who were largely from other institutions was warranted. The pracademics recruited fulfilled these criteria of having experience of and understanding issues, as well as being somewhat outside the research. I feel critical friend is the best description of the role they play.

It is common within the literature to highlight the importance of formative feedback and support provided by critical friends throughout the research process (for example, Loughran, 2005; 2007; Schuck & Russell, 2005; Samaras & Roberts, 2011; Storey & Wang, 2017, Samaras et al., 2019). My use of critical friends did not permit us meeting as a group, nor were the meetings formative. The process of feedback and critique from my critical friends was not ongoing as suggested by Samaras (2011) nor were we able to meet face-to-face as recommended by Schuck and Russell (2011). The primary reason for not following this critical friendship model as described was logistical. Phase Two of my research – the enacting of my teaching plan – took place during a period of highly restricted social interaction. Due to COVID-19 it would have been impossible to meet face-to-face with colleagues, even from my own institution, on a regular basis. It would also have been a lot to ask academics who were already weary of online communications to commit to a weekly process that would primarily benefit me alone.

To date there is no research that utilizes self-study to examine sport science education. Corvo (2014), outlines some of available science education-based research and highlights the challenges and benefits of science-specific self-study research but concedes that much of the literature focuses on pre-service or first year teachers in science education. Corvo (2014) posits that the lack of self-studies which are situated in the classroom and carried out by fully trained teachers is unsurprising given the time commitments required for its execution. The lack of self-study style research in sport is interesting given the tradition of sharing self-reflections on applied practice at professional development conferences. This may, however, reflect the overall lack of interrogation of sport science education approaches within published literature, as discussed in chapter 2.

Corvo (2014, p. 27) discusses the improvement of his "STEM teaching practice where I [Corvo] move beyond my technical rationality orientation to a more reflective practitioner orientation". The technical rationality the author refers to concerns Schön's (1983) description of practice-based problem solving involving a series of rational steps that professionals may follow. Following a linear step-by-step approach such as this separates professional knowledge from its social context, hence the requirement for a more reflective practitioner orientation. Such descriptions of technical rationality reflect common conceptions of sport science practice (for example, Nash & Collins, 2006; Callary et al., 2022; Maulini et al., 2022). Russell (2012) also refers to the work of Schön

when discussing the reflective turn in science education. Schön, (1991, p. 5) describes the reflective turn as:

> a kind of revolution. It turns on its head the problem of constructing an epistemology of practice. It offers, as a first-order answer to the question, what do practitioners need to know?

This discussion has forced me not only to examine the types of knowledge required in sport science practice but also to examine more closely my own teaching practice and question is my approach to teaching and learning too linear? Learning to move beyond the linear, step-by-step approach to sport science teaching and practice, and focus more on reflective practice for improvement is central to my research and asks me the question – what do I as a practitioner need to know?

It is clear from self-study scholarship and the name of the ethos, that the 'self' is at the centre of the research process. In incorporating elements of a self-study methodology, I am examining my own practice whilst asking critical friends, in the form of fellow pracademics, to offer alternative perspectives and challenge my findings and interpretations (LaBoskey, 2004). By making my research public I am offering others the potential to learn from it (Lyle, 2019). In planning and enacting my lesson plans, asking students for feedback, and making my own reflections I am offering critical reflection. All of this makes a self-study framework congruent with my position on this research – a focus on my practice, with input from others and an output that will potentially benefit others. However, self-study does not provide a framework for examining the planning, enacting and reflection on my classes.

### 3.5.4 Action Research

My research is strongly influenced by action research as it informs how I implemented and examined the ABL approach by examining my own teaching practice (Whitehead, 1989). The term action research is said to have been coined by American social psychologist Kurt Lewin (1946), to describe a process of systematic inquiry that attempted to improve social issues impacting the people's lives (Adelman, 1993; Hine, 2013). Action research in education is viewed as the process of studying a pedagogical dilemma to understand and improve the quality of the education process (Hine, 2013). It provides teachers with new knowledge and understanding about how to improve their educational practices, and wider practices within their field (Hine, 2013). According to

Reason and Bradbury (2008, p. 4) action research is a "process concerned with practical knowing" and one that "seeks to bring together action and reflection, theory and practice… in the pursuit of practical solutions to issues". This process of developing practical knowledge is based on an iterative action research process that follows a general cyclical development of idea formation, plan, act, evaluate and reflect within a particular context (Rossi & Tan, 2012; Lê et al., 2015). McNiff (2002, p.5) posits that action research "refers to a practical way of looking at your own work to check that it is as you would like it to be". Meyer (2000) attributes a focus on developing solutions to practical problems and its ability to empower practitioners, by getting them to engage with research and the subsequent development or implementation activities. Fundamentally, "Action research is characterized as research that is done by teachers for themselves." (Mertler, 2014, p.4). Action research informs my research through the placement of theory within practice rather than viewing it as abstract knowledge (Whitehead, 1989; McNiff, 2013). Such a description of action research shows its similarities to self-study. However, whereas I see self-study having a focus on the self-reflective, I see action research as having a focus on reflection on practice.

My research is not an examination of an outcome but rather an exploration of a process. As a researcher I am drawn to the practical nature of action research and the iterative process that allows me to develop my teaching practice. McNiff (2002) highlights the future focus of action research which captures my desire to improve my teaching practice as well as the evolving nature of what I am researching. As with most forms of qualitative enquiry there are numerous strands within the action research paradigm. Specifically, my research is influenced by teacher action research (Mertler, 2006). Teacher action research is congruent with educators who make their own contexts the focus of the research to inform and improve their practice (Pine, 2008). Such contexts may include classroom dynamics, the use of learning aids, methods of instruction and assessment. Action research is a pragmatic approach to research and professional development as it helps educators to understand their practice better, and from there, come up with ways to improve the effectiveness of their teaching (Whitehead, 1989). As an approach, it acknowledges the position of the educator as a 'local expert'.

I was strongly influenced by action research primarily because it gives a framework for the cyclical nature of enquiry. My research is not concerned with proving something or finding something new – it is focused on exploring my teaching and giving due acknowledgement to the context of my field. Pine (2008, p.44) outlines the case for action

research as a research tool that can combine research and practice as it is a "is a conceptual, social, philosophical, and cultural framework for doing research, which embraces a wide variety of research methodologies and forms of inquiry". It is unlike positivism, the dominant research methodology within sport science, in that it focuses on the constructed reality of individuals and collectives. Action research is therefore utilized to solve problems in an ongoing systematic and recursive manner which allows the educator/ researcher to act to solve that problem (Pine, 2008). Accordingly, Pine (2008) describes action research as a paradigm and not a method. However, within this paradigm the action research cycle gives me a key method in my enquiry.

The process of conducting action research is generally characterised by a recursive cycle of planning, acting, observing, and reflecting (Figure 3.2). Cycles are repeated until the problem is solved or a new iteration of the problem develops, meaning there is a need to be exacting in the execution of each (Rossi & Tan, 2012). This means that in order to fully implement action research cycles there must be defined end goal or problem to solve. However, if this aspect of action research is put to one side, then the researcher can focus on utilising the cyclical model for progressive research within practice. This then allows the researcher to focus on a significant aspect of action research, according to Pine (2008), which is how theory can inform practice and practice in turn refines theory allowing a more continuous transformation of teaching and learning practice.

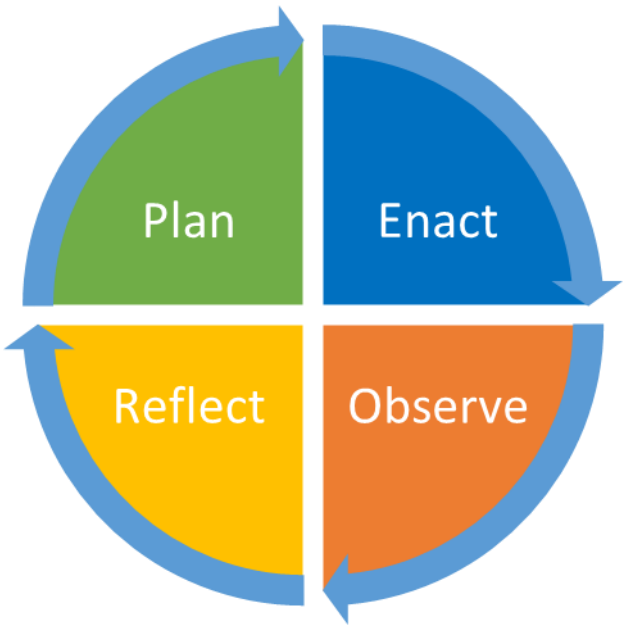



Figure 3.2: Action Research Cycles (adapted from Lê et al., 2015, p. 5)

Whilst action research can be seen as a pragmatic approach to improving practice it has some disadvantages. A lack of subjectivity can be seen when research is left unchecked (Kock, 2005). This is congruent with criticisms of the self-critique nature of self-study (Feldman, 2003). These criticisms reinforce the need for appropriate peers in critical friend roles. Further criticisms surround ethical issues of power. The idea, planning, implementation, and interpretation of the research all reside within the researcher, who therefore controls power within the project (Masters, 1995). This issue is explored in more detail in section 3.9 below. Thirdly, there is the drawn-out process of enacting multiple action research cycles. Having multiple cycles of action research points to an evolving methodology which has led critics to label action research a 'fuzzy methodology' which in turn leads to 'fuzzy answers' (Walter, 2009). There is no set duration on action research, and this may mean that it should only stop when there is a resolution to the problem. What if resolution is not the goal? What if there is only evolution of practice? McNiff (2013) tells us that action research allows the researcher to develop a systematic body of evidence-based knowledge that is situated in real events that explains the judgements we make as teachers and how we understand 'good' practice. Good teaching practice should not be static in my opinion. There should be space for process of good teaching rather than a goal of good teaching.

Criticisms of action research are not unfounded but the primary issue that I have with using a purely action research methodology is the lack of a defined problem. Rossi and Tan (2012) hold a position that action research in educational settings should be underpinned by emancipatory goals, and this is something that I agree with. This is what gives action research its characteristic cyclical nature. Cycles should develop progressively on each other through the research process towards an end point. Within the plan-action-observe-reflect cycles there is a need to be exacting in the execution of each (Rossi & Tan, 2012). If the action does not adhere strictly to the plan, then any subsequent planning will be off target. Kock (2005) points out that action research has a dual goal – to satisfy the subject(s) of the research and to contribute to the research community. According to Kock (2005, p. ii) it is often difficult to satisfy the research community "especially in fields of inquiry where Action Research has not traditionally been used". Without having a set problem to investigate and given the time constraints of this project it, became clear that, whilst I am strongly influenced by the philosophy of action research, it would not have been appropriate to enact action research cycles for the same reasons that a purely self-study methodology would not have worked. Practically it

would not have been possible and philosophically it is incongruent with my position as researcher in this project.

A core assumption in action research, according to McNiff (2013), is reflection on action – an idea made popular by the work of Schön (1983, 1991). This means that when carrying out action research the researchers must regard learning as a process and like all processes there is a requirement to navigate the journey with others as well as within themselves. The researcher must "negotiate choices" with themselves and their colleagues and participants (McNiff, 2013, p. 44). The aim is to create spaces of understanding through action and reflection upon that action.

### 3.5.5 Reflective Practice

Reflection is an important part of both self-study and action research and has been important in developing my methodological choices of self-study, action research, disciplinary location of my research, and how these shape knowledge development (Braun & Clarke, 2022). According to Dewey (1910, p. 6) reflective thinking is an "[a]ctive, persistent, and careful consideration of any belief or supposed form of knowledge in light of the grounds that support it and the further conclusions to which it tends". Dewey's work emphasises the positive role that reflection could have on our ability to foster critical thinking and the development of skills (Lew & Schmidt, 2011). Schön (1983; 1987) took a particular view of this. From a practice perspective Schön challenges the conventional technical-rational approach to viewing professional practice which posits that professionals apply formally learned specialist or technical knowledge when engaging in their practice (Cheetham & Chivers, 1998). Schön (1983; 1987) argues against this position being the only way in which professionals conceptualise or solve problems. Schön (1983) saw reflection as the primary resource practitioners use to learn in practice. The popularity of reflection as a learning tool in practice centres around the idea that it affords a level of autonomy (Nguyen et al., 2014) and this presents practitioners with the opportunity to develop and improve their practice through reflection. Professionals utilise more tacit forms of knowledge that are linked to patterns of action such as "knowing-in-action" (Schön, 1987, p.49). Within their practice professionals develop what Schön (1987, p. 265) calls "repertoires of cumulatively developed organizational knowledge" which allows them to 'reframe' difficult problems into more manageable conceptualisations. This in turn leads to Schön (1983; 1987)

reframing professional practice as a form of ‘artistry’ as much as the technical, rational application of theory; a concept that Woods and Davids (2022) have put forth regarding sport science practice.

Schön posits that professionals need to reflect on their actions in order to improve their practice. The idea of being reflective regarding one’s practice - reflective practice - is central to my research in two ways. Firstly, there is the need to move beyond linear, technical-rational approach to my teaching practice, and towards utilising reflection and more tacit forms of knowledge to reframe pedagogical dilemmas (Moon, 1999). Reflective practice in this sense is shown with my research methodology. Secondly, this need is mirrored by what my students will require in their sport science practice. Reflective practice in this sense appears as part of my analysis of the fieldwork, which is outlined in detail in section 3.6. Despite positivism being the dominant epistemological framework for sport science, sport science practitioners are aware that much of sport performance happens outside such stable descriptions of the world (for example, Taberner et al., 2019; Bartlett & Drust, 2020; Woods & Davids, 2022). A similar acknowledgement is made by Schön when highlighting the importance of ‘knowing-in-action’. Schön (1983, p. 279) uses the metaphor of a downhill skiing coach when discussing practitioner knowledge, stating that “[a] good coach learns to capture the complexity of action in metaphor (“Lean into the slope!”) that helps to convey the feel for the performance”. The implication here being that a good coach or practitioner has the experience and tacit knowledge to understand the right words to say to an athlete in order to get the desired performance. According the Schön (1983; 1987) a crucial component in developing this type of knowledge is reflection and central to this is the concept of "reflection-in-action" and "reflection-on-action."

Schön (1983; 1987) discusses reflection during activities (reflection-in-action) and after activities (reflection-about-action) as being key to a process of continuous improvement by acquiring new knowledge and competency. Reflection-in and on-action can help to make practice-focused knowledge more readily available to practitioners when dealing with domain-specific problems. Critical reflection-in and on-action is necessary for professional development (Schön, 1983; 1987) which can be linked to the dialectal relationship between action and reflection (Freire, 1970; Zuber-Skerritt, 2001). Within this reflective observation is a key stage in which individuals reflect on their experiences, observe what happened, and try to make sense of it. The concept of reflection-in and on-action (Schön, 1983; 1987) which emphasises both acute and chronic reflective practice

helps me to conceptualise how to improve my teaching practice and the learning experience I develop for my students.

Within education, reflection is considered a significant component of learning (for example, Mezirow, 1998; Moon, 1999; Dinkelman, 2003; Lew & Schmidt; Sellars, 2017). In sport science practice reflective practice has also been highlighted as a key element of practitioner development (for example, Knowles et al., 2006; Doncaster, 2018; Szedlak et al., 2020). Samaras and Roberts (2011) outline the important role of reflecting on teaching practice to help educators in actively seeking improvements in their practice. The role played by those described as critical friends can be important in this regard as they can stimulate critical self-reflection (Schuck & Russell, 2005). This can seem somewhat counter-intuitive as it shows that sharing in cooperative dialogue can foster deep personal reflection. Schuck and Russell (2005) also refer to the importance of having or making time for reflection, which suggests Schön's (1983, 1987) reflection-on-action where deep reflections are made.

My research required a reflective approach, even in the early stages of planning. I kept a journal of my research journey and used this to track the progress of the research design and how the process of developing my research took shape. I also had innumerable discussions with my primary supervisor, the DHAE supervisory team, colleagues, critical friends and DHAE allies which were invaluable components of my reflective practice. These discussions included how the research could be framed and led me to research self-study and action research methodologies. They also helped me to plan and develop ABL process, my data collection methods and deal with some of the challenges of the research, such as COVID-19.

## 3.6 Setting, Methods and Participants

### 3.6.1 Study Setting

This section is intended to give a broad overview of the EC module delivery. The planning, implementation, and reflection on the module delivery portion of the research can be deemed 'the fieldwork'. Based on my epistemological and ontological positioning, and study design – three key principles guide this research: (a) using my own practice as an authentic setting for research, (b) acknowledging that knowledge is social constructed, and (c) being an active participant in all aspects of the research. These principles were

influenced by research methodologies that promote exploration of individual practice such as self-study, reflective practice and action research which were discussed in greater detail in section 3.5.

There were three distinct, but interconnected phases to the fieldwork, as outlined in Figure 3.3:

Phase One involved the research and development of teaching plans. These plans were designed based on some of the key issues that are discussed in the chapter 2 such as, the identity of sport science; preparing students for sport science roles; developing multiple ways of knowing; and influences on my education philosophy. A sample lesson plan is given in Appendix F.

Phase Two involved the implementation of teaching plans over an 11-week period. Recordings were made of weekly student feedback and my own reflections were logged. There was a constant and incremental development of the ABL approach.

Phase Three involved a summative feedback session with students on their experiences and semi-structured interviews with five pracademics concerning their experience of teaching practical classes and the practice-academia intersection.

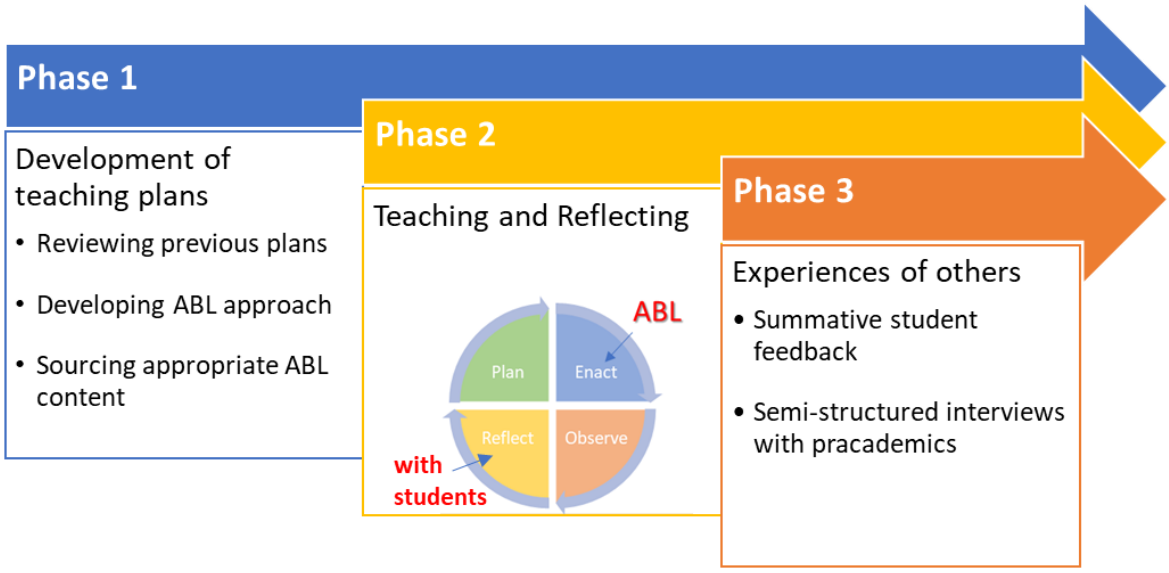



Figure 3.3: Key Phases of Fieldwork

## 3.6.2 Methods

This section gives an overview of the contents of each phase and clarifies how the phases interacted and progressed. The fieldwork took place from early September, 2020 to late

March, 2021. The three phases can broadly be categorised as planning, enacting, and reflecting on my teaching practice, although there were constituent recursive cycles within each phase and the overall process was not linear.

#### 3.6.2.1 Phase One - Developing ABL Content

The timeline of the fieldwork (Figure 3.4) began with Phase One. Plans for a return to on-site learning were clarified on 1 September, 2020. To allow staff to familiarise themselves with new work practices and plan for the upcoming term, teaching did not commence until 2 October, 2020. The workload descriptor for the EC module stated that:

> Practical classes allow learners to explore and develop the application of theory. In addition, practical experience enables learners to develop mastery of advanced specialised skills and practices associated with each module.[1]

Beginning in September, I reviewed previous class plans and pedagogical approaches. Class plans were updated based on research and notes on a particular topic. I would re-research topics, searching for updated published research or talks by experts such as previous conference and webinar presentations on UKSCA's IQ platform (UKSCA, 2022b). I also utilized notes from my OneNote notebook; a space where I store content on topics that I come across online. My OneNote notebook was an invaluable tool in updating practical class plans as I often came across content that I had forgotten about.

[1] The module descriptor is not publicly available.

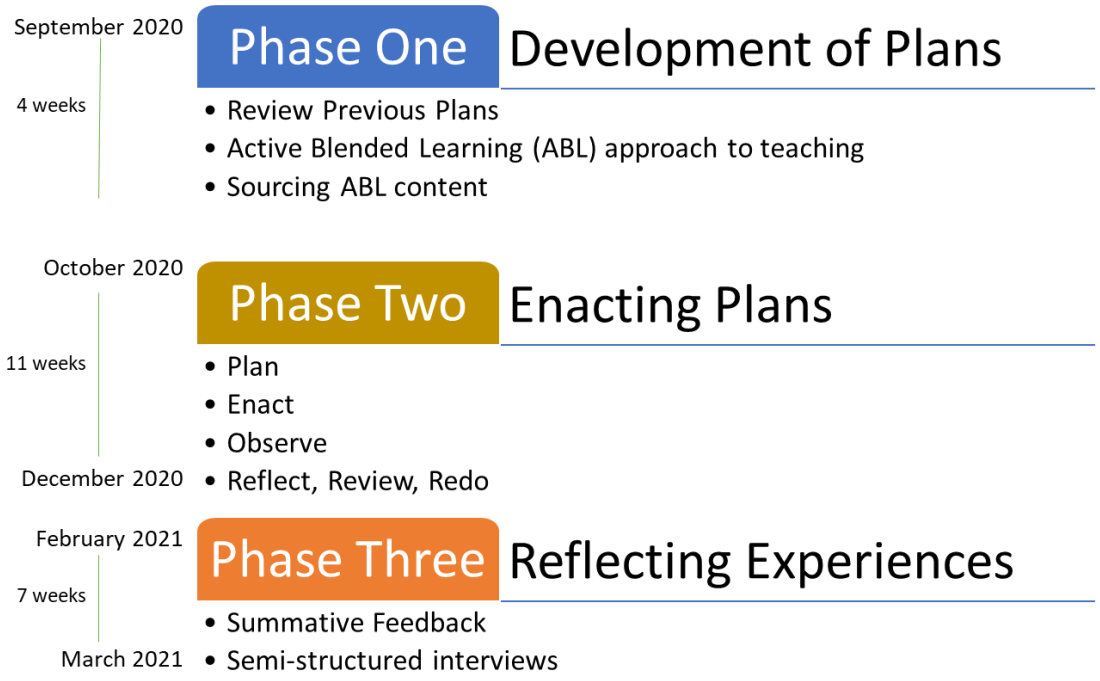



Figure 3.4: A timeline of fieldwork

Choosing the ABL content was informed by my interpretation of the tool, as discussed in chapter 2. Fyfield et al. (2021, p. 56) state that when teachers are searching for content, they "use their deep content knowledge to evaluate the resulting search returns". I felt my position as an applied sport scientist with over a decade's experience, coupled the lecturing experience I had developed, informed my content knowledge on the topics. Videos were chosen based on my personal judgement of their validity - their applicability to the week's topic, the clarity of the content, duration of the video and my perception of their ability to generate discussion. Videos were all from professional S&C practitioners who were directing their instruction towards other practitioners. This was an important process and one that I was keen to get right. Fyfield et al.'s (2021) research into how school teachers select content describes six key criteria to choosing video aids: (a) Teacher fact checking and diligence - having the time and knowledge to preview content, (b) Specificity - videos should address the specific learning goals and the curriculum demands of modules, (c) Length – the shorter the better, provided the key learning material is present, (d) Engagement - design features are important (for example, high resolution and good sound quality as possible, the use of live footage), (e) Affective response - the 'culture' of the target audience needs to be understood (age, demographic, interests, and (f) Content knowledge - "teachers should be content experts" (Fyfield et al.,

2021, p. 56)**.** Although this research was published after I had completed the fieldwork, it does describe how I selected appropriate video content.

Videos on YouTube are freely available, easily accessible and links can easily be embedded into the VLE. Utilising YouTube videos to enhance teaching and learning practices is not novel, with a range of research highlighting the platforms potential in health science and related courses (for example, Burke & Snyder, 2008; Jaffar, 2012; Barry et al., 2016). Modern students have largely grown up with access to platforms like YouTube and it is seen as inevitable that such platforms would integrate it into a student's education experience (Hall et al., 2013; Foley et al., 2014). Using YouTube is native to most students, it is free to use and easy to integrate but it also has another important feature that makes it a useful tool for education – the recommendation algorithm. YouTube - like other social media networks - uses an algorithm to suggest videos based on the content the user searches for, watches and engages with (Cooper, 2021; Fyfield et al., 2021). Such algorithms are not without controversy (see for example, Brown, 2021) but the ability of YouTube to suggest content based on previous searches and viewing history can help students to engage more in topics (Fyfield et al., 2021).

All video content was available on Blackboard, the institute's VLE, at the appropriate time. Video links are available in Appendix E. In total ten videos were made available over a nine-week period. The process of choosing ABL content is outlined below, in section 3.6.2.2. The remaining two weeks consisted of students making their own videos on a topic and developing a resource that could be text or video based.

#### 3.6.2.2 Phase Two - Class Procedures and Formative Feedback

Phase Two began with the enactment of my practical lesson plans in October and culminated 11 weeks later in mid-December. The implementation of each class followed an action research cycle of plan, act, observe, reflect as described previously. Weekly ABL content was planned, made available, the class was conducted, and formative feedback on both the video content and the ABL process was sought. Feedback was then used to guide the following week's content. For the first nine weeks, ABL content released on the VLE each week on Monday in advance of a Friday class. Each video link was accompanied by some short prompt questions to stimulate thoughts prior to and discussion during the subsequent practical class – see Figure 3.5 as an example. A reminder email was also sent to the students on each Thursday with the YouTube link and the prompt questions. The duration of videos ranged from 05:12 to 16:42 minutes. The median duration was 06:39 minutes. Following reflection and discussions with my DHAE

peers on my desire to have more student input on content, and to gain additional insight into what students viewed as valuable content for their learning, some alterations to my approach were made in weeks 10 and 11.

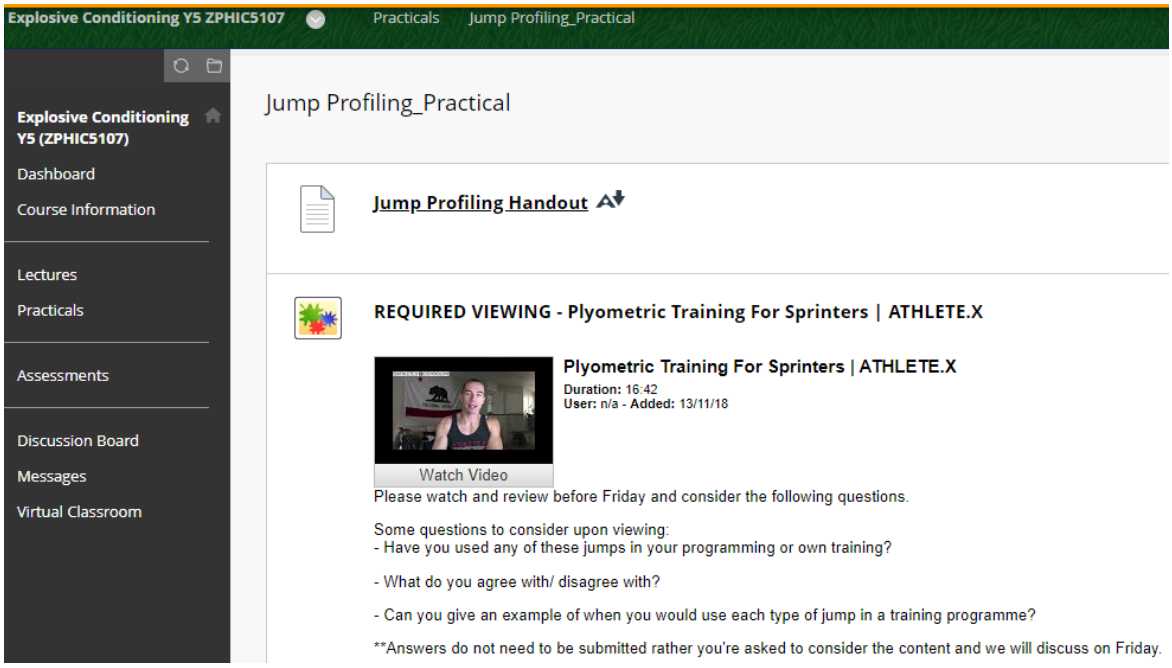



Figure 3.5: Screenshot of the VLE for the Jump Profiling practical class. The screenshot has been cropped to improve image quality.

In week 10, students were asked to select their own video content based on that week's topic. Student's selected YouTube clips and shared links to the discussion board on the VLE, inviting classmates to view them. For the final week of term, students were asked to create their own video content on a topic of their choice during the practical class. This reflected the review nature of the final teaching week of term and most students chose to create study aids. See Figure 3.6 for an annotated screenshot of a video resource, developed by students. Annotation has been added by me to reflect the audio instructions that students included in the video. Furthermore, in weeks 10 and 11 there was a move to anonymised written feedback. Students were asked to provide written feedback on the how the class went and the value they placed on the resources they selected or created. The time required to view and engage with pre-class content was targeted at no longer than 30 minutes. According to the module descriptor, 13.6 hours of independent learning time was attributed to this module so 30 minutes was not considered overly onerous. Formative feedback was gathered via group discussions at the end of each practical class and towards the end of the phase feedback was given via anonymised written feedback.

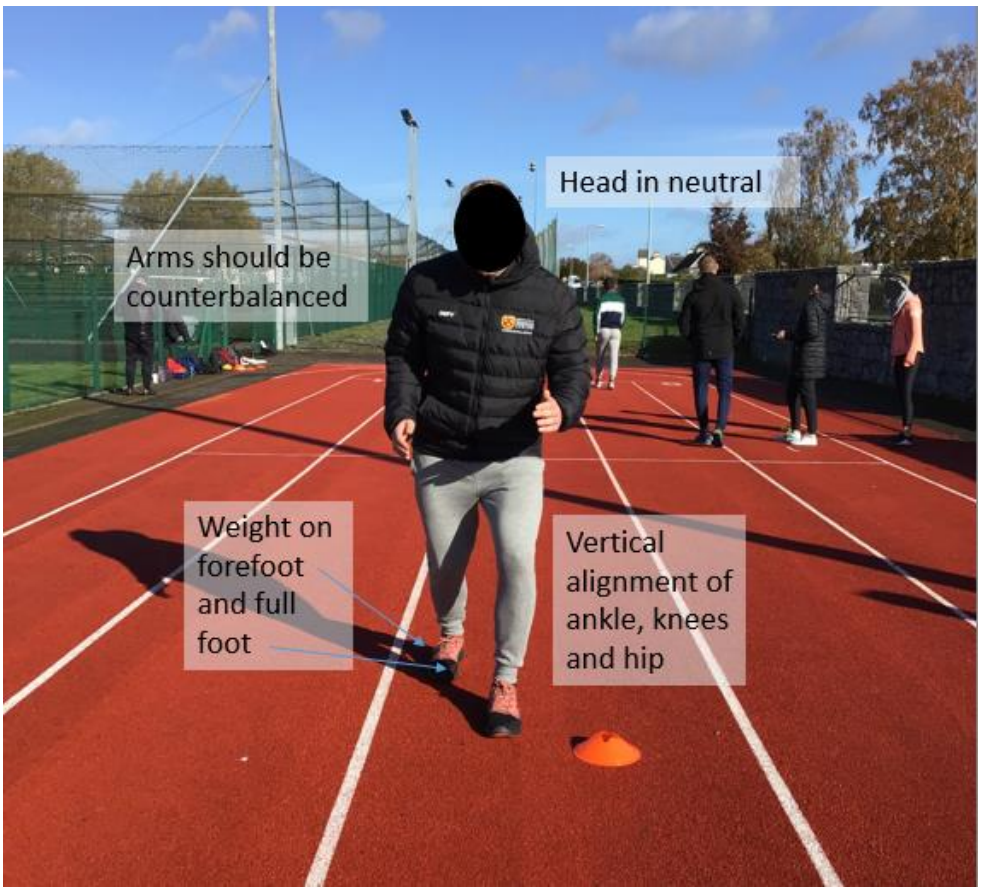



Figure 3.6: Screenshot of a video resource with added annotation, developed by students. Annotations reflect audio content of the video. The screenshot has been cropped to improve image quality.

Every EC practical class began with a check-in. This simple ritual involved asking how students were, how their day had been and what they expected from the practical. This is a tool that I utilise with all my class groups in an effort to develop rapport and dialogue. Check-ins helped me to form a space where the group could develop a sense of togetherness and begin the process of co-constructing knowledge. This forms part of my dialogic approach (Freire, 1970). As discussed in chapter 2, this approach to pedagogy has been demonstrated help lecturers gain understanding of learner views and to see students as partners and collaborators, while students gain insights into staff viewpoints (Jensen & Bennett, 2016). For me, check-ins are like the huddle we see sports teams engaged in before and after activities.

Gumperz (1982) highlights the importance of effective communication for social interaction. Primarily, the use of an ABL approach was to encourage discourse. If students had a frame of reference from the start of every EC practical class, then they should, in theory, have been able to contribute to discussions in every class. Students were

questioned on the videos they had watched; they were asked about specific aspects and to contextualise the content within their own practice. The importance of questioning for learning is widely acknowledged within general education literature (Cazden, 2001). One of the tenets of an ABL approach is that the online content becomes central to discussions in the classroom, so it was important for me to question students and begin the process of co-constructive discourse (LTE, 2021). Questioning within the right context promotes discursive activities and socialisation within and beyond the classroom (Harvey & Light, 2015).

In an effort to limit my influence from group discussions, students were often split into small groups to converse on topics. This would happen throughout the class - usually these were planned discussions but occasionally they were spontaneous. Often small group discussions were set up following demonstrations. Demonstrations are a key component of my EC practical classes. Although students had already become familiar with movements via the ABL content, there was always some aspect that needed to be clarified. The use of demonstrations is important for my pedagogical approach, but they are also important in understanding my research. Typically, a demonstration is delivered by the instructor in conjunction with a technical model of the movement. Technical models are verbal descriptions of a movement that aid practitioners by giving a conceptual framework to direct athletes toward, assisting in coaching athletes to perform movements in a safe and proficient manner (Pedley et al., 2017). As discussed in the previous chapter, activities that are intended to teach students about movements and associated technical models tend not to reflect student-centred approaches, as they are more often commonly conducted in a didactic manner with instructors demonstrating and describing movements which the student copies and regurgitates (Weeks & Horan, 2013; Raiola & Tafuri, 2015; Raiola & Di Tore, 2017). Freire's (1970) banking model is a useful way of conceptualising this approach.

Many of the movements taught in sport science practical classes are familiar to students due to their own sporting background, but the depth of understanding required by practitioners is generally underdeveloped in students and technical models of movements are often difficult for students to articulate despite their familiarity (Raiola & Di Tore, 2017). Furthermore, research into sports coaching has shown that clear pre-practice information about the task goal improves understanding of movement patterns (Hodges & Franks, 2002; Jones et al., 2012). The ABL approach, with an emphasis on in class

discussion, was utilized to help students to articulate, share and discuss their innate knowledge.

Another conscious choice in my pedagogical approach was that of modelling. Within teacher education the process of modelling behaviour is recognised in the literature (Loughran, 2005; Lunenberg et al., 2007). Specifically, it encapsulates some of the layered nature of teacher education; the complexities of teaching and learning about teaching and learning, where teacher educators often refer to different levels of objective within their teaching practice (Boyd & Harris, 2010). In sport science practical classes, lecturers are often role-playing the positions that their students will take up in educating stakeholders in their sport science practice (Martindale & Nash, 2013; Bartlett & Drust, 2020).

Within the study design formative feedback was provided by my students throughout the teaching term. These discussions took place immediately after each EC practical class. This is a portion of the research that would be considered outside a self-study framework. McNiff (2013, p. 121) highlights the importance of such formative feedback during action research-type approaches as such feedback can be "valuable sources of data that capture the live responses of people". McNiff (2013) recommends a range of methods of recording such feedback, including the method that I utilized – audio recordings. Audio recordings were made at the beginning and end of each class to capture the students experience of the ABL content and how the class was delivered. These discussions had a dual mandate. Firstly, they acted as formative feedback on my processes and assisted my reflections and planning of subsequent classes. In the second instance they allowed open forums for students to express their views and hear the views of the others, the importance of which is shown in the chapters 4 and 5, which concern the findings and analysis of my research.

Formative feedback recordings were made to a Lenovo Yoga 940 laptop (Lenovo Limited, Beijing, China) and transcribed using the 'transcribe your recording' feature (Microsoft, 2021). Transcriptions were checked for accuracy by listening back to the audio recording and editing as appropriate. The audio of the formative feedback was reviewed on a weekly basis. Written notes were taken in conjunction with my own reflections on the practical class which then fed into the design and implementation of subsequent lesson plans.

#### 3.6.2.3 Phase Three - Student Focus Group and Pracademic Interviews

Phase Three began in February 2021, after students had completed their EC assessments in December, 2020. Students were invited to attend an online focus group to discuss their summative experience of the practical classes and in particular the ABL approach. As previously mentioned, the focus group discussion was held online due to a tightening of COVID-19 related restrictions in Ireland. All participants agreed to take part in the focus group which lasted 18:25 minutes in duration and took place during class time of another module, which a colleague kindly allowed me to use so as not to put any additional time pressure on student participants. Semi-structured interviews with pracademics began on 1 March, 2021 and culminated in the final interview on 24 March, 2021. Again, all interviews were completed online due to COVID-19 restrictions. Interviews durations ranged from 22:29 to 29:28 minutes. The median duration was 25:52 minutes.

McNiff (2013) groups the use of focus groups with similar methods of data collection such as discursive formative feedback, the importance of which is outlined above. However, whereas the formative feedback from students primarily allowed me to monitor my thinking and actions as they happened - assisting my reflection-in-action - the summative feedback provided in the focus group allowed me to look at the process as a whole - assisting my reflection-on-action (Schön, 1983; 1987). Focus groups are settings where "people describe their practices and ideas to the researcher" (Peräkylä & Ruusuvuori, 2018, p. 1163). The aim of the focus groups was to provide a space where students could share their interpretation of a specific issue from a participant's perspective, thereby developing a shared understanding (Liamputtong, 2011). Drawing on the example of Gallery (2021), the focus group was implemented to allow a collective voice to emerge on the impact of my pedagogical approach.

The use of an online focus group was necessary, due to COVID-19 restrictions, and this presented some unique challenges. Kamberlis and Dimitriadis (2014) warn that "the communicative functions of the subtleties of bodily cues and other nonverbal elements of face-to-face interaction are not so easily recreated in virtual reality environments". However, online focus groups may also have their advantages. For example, (Liamputton, 2011) claims that online focus groups can reduce researcher bias, inhibitions may be reduced, there may be reduced pressure to conform to what other participants views. Overall, I felt it was a disadvantage to have held the focus group online as that sense of huddle, as outlined previously, was not there.

The interviews with pracademics were also carried out online due to COVID-19 restrictions and to facilitate participants from a range of geographical areas across Ireland. As with all methods, there are some advantages and disadvantages of technological mediated interview techniques such as online interviews (Opdenakker, 2006). Online interviews over video call allow both the researcher and participant to take advantage of social cues such as voice tone and intonation, some body language due to their synchronous nature (Opdenakker, 2006; Lo Iacono et al., 2016). The ability to record the interview - with the participants permission - is also advantageous (Opdenakker, 2006; Lo Iacono et al., 2016). In reviewing their use of Skype as a tool for conducting online interviews, Lo Iacono et al. (2016) describe such tools as viable alternatives for data collection among qualitative researchers. Regardless of whether interviews take place via online mediated spaces or face-to-face, it is important to build a rapport with the participant (Rowley, 2012) and to set up a "a safe and comfortable environment for sharing the interviewee's personal experiences" (DiCicco-Bloom & Crabtree, 2006, p. 316). Stages of rapport between the interviewer and participants are generally described as apprehension, exploration, co-operation, and participation (DiCicco-Bloom & Crabtree, 2006). It is therefore recommended that interviews begin by setting the context of the research and broad, open questions to get the interviewee talking (DiCicco-Bloom & Crabtree, 2006) - as was the case in my research.

The student focus group took place online through the Microsoft Teams application (Microsoft Corporation, Redmond, United States). The interviews with academics took place online via a platform of their choice – this was either Microsoft Teams or Zoom (Zoom Video Communications, Inc., San Jose, United States). Recordings were converted to MP3s and storage and transcriptions were completed in-line with the method used for the students' formative feedback. As per the formative feedback sessions, the audio of each interview was reviewed immediately and written notes were made.

### 3.6.3 Research Participants

The participants in my research consisted of myself as the researcher, students from my EC practical class and academics from within Irish HEIs. The term 'participant' is used to capture the sense of "active involvement" from the students and academics, as well as the "equity" that I tried to build in our relationships (Seidman, 2006, p. 14). Sixteen students from the MSc Strength and Conditioning course volunteered to take part. The purpose of EC module is to provide students with knowledge related to the adaptations to and coaching of various forms of explosive training – an umbrella term for plyometric,

speed and agility exercises. The student participants comprised six female and ten male students.

The second cohort was selected from academics who were concurrently practising within a sport science domain, these are referred to as pracademics from now on. Pracademic, as discussed in chapter 2, is a term used to describe those working in both practice and the associated field of academia; meaning they possess a "deep exposure to both theory and practice [and] are ideally positioned to make singular contributions to both enterprises" (Posner, 2009, p. 15). Five pracademics were asked to take part in semi-structured interviews and to act as a form of critical friend. There were two female and three male pracademic participants. A critical friend is "a detached outsider who assists through asking challenging and uncomfortable questions, provides another viewpoint, and facilitates reappraisal" (Storey & Wang 2017, p. 107). Critical friends are people who can provide encouragement, validation and critical analysis of the data collected and conclusions drawn from that data. Critical friends can therefore provide alternative or supporting interpretations of data. The use of critical friends is encouraged in both self-study (Samaras & Freese, 2006) and action research designs (McNiff, 2002; Foulger, 2010). Critical friends act as a type sounding board – someone to discuss issues with, who will offer their opinion and assist in the critical reflection process. Having colleagues that I can 'bounce ideas off' is an important part of my practice – both in teaching and applied practice. A form of critical friendship was deemed essential to the research design - it was important that this function be carried out by pracademics.

Purposive sampling was used to recruit the pracademic participants. Purposive sampling is "…based on the assumption that the investigator wants to discover, understand, and gain insight and therefore must select a sample from which the most can be learned" (Merriam & Tisdell, 2015 p. 96). Such an approach allows the researcher to select participants based on their "knowledge and experience" of a given topic in addition to their "availability and willingness to participate, and the ability to communicate experiences and opinions in an articulate, expressive, and reflective manner" (Etikan et al., 2016, p. 2). According to Merriam and Tisdell (2015), a sample is one chosen because it represents the average person, setting, or instance of the phenomena of interest. For this reason, the selected sample came from a range of sport science disciplines and academic institutions. Furthermore, the sample of participants must be congruent with the research context (Merriam & Tisdell, 2015) – in my research the practical classes. Pracademic participants were required to have experience of teaching practical classes. I felt that a

purposive sampling approach was appropriate to my research because of the influence my practical knowledge has on my teaching practice. Furthermore, the purposive sampling procedure allowed for the selection of critical friends as outlined in section 3.5.3.

Critical friends are utilized to allow researchers to "gain new perspectives in understanding" and allow for a "reframing of their interpretations" (Samaras, 2011, p. 5). Samaras (2011) further points out that a critical friend is someone who listens to an account of practice and critiques the thinking behind that account. I felt that given their combined sport science teaching and practice experiences, the cohort of pracademics I identified met the criteria to be deemed critical friends. I began with pracademics in my own network who I felt fit these criteria and branched out to others that I was aware of who would fit the criteria. One participant was a lecturer at the same institution where I work. Although literature on critical friendship often refers to colleagues, it is not clear if this refers to colleagues in the same faculty/ institution or colleagues in the same field – this is explored in more detail below. I felt that the colleague from my institution fitted the criteria of a pracademic participant, but others did not. Two faculty colleagues acted the role of critical friends in pilots of the semi-structured interviews which discounted them from the main research study. Of the remaining four pracademic participants, three were previously colleagues in applied sport science environments, and one was someone who I was aware of through recommendations and their scholarship and sport science practice. Together the five pracademics were drawn from a range of sport science disciplines such as biomechanics, sports coaching, sports nutrition and physiology, S&C, and sports psychology. Aside from requiring academics to be concurrently practicing in applied sport science roles, I wanted to ensure that I had a range of experiences to draw upon and a group of people that I felt would be comfortable in offering honest opinions and critiques. This final point was crucial to my selection. I wanted critical friends who I believed would offer honest critiques and I felt the purposive sampling gave me this.

## 3.7 Coding and Analysis

All components of the data set – formative feedback from the students, focus group with the students, interviews with pracademics – were combined. The formative feedback included both transcripts of discussion and the written anonymous feedback provided in weeks 10 and 11. A thematic analysis approach was used to analyse the data set (Braun

& Clarke, 2006; 2013; 2019; 2022). The analysis process sought to locate the data within the wider contexts of sport science practice and academia; to interpret what was being said by participants; theorise the relationship between participants and their field of practice; and make an argument about what I see as good teaching practice within my own setting. By examining the contributions of others, I endeavoured to find out what matters in planning and delivering sport science practical classes.

The process of coding and analysis began with transcriptions, as outlined in section 3.6.2. Braun and Clarke's (2013) 15-point checklist for thematic analysis was used as a guide for this process (see Appendix G for the checklist and my response to each element). The data was transcribed to the highest level of detail possible and final transcripts were checked twice against the original recordings for accuracy. Due to the large, cavernous venue for EC practical classes and the wearing of face coverings, some of the audio was not of sufficient quality in the first student formative feedback session. It should be noted that social distancing rule meant that students could not form a tighter unit. Furthermore, two formative feedback recordings were lost completely due to rain on corrugated roof of the sports hall interfering with audio recordings. Once transcriptions were completed to a satisfactory level, they were uploaded to NVivo qualitative data analysis software (QSR International, Doncaster, Australia).

Within NVivo I coded the transcripts. Ryan (2015, p. 98) states that coding is the "first step in analysis… that is, reading your data and developing a set of categories, themes, or basic organising ideas". I began with line-by-line coding of transcripts. According to Gibbs (2007, p. 57), line-by-line coding means:

> … going through your transcript and naming or coding each line of text, even though the lines may not be complete sentences. The idea is to force analytic thinking whilst keeping you close to the data... One of the advantages of line-by-line coding is that it forces you to pay close attention to what the respondent is actually saying and to construct codes that reflect their experience of the world, not yours or that of any theoretical presupposition you might have.

Performing line-by-line coding was an onerous and cumbersome task but one I felt was possible given the amount of transcription I had, and necessary given my relative inexperience with qualitative research. Additionally, Braun and Clarke (2006; 2022) highlight the need to give adequate time and repeated attention to each data item.

Once coding was completed, codes were collated into relevant themes and sub-themes as outlined in chapter 4. This was one of the most difficult processes of the research for me. Ryan (2015, p. 98) highlights the difficulties in this process and notes that it is not uncommon for novice qualitative researchers to have such issues, but it is an important element as "the act of organising the data into themes is itself a form of analysis, because you are selecting things that you consider important and leaving out others".

Preliminary findings were drawn to up try to make sense of the various codes and themes that I had identified within the data. I then endeavoured to make sense of the data through analysis (Braun & Clarke, 2022). Analysis involved a process of interpreting or making sense of what was said, rather than merely summarising. The organisation of codes stemmed from a broadly constant comparative method approach (Braun & Clarke, 2021). The constant comparative method stems from the work of Glaser and Strauss (1967) on grounded theory and describes the subjective and interpretive organising of excerpts of raw data into groups according to attributes. In other words, it is a strategy whereby elements of data are compared with other elements of data, codes are compared with other codes and categories with other categories (Braun & Clarke, 2021). Analysis took place in an ongoing fashion in keeping with Merriam and Tisdell's (2015 p. 297) advice that "analysis should be conducted *along with* (not after) data collection" [emphasis in original]. As per the description of data sources above, listening to audio recordings allowed for additional reflection so that data collecting, coding and analysis took on a cyclical form, rather than a linear one. Once everything was organised, I used an inductive process in which thematic categories were developed after reviewing the data and my notes. For example, when I looked at how students and academics view sport science as a discipline of practice and academia, I noted a range of concerns such as research bias, the importance of appropriate content and what a job in sport science entails. It was then possible to group these concerns into the 'The Art and Science of Sport Science Practice' theme. This process was repeated for all codes until I had three distinct themes.

## 3.8 Validity and Reliability

### 3.8.1 Researcher Bias

As a researcher I acknowledge that I have carried out my research from an insider's perspective, I have articulated my perspective in previous sections and will now address the issue of bias (Herr & Anderson, 2005; Braun & Clarke, 2022).

As my research is strongly influenced by action research, I draw upon Herr and Anderson (2005, p. 60) who state that "bias and subjectivity are natural and acceptable in action research as long as they are critically examined rather than ignored". In this research I use my own position as a lecturer and as someone who practices sport science to understand the issues raised in the research questions. I must accept that whilst my experiences are a source of understanding, they can also be a source of bias. In highlighting the personal in research, Merrill and West (2009, p. 118) tell us that researchers "subjectivities can be a source of evidence and understanding as well as bias but using them requires thought, self-awareness, and transparency in doing and reporting research". I have tried to be as critically self-reflective as possible with my research. I have kept notes throughout. I have sought feedback from numerous sources and have been open and transparent in my methodology. Therefore, despite my research being completed in a largely self-study fashion, I have been able to develop rich insights into my own practice thanks to the inputs of others.

### 3.8.2 Validity, Reliability and Study Rigour

As previously stated, my research is an examination of my own teaching practice, how it is influenced by others and its potential to influence others. Being a pracademic in sport science is part of my identity, so I am influenced by the dominant constructs of the field – the site ontology of sport science (Schatzki, 2002). Sport science graduates have been shown to be strongly influenced by positivist thinking on research (Olivier & Fishwick, 2003; Koca & Hünük, 2018). Within the sport science research paradigm, the dominant practice ideology is also positivist (Petrovic et al., 2017). Central to this ideology is "producing statistically significant results to help fit the outcome into a predetermined theory" (Bernards et al., 2017, p.87). Coming from this position a quantitative approach to my research may have seemed a better fit. However, I was drawn to the richness of qualitative research and the ability to gain insight into how systems, structures and people work. Merriam and Tisdell (2015) emphasise the importance of a qualitative research approach when aiming to interpret experiences and what meaning is attributed to those

experiences. I sought to capture the knowledge required and held by my students and I wish to construct a greater understanding of my experience and the experiences of others I relate to. A qualitative approach best fits with this proposal.

Although a positivist approach and emphasis on appropriate *p*-values dominates sport science research, it does not necessarily dominate the development of sport science practice. Most sport science conferences will include a mix of traditional positivist-research focused presentations and - as outlined in chapter 1 - what would be described in sociological paradigms as case studies or ethnographic research. Creswell (2013, p. 68) tells us that ethnography is a "design in which the researcher describes and interprets… most often through participant observation in which the researcher is immersed in the day-to-day lives of the people…". This, to me, describes succinctly how applied sport science practitioners present case studies at sport science conferences. There is an acknowledgement that the coach is part of the process of developing the athlete, that the coach-athlete relationship is generally quite close and that there is a degree of interpretivism to their analysis (Nash & Collins, 2006).

Being at the centre of research about myself inevitably asks questions about my scholarly rigour, as is reflected in criticisms of self-study and action research methodologies above. Triangulation was the primary strategy in answering such questions. Triangulation "is a powerful strategy for increasing the credibility or interval validity" of research (Merriam & Tisdell, 2015, p. 245). Furthermore, Quinn Patton (2015, p. 674) argues that triangulation "increases credibility and quality" and is a method for counteracting "a single investigator's blinders". More precisely, my research utilized a combination of data and methodological triangulation. Data triangulation was formed by the different sources of information such as students, pracademics and I (Merriam & Tisdell, 2015). Methodological triangulation involved the mixed methods approach to data collection such as focus groups, semi-structured interviews, and my own observations (Merriam & Tisdell, 2015). Furthermore, the students interpretation of the ABL approach, as outlined in the next chapter, offers a direct form of validity to my teaching practice. These methods were used to support findings and to ensure that I had fully examined my own practice.

Herr and Anderson (2005, pp. 67-68) offer five validity criteria that are linked to the goals of action research-based studies – see Table 3.1. These criteria are based on what Herr and Anderson (2005, p. 67) describe as the goals that "most traditions of action research agree on".

**Table 3.1:** Goals of Action Research and Validity

| Goals of Action Research | Quality/ Validity Criteria |
|---|---|
| 1) The generation of new knowledge | Dialogic and process validity |
| 2) The achievement of action-oriented outcomes | Outcome validity |
| 3) The education of both researcher and participants | Catalytic validity |
| 4) Results that are relevant to the local setting | Democratic validity |
| 5) A sound and appropriate research methodology | Process validity |

*Note* . Adapted from Herr and Anderson, 2005 (p. 68)

For dialogic and process validity, I relied on the weekly formative feedback of my students, and fortnightly DHAE discussions. This allowed for developments in my practice and research through conversations with others. Regarding outcome validity, I focused on the ongoing reframing of problems which has led to a series of iterative conclusions that characterise the process of self-study and action research – these are outlined in later chapters. Conclusions, or outcomes, include a better understanding of my teaching practice, a better understanding of how my practice fits into the wider field of sport science. For catalytic validity, I have utilized a methodology that has led to evolutions of my practice in areas such as epistemology, framing education and understanding authentic site-based research. Similarly, for democratic validity, I conversed with my own students and pracademics from various contexts who could inform my teaching practice. For process validity, I have employed continual cycles of improvement which is congruent with my own social-constructivist position.

## 3.9 Ethical Considerations

The student participants were be asked to complete their EC module with the aid of technology through an ABL approach. The participants were also be asked to reflect on how they interacted with and experienced the use of video content as part of the EC practical classes. This approach was in keeping with my normal teaching practice.

Permission was sought and granted from the head of department at the institution to ask students to take part in this research. A written plain language statement and informal verbal overview of the project familiarised the students with the aims and objectives of the project. Informed consent was received prior to commencement from all student participants. Students were further afforded the opportunity to review their consent prior to and after the end of the EC practical classes, and prior to and after the student focus group took place. Participants were afforded the opportunity to review transcripts of the group discussions and were free to amend or redact as they saw fit. A copy of the participant information and informed consent form are available in Appendices A, and B.

The pracademics were asked to critique my pedagogy and preliminary findings and to discuss their thoughts on the interplay between the notions of art of practice and the teaching sport science practical classes. Pracademics were sent a written plain language statement outlining the aims and objectives of my research and verbally agreed to take part. Informed consent was received prior to commencement from all pracademic participants. Indicative questions I asked during these discussions is available in Appendix H.

The primary ethical concern of my research was my role as lecturer to the student participants, whilst also being the principal investigator. As the students' lecturer, I was in a position of power brought about by my status. This meant that I was assigning and administering content as well as setting and grading examinations. As a researcher I was requesting that participants share their experience of the content and its delivery. There was a conflict of interest here as students could have felt pressure to give the responses they believed were expected, rather than authentic responses. In addressing potential power imbalances during data collection, Creswell (2013) advises discussing the purpose of the study and how the data will be used; avoiding leading questions; withholding sharing personal impressions and avoiding disclosing sensitive information. These recommendations were implemented. Komesaroff (2008) speaks of micro ethics in which everyday ethics in practice - such as power dynamics in a classroom - are considered, as opposed to classic morally debated ethical issues – for example, the moral question of euthanasia. I continually returned to the micro ethics of my research to ensure I attended to the complex dynamic of an academic conducting research with their own students as participants (Komesaroff, 2008). This focus provided a lens through which to view and reflect upon the ongoing power dynamics on an ongoing basis. Foucault describes power as being everywhere – it is spread throughout our lives and embodied in discourse,

knowledge and ‘regimes of truth’ (Foucault, 2020). Power cannot be escaped or eliminated; it can merely be distributed more equally. Power relationships flow both ways and influence research, both in the production of the ‘product’ (participant power) and the ‘final product’ (researcher power) (Thapar-Bjorket & Henry, 2007). Whilst the delivery of the module was largely in keeping with normal teaching practice, this power dynamic still had to be considered. Following the MU Conflict of Interest Policy advice (National University of Ireland, Maynooth, 2011) a four-step approach was taken to mitigate the potential power imbalance.

Step 1) The potential conflict of interest, potential repercussions and impact upon the lecturer-student relationship were to be disclosed in writing to all potential participants via the plain language statement (Appendix B).

Step 2) The conflict of interest lay in the students being asked to participate in research that had no obvious initial benefit to them, and they may have felt that by not agreeing to participate they could suffer repercussions. This was mitigated by clearly outlining the opt-in and opt-out procedures – participants were directed to opt-in if happy to take part and were free to opt-out at any time without explanation or fear of recourse. Furthermore, it was made clear in the information session that participants were not being assessed through their reflections; they were being asked to give their views so that I might reflect on my teaching.

Step 3) Participants had the option of contacting the Head of Department or their class tutor in strictest confidence if they felt their learning experience was being negatively impacted.

Step 4) A second member of faculty acted as a second marker in all written assessments. Practical assessments were videoed and made available to the external examiner to ensure fairness in the assessment process. All assessments were completed, and results distributed before the student participants gave their summative experience of the process.

At all times efforts were made to maintain the usual lecturer-student relationship. The planned method was my teaching practice. The addition of documenting it was the only difference. Participants were kept anonymous throughout the documentation process and were free to withdraw their contributions at any time up to publication of the research. Student participants were repeatedly reminded that they may drop out of the research without explanation and without fear of repercussions or negative implications on their

learning or grades. This was made clear, in writing (Appendix B), at the beginning of the process and reiterated at regular intervals throughout.

Ethical approval was sought and granted from the Research Ethics Committee at my employing institute and the MU Social Research Ethics Subcommittee (Appendices C and D).

## 3.9 Summary

The research questions explored in this doctoral thesis concern the micro and the macro of my teaching practice. The macro contexts include my understanding of the wider field of sport science and the micro contexts focus on my position as an educator and researcher. Having outlined much of the micro and macro contexts of my research in previous chapters, this methodology chapter turns the focus to my own position as a researcher and how I wish to explore my practice. Primarily I have taken a qualitative approach to this enquiry as I acknowledge myself as an active and analytical participant in my research and a qualitative orientation allows me to explore the nuances of my practice and, in particular, embrace the range of knowledge that I am required to foster when teaching the EC practical class.

Using a practice theory informed conceptual framework, I have taken elements of self-study action research design, both underpinned by reflective practice, to examine my teaching of a group of postgraduate sport science students. The combination of the research design influences allows me to examine my teaching practice in an ongoing and recursive manner. Specifically, my teaching practice incorporated an ABL approach to lesson planning, delivery, and reflection. This approach was specifically designed to capture some of the multiple ways of knowing among students. Having sought formative and summative student feedback throughout the process, I then engaged with other pracademics to further interrogate my teaching practice and gain a better understanding of how others with backgrounds conduct and interpret their own teaching.

Chapter 4 offers an outline of the findings of my research through key themes derived from my interactions with the student and pracademic participants.

# Chapter 4 - Findings

## 4.1 Introduction

This chapter draws from three components of my fieldwork. In the previous chapter, I have positioned my research as a self-study project that utilizes principles of action research with a strong emphasis on critical self-reflection. My self-study research has been developed through the lens of practice theory, and in particular the influence of my site (Schatzki, 2002) on my teaching practice. This methodology has been designed as way of documenting reflections of my own practice with a view to understanding it better and improving it. This findings chapter is a broad overview of the key themes generated from my discussions with others. The dataset is derived from the formative feedback and focus group sessions with students, and the interviews with the pracademic participants. Datasets were coded into three main, but overlapping, themes: 'Knowledge and Critical Thinking'; 'The Art and Science of Sport Science Practice'; and 'Reflections on the ABL approach'. Each theme contains sub-themes which were derived from focusing on the central characteristics of the themes – see Table 4.1. The theme entitled 'Knowledge and Critical Thinking' is concerned with my own epistemology, how I wish to facilitate multiple types of knowledge and how this understanding of knowledge informed this pedagogical approach. The 'Art and Science of Applied Sport Science Practice' reflects what I see as the dominant discourses in the sport science community. 'Reflections on the ABL approach' was generated from my interpretation of how the students found the ABL approach and how my fellow pracademics employ similar approaches to their academic roles. The same codebook was utilized across both the student and pracademic datasets meaning the same themes were evident across both.

**Table 4.1:** Themes, their characteristics and associated sub-themes

| Theme | Characteristics | Sub-themes |
|---|---|---|
| Knowledge and Critical Thinking | A focus on my epistemology - how I wish to facilitate multiple types of knowledge; and how my understanding of knowledge and multiple ways of knowing informs my pedagogy. | Co-constructing the transfer of knowledge<br>Developing critical and analytical thinking<br>Encouraging learning<br>Making sense of complexity |
| The Art and Science of Sport Science Practice | Dominant discourses in the sport science - what is sport science as both a field of academia and a field of practice; how do these distinctions influence and interact with each other; and what is important to become a successful practitioner? | It is not handled in the handbook<br>Pracademic experience<br>Preparing for sport science roles |
| Reflections on the ABL approach | My interpretation of how the students interacted with my pedagogy and how the approaches of other pracademics compare. | Why implement an ABL approach?<br>Appropriate ABL<br>Complexity of ABL content<br>Familiarity with ABL<br>Practical classes feedback |

As referenced in chapter 1, this process of interrogating my teaching practice reflects my sport science practice. As a sport scientist/ S&C coach I am required to design training programmes that are prescriptive yet malleable. I am in constant communication with others about the programmes and how they can be more effective. Formative and summative feedback is therefore an important part of this process. Often the lessons I take from feedback generate new inquiries and I discuss this with other coaching and support staff and my sport science peers. For example, we might have a prevalent injury among the squad during a season, such as a hamstring strain. In-season there is constant communication with players on the importance of completing their mobility and strength work. We also ensure that players achieve exposure to a set threshold of high-speed running each week. This is measured objectively but communicated to the players subjectively. Sometimes extraneous factors impact on their physical performance. The data collection process of my self-study research has followed much the same process for similar reasons – to improve the effectiveness of my practice. Additionally, I hope that in recording my teaching practice and documenting its influences, I can assist fellow sport science educators in examining their own. Within the literature there is evidence to support ongoing, formative communication with athletes through effective learning environments (for example, Nash et al., 2011). From this perspective it is important to outline what the participants in the research said and how this aligns with my own position. Previously, in chapters 1 and 2, it has been argued that whilst there is interrogation into the teaching of sport science, there is a lack of students' perspectives on creating effective learning environments, and criticisms of both applied practices in the field and academic research have been laid out (for example, Reade et al., 2008; Finch, 2011; Martindale & Nash, 2013; Fullagar et al., 2019b; Bartlett & Drust; 2020; Woods & Davids, 2022). Through documenting the main themes of my discussions with others, I hope to give voice to sport science students and academics and develop their contribution to the body of knowledge. I also hope to develop answers to the questions in chapter 1 that anchor my research – how can I incorporate applied sport science practices into practical sport science classes in order to facilitate an effective student learning environment; and how can I use practical class content to enable students to engage in theoretically informed self-reflective practice?

The focus of this research is on my own teaching practice, and I have included quotations that provided clear insight or cause for further reflection in support of the themes and sub-themes derived from the dataset. Quotations are accompanied by pseudonyms and role

[student or pracademic]. If the quote comes from the anonymous feedback forms in weeks 10 and 11 of Phase Two (Figure 3.3), this is noted as '[anonymous, student]'. I have lightly edited some of what was said for brevity and clarity - for instance, one student did not have English as a first language; these edits are denoted with "…". Spelling and grammatical errors in the dataset have been corrected to improve the readability and comprehension of quotations. At times words have been added to clarify my interpretation of what was meant by the speaker; these additions are denoted in "[ ]". Where elements overlapped between two or more themes or subthemes, I have made a subjective decision on where it is most appropriate, given the characteristics of each theme (Table 4.1).

I now present my analysis of my interactions with students and pracademics and reflect on the key themes that were generated. In doing so, I draw on the experiences of my peers and I, and the students' experiences of the practical classes to try to understand my practice and the learning environment I facilitated.

## 4.2 Theme 1: Knowledge and Critical Thinking

> Absorb what is useful. Reject what is useless. Add what is essentially your own.
>
> - Bruce Lee (1975)

Sections coded under Knowledge and Critical Thinking relate to some of the key pedagogical concerns of my teaching. I have always understood my teaching role to have a dual mandate – to assist students in meeting the learning outcomes whilst also setting them up for future learning (Dewey, 1903; 1910). To my mind these are not separate but intertwined. The focus in this first theme reflects this thinking. I am looking for the key elements of what I am trying to achieve in my teaching and have centred this theme around questions such as 'what is important to these sport science students and why is it important?'; 'what is my position as an educator?'; and 'how can I prepare these students for lifelong learning as applied practitioners?'. Identification of these codes were driven by what I perceive to be important in teaching and learning, what I perceive to be important in sport science as a professional practice and concerns around graduate expectations – this is part of the reason why I felt it important to outline how I see the field in chapter 2. The sub-themes that I identified were:

1. Co-constructing the transfer of knowledge

2. Developing critical and analytical thinking skills

3. Encouraging learning

4. Making sense of complexity

These sub-themes may appear generalisable to any academic field or pedagogical approach but in the context of my research they have been generated through the lens of my practice with my students.

Themes and sub-themes were inevitably driven by both the dominant discourses in sport science education and applied practice and the key issues that were found within the dataset. Some sub-themes are potentially predictable – for example, developing critical and analytical thinking skills long been claimed as a key component of instruction and assessment in HEIs (Facione, 1990), and this is particularly so on MSc level courses – but these are notable due to the importance the student participants placed on them. Others developed as I engaged with the datasets and were more surprising – for example, the importance students place on practical classes to scaffold and layer upon their theoretical knowledge.

### 4.2.1 Co-constructing the transfer of knowledge

There is a clear focus on how the co-construction of knowledge develops in the practical class setting and how this co-construction is valued by students and pracademics. Co-construction of knowledge was a strong theme throughout the dataset. Initially I had two separate themes 'Co-constructing knowledge' and 'Knowledge transfer'. However, further interrogation highlighted a symbiotic relationship between the two.

I value practical classes as spaces where I can share my own practical experiences with students to improve the group's understanding. In these spaces I teach students in a variety of manners to reinforce theoretical knowledge in a practical manner through instruction and demonstration, and articulation of my experiences as an applied sport science practitioner. This was a view shared by all of the pracademics – for example, "I suppose I feel like we're teaching students principles, but we're also giving them the benefit of our experience as well," [Mary, pracademic]. Practical classes also provide a space to contextualise theory and "link it to [what] students are actually trying to do," [Margaret, pracademic] when they move into practice. I can encourage a collaborative space by sharing my experience, but I can also do this by having students draw on their own personal sporting experiences with an understanding that this experience "provides them

with a lot of their insight and if they're thinking of theory, their contexts straight away goes to whatever sport they participate in," [Jack, pracademic]. In opening up a space for sharing, the practical class becomes a site for the co-construction of knowledge, and this is acknowledged by the students who appreciated gaining "insight into how each other thinks about the same topic," [anonymous, student]. This collaboration helps to advance an individual's knowledge base through "a greater spread of ideas on a topic which leads to a more global understanding," [anonymous, student]. The group discussions also fostered a sense of safety and belonging in the group. This was evident throughout all of our discussions in Phase Two:

> I suppose as well, it might put you at ease maybe a bit as well about - God, you're struggling with something that everyone is at it and it's like, uh, it's actually that's a good thing…, I'm not just way behind everyone… and I suppose it's a good way to... kind of communicate with people in the group. Do you know if you say something out loud, there might be someone in the group who has experience of it, or had done it before and they can bring their experience and you kind of allow for that, but when we all write it down [in class and do not discuss] and no one's communicating it - it takes that that part away? [Niall, student]

Co-construction of knowledge was a key component of the pedagogical approach that I took and in a sense an aim of the practical classes. I was aware of this at the time but how it specifically occurred was not understood until I undertook the analysis of the findings. This is laid out in more detail in sections 5.2, 5.3 and 5.4 of chapter 5. The knowledge that I was trying to co-construct was centred around the module learning outcomes, and the dataset supports this approach from both the student perspective and the experience of fellow pracademics.

A second, and complimentary benefit of a co-constructive space is developing students understanding of co-creating knowledge. Twelve of the 16 students made comments that showed they understood that future roles would require them to create collaborative spaces. At no stage did the other four students contradict this view. In articulating this view, participants identified one of the key tenets of the ABL approach – to actively discuss the content. As applied practitioners they could also use video and "talk over it - say if the athlete was doing the movement you could talk over it and summarise it and then talk after it [because] that reviewing element of it is most beneficial," [Philip, student]. The collaborative process helps develop a student's creativity as it "gives ideas

[students] can use to coach athletes," [anonymous, student]. Students often picked up elements within the videos which were secondary to the primary focus of the lesson and remarked that "watching coaches cue their athletes and go through the coaching points is very helpful and educational," [anonymous, student]. By having a variety of inputs such as lecture slides, practical notes, blended learning content and discussions, students are provided with a range of "ideas, techniques, exercises that can be used for the specific topic we [students] are covering," [anonymous, student]. This is an example of student support for the development of declarative, explicit, and procedural knowledge or the "ideas, techniques, exercises," as referred to in anonymous student feedback. The formative feedback discussions at the end of each class helped facilitate this knowledge development, as Tom [student] noted:

> I think the kind of the discussion at the end of the practical kind of helped me in that sense, that kind of the main points were kind of noted and it kind of reminded me of the kind of main points of what went on in each of the practicals.

Students recognise the need for different types of knowledge in their applied practice and practical classes gave them a space to explore these. In attempting to create a co-constructive space in my practice, I may well be developing the students' creativity for their practice.

Within practical classes there is a fusion of explicit, tacit, declarative, and procedural knowledge. This fusion of knowledge is evident in literature on practice in general (de Jong & Ferguson-Hessler, 1996) and sport scientists practitioners in particular (Dorgo, 2009). Among my objectives is to develop my practical class as a space to explore different types of knowledge. Findings show that all of the students acknowledge this and eight of the 16 referred specifically to the linking of practical class and lecture content as "a way of reaffirming… the theory," [John, student] and believed they are "a good way to… reinforce what [they] were doing in the class," [Niall, student] and "put the theory into practice," [Hugh, student]. The practical classes I teach are either preceded by or begin with some theory on the day's topic. Students will then build on this theory by learning how to execute and analyse the movements. Finally, there is an opportunity to coach a peer in the movements. Students see this translation of theory into practice as being an important part of their own learning where they "learn it [theory] and then go on to actually do it and coach it," [Niall, student] – this aligns with a 'see it, do it, teach it' model of practical skill development (Kotsis & Chung, 2013). To the student this process

of learning, participating and instructing gives a sense "of completion of the circle of the whole process," [Hugh, student]. All five of the pracademic participants that I spoke to share this point of view - practical classes are viewed as a space to link "whatever they [students] do in class that week… into that context in a practical setting to try and translate… whatever theory we're covering in a practical context," [Jack, pracademic].

### 4.2.2 Developing critical and analytical thinking skills

All student participants recognized a need to critique the decisions they will make in practice. Due to the complex and hyperdynamic nature of sports performance environments, no one approach, or training plan will be appropriate in every context (Collins et al., 2022). Practitioners must be critical and analytical of their own practice. This is something I speak about consistently in all classes, the idea that students need to think for themselves rather than simply copy others. For example, the internet is awash with training programmes, but these do not account for the nuances of real-world training. I believe practical classes are spaces to develop this way of thinking and the dataset appears to indicate that students are of the same opinion. Having "a rationale for the exercise selection," [John, student] is a key learning that students took from the practical classes. There was a strong sense among the student participants that the exploration of theory and practice in the practical classes was beneficial – "I suppose it [the practical class] was a way of reaffirming as well the theory we were doing, d'you know, in class," [David, student]. The ABL approach was designed to encourage more critical thinking with students being asked interrogate content and in this this was borne out in feedback from students – "helped to find more quality videos as there was a lot of bullshit ones and gave links as to who is actually worth following," [anonymous, student]. Here I can see students questioning what is important and what is not. They are thinking critically about educational content and this feedback could be used to inform future pedagogy.

The students' critical thinking through formative feedback then fed into what the following week's ABL content should include. Feedback on this was interesting as it highlighted to me that there was not one format or type of content that students found more beneficial than others. This surprised me as I assumed that video instructions by experts in the field would be most valuable, a view that was shared by four of the five pracademic participants. However, all students said that a range of videos – either in their own search or in what peers presented – was actually of most importance as "giving different ideas and not just using/ seeing the normal ones," [anonymous, student] caused them to think critically.

Students acknowledged the complexity of sport science practice and that ABL content assists them in critiquing topics – it gives them a reference point to work from whereby they can view "the video of the technical model that they're doing right… and come in here [to practical classes] then you kind of have that to compare against when you're watching," [Paul, student]. For example, it is difficult to analyse the technique of an athlete when they move at speeds of up to 10 meters per second. Video allows students to pause, slow-down and replay movement – "if you've the video… it's probably a big benefit… because you can look back on what you did, like, and slow it down," [David, student]. This extract from a student highlights the deep thinking required to analyse movement and an acceptance that when we watch with the naked eye, we might miss key aspects. Ten of the sixteen students spoke about this aspect during the semester, their insight being summed by this quote from John [student]:

> Obviously globally you're looking at the whole thing, but you want to make sense of what's going then overall. I suppose you're going joint-by-joint and see what is the problem [sic]? Sometimes it gets a bit confusing looking at the whole thing.

One pracademic summed up the value of developing practical thinking skills when they observed that students want to graduate and "become nutritionists, psychologists, sports scientists, physiologists… [and practical classes help develop key] skills around observing, collecting data, simplifying it, feeding back in an appropriate way…" [Bill, pracademics] – it is much more than take a body of evidence and plugging it into a gap.

### 4.2.3 Encouraging learning

A practical class in sport science offers a more encouraging learning environment than lecture theatres. In practical classes there is room to move around, equipment to interact with and students are not hemmed in by rows of desks and chairs that only face forward. The EC practical classes took place in a large sports hall with training equipment such as mats, hurdles, plyometric boxes, and medicine balls all available. These are considered tools of the trade for the participating students. Placing students in this environment is akin to putting a group of soccer players on a soccer pitch with a ball but no instructions – eventually they will start playing with it. Similarly, the students could take equipment during the EC class and experiment with it. Students said that a more open, collaborative environment encourages them "to go and research stuff," [Hugh, student]. The students highlighted the importance of becoming familiar with the topic before coming to class and how this helped them to explore learning more when they came to class.

Pracademics similarly see practical classes as spaces where a more explorative learning environment can flourish. Without the confines of a lecture stage and passive audience, lecturers are able to open up their pedagogical approach to reflect that of free-play learning (Wood, 2009). This is something that all pracademics discussed. The following quote highlights the need to facilitate the development of a range of knowledge and skills without being too prescriptive:

> you're facilitating... You're not telling them everything. You're not saying this much you have to do this much about you know, and being really, really prescriptive, you're trying to teach them... facilitate them learning the skills so that they can implement them [Mary, pracademic].

This pracademic understanding of practical classes as sites of learning extends to practical assessment strategies and this challenged my teaching practice. Pracademics highlighted the importance of assessment for encouraging learning and value "an effective assessment [which] is such an important role of a lecturer in a subject that becomes practical…" [Bill, pracademic]. This challenges my evaluation of knowledge in the EC module, which mimics the UKSCA's professional S&C accreditation format. The objective of such an approach is to prepare students for professional accreditation if they wish to pursue them – UKSCA accreditation would be considered essential for any S&C roles in the UK. I believe that if I want to encourage a lifelong passion for development then my assessments are an area of development. I am comfortable with using practical class environments to facilitate rather than prescribe learning, but I have found, from my research, that this must also extend to my assessment.

### 4.2.4 Making sense of complexity

The complexity and nuances of humans and their movements present a range of dilemmas for sport science practitioners and researchers (Maguire, 2011; Collins et al., 2022). Students can learn theory and understand some of the mechanics of human movements, but no educational programme will ever have the capacity to explore the vast range of issues and how they interact with each other. Therefore, learning should continue infinitely in practitioner roles. To help students in this regard, it is important to provide space for students to develop their own thinking toolbox. Video resources are beneficial in developing these skills as they allow students to compartmentalise what they are seeing and "really focus in on the information being presented" [anonymous, student].

In our discussions none of the students explicitly named this development of their sense-making capabilities but in discussion on the content of the videos it was evident:

> It's their posture then as well. So, if they're leaning forward, they should be kind of in an acceleration phase, so leaning forward trying to hit max velocity – you can see it like, straight away [in slow-motion video]. Just angles then as well so if the knee comes through at a certain height [Philip, student].

This quote demonstrates the type of global and specific analysis that sport science practitioners need to employ. The student is looking at the whole-body task of sprinting and what the athletes overall posture tells them about the efficacy of execution whilst also analysing specific single joint angles.

The importance of developing this kind of thinking supports the use of an ABL approach to practical classes as it encourages sense-making discussions. Furthermore, students will need to be able to communicate what they have synthesised to stakeholders who do not necessarily need to know the underlying theory. There is an acknowledgement from the pracademics that practical classes are spaces where they can "also develop emotional intelligence… to be able to kind of understand certain things… and some of them are good at that anyway, but some of them are lacking," in the ability to simplify and communicate information to athletes [Margaret, pracademic]. Students "may have all the terminology and they may have all the" theoretical "knowledge" but "where they're not good" is "the actual soft... the kind of coaching skills. The communications and how to impart feedback, how to listen to somebody," [Margaret, pracademic]. An exclusively theoretical approach is "probably something we," as sport science lecturers have "probably overprescribed because we have knowledge," that is superior to the students so "we rate and… rank…" it as being more important [Jack, pracademic]. Using a "more blended approach," where lecturers "actually… kind of flip things a little bit more," to focus on the students' knowledge and "how to get them more involved in certain things and to be more gradual in how we do certain things," [Jack, pracademic] is likely to be more beneficial to our practice – this was something that all the pracademics spoke about.

## 4.3 Theme 2: The Art and Science of Sport Science Practice

> We teach people about science, we teach people about technology, and we teach people about program design, but we're not teaching people how to coach. This is a fundamental flaw in the way we develop movement professionals
>
> - Winkelman (2019)

The sections of the dataset that were coded with the theme The Art and Science of Sport Science Practice relate to a dominant discourse within the sport science community on

the role of the sport scientist. The quote from Winkelman (2019) demonstrates a common criticism within the ongoing formal discussion on the art or science of sport science practice. It is important at this stage to reiterate the power of this discourse. As discussed previously, applied sport scientists are practitioners who endeavour to improve a person's athletic performance. A knowledge of the underlying biological science is important but how that understanding is filtered and understood in specific contexts is crucial to effective practice (Maguire, 2011; Balagué et al., 2016; Bartlett & Drust, 2020; Collins et al., 2022). As argued in chapter 2, sport science is a discipline that is seen to largely follow a biomedical model with positivist research methods having a dominant position in the field (Olivier & Fishwick, 2003; Hristovski et al., 2016; Schneider, 2016; Koca & Hünük, 2018). This emphasis on such evidence-based practice prevails despite criticisms of this model (Ross et al., 2018). In my experience, and in the experience of all pracademic participants, emphasis in academic terms is placed on findings of the traditional hypothesise, predict, test model. However, in practical terms applied sport science is a much more qualitative endeavour that requires artistry of implementation, as discussed by Woods and Davids (2022). The dataset also supports the view that sport science has an issue with identity – the art or science debate as previously discussed in chapter 2. I will now explore the sub-themes of 'It is not handled in the handbook', 'Pracademic experience' and 'Preparing for sport science roles'.

### 4.3.1 It is not handled in the handbook

The scientific method posits an algorithmic approach - a step-by-step procedure to find an answer to a set problem following an exact number of steps. So long as the data punched into the algorithm is the same, the results are predictable and reproducible. In contrast a heuristic method is a rule of thumb or an educated guess which can guide decision making. By tying itself to a particular positivistic scientific method from a research point of view, sport science has presented itself as providing algorithmic thinking when practitioners require a more heuristic method of inquiry (Raab & Gigerenzer, 2015; Collins et al., 2022).

A common reflection from both students and pracademics during discussions about sport science was akin to saying "not all things in the real world can be done by the book" [Philip, student]. All pracademic participants referred to this topic, though not explicitly. Margaret, [pracademic] gave the clearest articulation. We have textbooks on any number of narrow topics but how we combine them in the real world is not easily defined "because the way we communicate now with athletes and coaches is not handled in the handbook,

or it's not handled in a hand-out," [Margaret, pracademic]. Furthermore, Margaret [pracademic] spoke about the primacy of research in sport science academia and how this does not reflect real world needs - "there's definitely been a real shift to kind of… to make things very research driven, and that I suppose in academia practical skills aren't appreciated as much," [Margaret, pracademic]. All participants understand practical classes as spaces where they can "kind of go through what happens in a real-life situation as opposed to just textbook," [Philip, student]. These observations show that students and their lecturers agree on the need to contextualise sport science knowledge in a real-world context. As previously mentioned, the venues for practical classes generally mirror those that are found in applied practice settings – for example, gyms, weight rooms, sports halls and playing pitches. Therefore, practical classes are likely to be the most appropriate site for such developments given their similarity to the 'real world'.

Students accept that they need to understand concepts and methods but that they will be required to be fluid in their interpretation and implementation of these in practice. This feeling of needing to be agile in applied practice is not limited to the application of scientifically proven methods but also in the limits that real world scenarios can place on practitioners. Often educational institutes will be well equipped in terms of sport science paraphernalia, but students said that access to such equipment is not always reflective of what they will face in practice:

> because whoever you are training, not every club has access to all this scientific stuff, like, so, it's very much the hands-on stuff that you would be doing with these lads... [sport science] is very practical [Hugh, student].

This is particularly interesting given the discussion in chapter 2 about the emphasis that is place on research outputs by universities and, by extension, academics. In my experience equipment procurement often follows research demands from faculty and the use of equipment as teaching aids is often secondary. This model is being challenged by the students that I spoke to in their emphasis on developing skills that could be applied in situations with limited equipment. The use of videos, such as those in the ABL approach, may be beneficial in this regard as they "explained the theory whole also applying it practically with examples," [anonymous, student]. Video content allows students to see a greater range of equipment being utilized in sport specific contexts, rather than in laboratory-style settings.

There are no handbooks for every situation sport science practitioners will find themselves in, there are books and robust sets of research on specific topics – but

practitioners cannot rely on this alone, “they have to draw upon their science and their knowledge to support why they did a certain thing,” [Bill, pracademic]. This supports the idea that pracademics are aware of the need to contextualise information and to help students develop their own heuristic methods. Sport science education programmes can be seen as foundational in developing this kind of thinking.

I hold a view when looking at sport science that art and science should be considered as complimentary. One cannot be seen without the other. I believe a positivist-scientific method dominates sport science academia and the fellow pracademics I spoke with agree. The focus is on being “reductionist in a lot of ways or an expert in a specific area,” [Jack, pracademic]. In practice the pracademics I spoke to, and I share this experience, find that:

> working with sports scientists, they’re very academic, but [can they] apply the knowledge? So, they have quite good declarative knowledge, yet their skill as a practitioner is far more based on their interpersonal skills, etc. and how they can apply it, simplify thing [Bill, pracademic].

Pracademics are aware, possibly more-so than anyone else, of the importance of knowing and understanding the science behind what they research and what they teach. My experience is that there is an appreciation for how that knowledge needs to be fostered in students who in turn translate to athletes. As pracademics we understand that it is not simply a matter of teaching facts and methods, rather we must work at blending their knowledge with their ability to convey that knowledge – “enlightening them around an area,” [Bill, pracademic].

> Knowledge... is making better decisions and having a blend of both [science and art] ... but in the same breath, you know that practitioner who doesn't have science and that scientist who doesn't have practice - I think they're at the polar end[s] of the scale and [lecturers need to bring them] ... from the naive to sophisticated [Bob, pracademic].

This ability to blend both components needs to be fostered in programmes of study and not merely left up to post-graduate scenarios. This is something that was expressed by all pracademic participants and summed up by Bob [pracademic]:

> On the flip side, the practitioner who's got all that art [practice]… is also not [as] effective [as they could be]… I think having a blend of both... you know that practitioner who doesn't have science and that scientist who doesn't have practice… [will both be limited in their effectiveness] there’s a lovely balance of art and science… You need the science; you need the art [of practice].

### 4.3.2 Pracademic experience

As discussed in chapter 3, all of the lecturers I interviewed were pracademics – people who work in applied practice whilst concurrently teaching the subject at third level (Posner, 2009; McDonald & Mooney, 2011). I would describe myself as a pracademic as I work with a sports team in addition to my teaching role. Pracademics sees this dual role as a strength of both the practice and academic work, with one complementing the other. One pracademic summed up this blending of roles to formulate an overall philosophy of practice, which straddles both roles:

> I would really consider... I would describe myself as a practising academic, a pracademic, completely - like it that would fit into my whole teaching philosophy. It's informed... it informs me in my practice in that when I read something... I can see something sometimes... when I'm standing in a dress from with a coach and I going OK, this is what's happening here. This is literally this theory unfolding in front of me… that kind of thing, but it also allows me to bring back that experience to the classroom to the student and explain it in real life Irish terms, which might be about the hurling coach, not the ice-skating figure that's in the American book that is your textbook or something like that. So, it's giving a real kind of a cultural… make it culturally appropriate and also bring it to life for students in a very meaningful, meaningful way [Margaret, pracademic].

Bill [pracademic] acknowledged the apathy that students show towards some of the more traditional science subjects such as physics, chemistry, and biology. These subjects are key foundations for subsequent, more applied practice-specific modules such as biomechanics, nutrition, and physiology but firstly students do not see this link when they are in them and secondly, the pracademics who deliver them, whilst undoubtedly excellent at their jobs, often will not have backgrounds in sport science. This was not something that the other pracademics spoke about, but it is noteworthy given Bill's [pracademic] position within his faculty. Bill's [pracademic] role as programme chairperson has been informed by his understanding of the program, his students and the working world that awaits these students. He spoke about altering the structure to develop sport science specific learning earlier in the program, to engage students more and to develop the theory-practice link sooner. This demonstrates that pracademics understand some of the issues with sport science programme constructs and work towards resolving them. This work, when viewed through the lens of them identifying as pracademics, can

be seen as being informed by their applied practical experiences.

> …what I've tried to do is the programme chair is move some of the practical modules earlier in the year… so we've changed the sociology of sport module in first year we moved that to 2nd year and put performance analysis in first year so they actually get some experience of doing something that is rather than just physics, chemistry, you know… and our other problem is that often those are taught by non-sports scientists or you know [not Department of] Health and Human performance people. They're taught by pure physicists… so yeah, so they talk probably in a very different way [Bill, pracademic].

For all five of the pracademics there was an awareness of the underlying scientific principles and the importance of understanding these is coupled with an appreciation of the nuances presented by the real world. This allows for rich research but also highlights why practical classes are an important component of sport science programmes. Art and science; theory and practice; understanding and application – each complements the other.

> I can teach them all the research on it, and I can give them my experience, but it's not until they do it and you know... actually, you're just after reminding me, I should really do a little bit of research on that because I'd love to do that [Mary, pracademic].

The relative youth of sport science as a field of academia has meant that academic practices have lagged behind applied practices somewhat and academia has tried to establish itself through the medical model of inquiry.

> I think part of the reason why so much emphasis is placed on the kind of the medical model and research in general is probably because [sport science] so young, kind of what you said there is such a young discipline that… like thoughts and principle, not principles, but thinking around big questions and what's best practice constantly changes that we feel a need to really hammer home research, research, research, and understand the scientific method to students because… not so much, maybe now, but things do change… just so much we don't know that to… to be good practitioners you have to stay in touch with that side of things, but it probably gets to a point where it's… too much, if that makes sense [Jack, pracademic] .

Furthermore, the pracademics see themselves and their research as being within academic structures, such as funding routes and award levels but their ideas and research questions come from distinctly practice oriented scenarios. This was best exemplified by Margaret [pracademic]:

> Probably the other thing that I see from my practitioner side is that all of my research is totally so... This is where it flipped back, I suppose... so, I have a new PhD student starting in three weeks and that is completely born out of the idea, the topic - even though I applied for funding in the academic world - the idea was... came out of practice...

### 4.3.3 Preparing for sport science roles

As discussed previously in the introduction to this theme and in chapter 2, sport science as an academic discipline has largely followed the medical model in terms of its positivist view of research and push for the implementation of an evidence-based practice approach. This is evident in the focus of research into methods and specific processes but a lack of research into holistic practices. Research therefore leads to learning what was unknown, rather than learning for developing more effective practice (Ross et al., 2018). However, as the dataset shows - particularly from discussions with pracademics - there is an awareness of this lopsided approach and attempts are made to counterbalance it within practical classes. The sport science methods, theories and processes that are presented to students in their education need to be translated in practice, not transported without due consideration for the context the practitioner finds themselves in.

In my experience, those who teach sport science students and develop sport science education programmes understand that they are preparing students for future roles and that learning does not stop when the degrees are handed out. This has previously been outlined above, under the subtheme ‘Encouraging learning’ and it is also important to encourage learning that will improve practice in applied sport science roles, not just learning for learning’s sake – “you [practitioners] have a degree and yes, you have sport science and that's great but going out there in the field - every day is a learning day,” [Bob, pracademic]. Here Bob is articulating a sentiment that I took from all pracademic participants - that learning is a journey and that degree programmes are only part of that journey. This sentiment was not reflected from the student participants which indicates to me that I need to develop this concept in my practical classes.

How well sport science programmes currently fit into this journey is contentious. Practical classes offer an opportunity to role play working with real athletes but the knowledge and experience that comes with real-world situations is something that students "can't get in a lab… you can't simulate it… you can to an extent, but you can't simulate it to 100 per cent," [Mary, pracademic]. Despite the important role that practical classes can and do play in educating sport scientists, it is always somewhat artificial – that there is an exam at the end of each semester dictates this. One obvious way of exposing students to these types of situations is by inviting in outside groups such as sports teams or local school children. Often this type of learning environment can be very powerful and act as a "lightbulb" [Margaret, pracademic] moment for students as it "gives them that 'Oh yeah, OK, this is how I work with people in real life'," [Mary, pracademic]. This is, of course, not always practical, or possible but the power of such an approach should be appreciated and reflected upon. Bringing in outside groups was not something I considered with this group of students but having spoken to the pracademics and having understood the importance they place on it, it is something that I have begun to implement more recently.

Another potential way to improve the preparation of students for applied sport science roles is to re-think the overall programme model and look at other disciplines, in particular, looking at how other disciplines that merge socio-relational knowledge with scientific inquiry methods might yield some avenues for progress. Chapter 2 has already outlined the influence of nurse education models on my thinking and in particular how the work of Patricia Benner helped me to conceptualise notions of practice development. None of the practitioners referenced the work in the area of S&C to develop psychosocial and professional competencies either (for example, Dorgo, 2009; Gearity & Murray, 2011; Gearity & Mills, 2012; Szedlak et al., 2019a; 2019b; 2020; 2021; Szedlak & Gearity, 2020; Callary et al., 2022). Although none of the pracademics directly addressed this type of scholarship, it is interesting to me that they all had similar perspectives on how we could improve sport science education to develop such ways of knowing. Their perspectives mirrored those of Bradley et al. (2022) who advocate for active learning approaches to sport science education to improve practitioner competencies, lay a foundation for future expertise and to enhance graduate employability. Bradley et al. (2022) draw on similar approaches in healthcare education. This acknowledgement by pracademics of potential learnings to be taken from other fields supports my view that

there is a large amount of scholarship on education and practitioner development that sport science educators could draw upon.

> One thing that could definitely be improved is if [we] look at other kind of health-related disciplines, whether it's medicine or physiotherapy, where they continuously have ongoing placements almost each year… that's something that sport science would definitely benefit from in general… whereas we obviously have the… formal six-month placement, but if there was more of a formal, ongoing type of translation [that might be more beneficial]. It's [often] very easy to apply things to classmates… but maybe second, third fourth year trying to push [students] out into external environments a little bit more, outside of even that formal placement is definitely… would definitely be beneficial [Jack, pracademic].

My own background is that I was a practitioner before I entered academia. All five pracademic participants that I spoke to had similar backgrounds. Though this was not a criteria for inclusion, I learned from our discussion that all five had actively taken part in competitive sport in their formative years and gone on to work in a role that involved coaching and developing other people. They then worked in applied practice roles before entering academia. This is interesting given the positive emphasis that the pracademics place on practical class teaching. However, it may also point to a homogeneity of pedagogy that should not go un-examined.

## 4.4 Theme 3: Reflections on the ABL approach

> They might not need me — yet they might —
>
> - Emily Dickinson (1998)

Extracts coded under the theme Reflections on the ABL approach consider the interrogation of ABL as an approach to practical teaching. There were two key components to this. One was a focus on interactions with the practical classes generally – the benefits of practical classes and the value that students placed on them. This was a rich theme generated from the student dataset and something that I had not anticipated. The second component focuses on interactions with ABL as a pedagogical tool – were students previously familiar with the approach; was it useful; what was beneficial about the approach; what criticisms had they of the approach? Having implemented a particular pedagogical approach, I was aware that this would likely generate discussion. However, I did not anticipate the degree to which the students would engage in it.

The pracademic input on this theme centred around their experience of using ABL approaches and how their general pedagogical approach aligned or diverged with its use. There were certainly worthwhile discussions on this topic, but I felt they did suffer somewhat from the lack of a common language – one which I have built with students over a term or pracademics over years of discussion. The once off nature of the interviews did not provide the richness of discussion on this theme as I might have hoped.

There was broad agreement with the effectiveness of the ABL approach and an appreciation for what it was trying to achieve, which was to ensure everyone arrived at the practical classes with a basic understanding of the topic. Issues and criticisms of the ABL approach and how it fitted in with the wider module/ course content are also addressed in this theme. The primary criticism was that any additional course work is adding an extra layer to a demanding and compressed schedule due to the restrictions of part-time learning in taught post-graduate courses. I think this is a legitimate criticism.

### 4.4.1 Why implement an ABL approach?

The ABL approach was scaffolded by my understanding of my site (Schatzki, 2002) – sport science academia and applied practice. The influence of my site of practice has previously been outlined in chapters 1 and 2. The potential benefits of an ABL approach and the specific approach I took have been discussed in chapters 2 and 3. The dataset supports the use of an ABL approach to teaching practical classes as it indicates that students engage in the topic outside of scheduled teaching hours and it can be used to develop a common language for initial discussions on a topic. This common language is possible because students have an awareness of the topic prior to beginning the practical class. Students undertake sport science programmes largely based on their interest in sport (Sleap & Read, 2006). Pracademics use this to their advantage to engage students in the topic and this transferred to the videos that I utilized. As Jack [pracademic] noted the students' "sporting background… provides them with a lot of their insight… if they're thinking of theory, their context straight away goes to whatever [sport] they participate in." Making pre-class content available gives students an insight into what will be discussed and they begin to construct an understanding before joining the group. This understanding is founded upon their own sporting experiences and all 16 student participants remarked on this over the course of our interactions. The approach I took was successful in this aspect as it got them "thinking about what's coming before the class started [so they] have an idea of what's going on" [David, student] right from the off and

initial stages of classes are not spent trying to introduce the topic. Some examples of why an ABL approach may be beneficial include:

> …so, it's kind of like if you had the video beforehand, like at least that's your first time seeing it and you have an understanding before you're actually doing it in the practical, whereas if you didn't have the video, you are kind of spending the class trying to understand it and figure out how to do it [Paul, student].

> You're exposed to it more times as well and it's not just theory. You're not just hearing it for the first time – you've already seen it and you can look at it again afterwards… I thought it allowed you to be more thorough with the information [John, student].

These examples highlight the benefits of an ABL approach, and particularly one that uses video as a medium. Video can act as a constructive companion to traditional text-based mediums such as journal articles, books, or presentation slides. This is clear from this perspective, given by Maeve [student]:

> it's handy having both because [students will] read it but… might struggle to picture it… but… when [they] see the video, the person is talking through it, [they better] understand terms and it's a bit easier [Maeve, student].

It is clear from these extracts from the dataset that early and repeated exposure to topics in relevant contexts is appreciated by students.

Using video and smart technology is in keeping with the modern third level student's native familiarity of such tools and the value they place on them (Roberts et al., 2012; Connelly & Miller, 2018). Also, as discussed in chapter 3, COVID-19 has led to a proliferation of video content as face-to-face teaching was not always possible. This may in turn lead to sport science academics needing to be more comfortable with the use of ABL and similar approaches.

> …with the video example, it's something that I probably come across even more this year than ever because of obviously everything is [online]… zoom based… so there's been a lot more video content than maybe we typically [would] have. [Jack, pracademic]

An ABL approach is different to live, synchronous online teaching yet educators are still challenged by the same dilemma – 'what matters, what should I include and what approach should I use?' It is important to explore this in a reflective manner rather than choosing stock options or what others have done.

Video can also be a more 'powerful' medium in some ways. Traditional journal articles and books are written in a particular manner and in sport science this often mean in keeping with positivist frameworks. Video is not beholden to such traditions which gives it more freedom, but this freedom also has limitations such as the lack of a peer review process. In practice the lecturer must act as the reviewer. When talking about using video content as part of their own ABL approach, one pracademic noted the following - which resonated with me - about a particularly powerful video they use in their class.

> I always get the hair stand up even though I've watched it loads of times because I feel like grand I can [give] them a research paper that says you know this is the views of disability' and it's like… how do you translate that really to make it meaningful… so like that using the likes of a Ted talk where this girl who has a disability is talking about this? [Mary, pracademic]

Video content offers the ability to give alternative content to students, but it requires framing by lecturers who can act as a form of peer review in choosing content to enhance validity.

### 4.4.2 Appropriate ABL

An ABL approach may make it easier for students to understand, contextualise and apply theoretical knowledge. When choosing any pedagogical approach, care must be taken to ensure it is appropriate to the topics, group, stage of education and learning environment. The use of a blended approach to learning where some takes place off-site is one that is used by pracademics to contextualise and "contemporise" [Margaret, pracademic] theory. This type of approach is useful for pracademics in engaging their students in learning as it frames learning around the future goals of the students; it helps students visualise their future practice in some respects. Margaret [pracademic] articulated this sentiment when she said that, as lecturers, we are "trying to link [content] to what they're actually trying to do [in applied practice]". Being a pracademic has implications here such as the issue of publisher bias. For example, video content is often posted online with the aim of self-promotion or to influence the purchase of equipment or professional development content. This issue did not come up in the dataset but should nonetheless be considered when drawing on applied practitioner knowledge when teaching. The lack of discussion on this topic does not mean that it is not considered by students and pracademics but based on the dataset, it is not at the forefront of their thoughts on the use of videos published by practitioners.

Pracademics have a contemporaneous understanding of applied practice that they can refer to – for example, I can show students video or data from a recent game that they may already have been aware of, or we can refer to an interview or something that happened in the past. Again, Margaret [pracademic] articulates this well:

> Like I would be comfortable discussing something… that's contemporary and bringing it to class or we do a lot on debriefing, things like that, looking at the interviews after matches. So, what did the coaches say and what are they doing there, is this internal, external... or is this attribution... is he protecting his players... that confidence. So, after breaking down what the coach says after games to kind of link it even to theory... they [the students] don't connect [theory] to what actually happened in reality. [Margaret, pracademic]

As a pedagogical approach, the dataset supports the use of ABL - in particular it has value as a tool to communicate more nuanced topics. Students are able to engage with the content in their own time and allow space for review and reflection – this is particularly pertinent when video is used as users have the ability to pause, rewind and rewatch, as previously discussed. Students believe that it allowed them "to be more thorough with the information, like… how you set up… all the different component to be aware of… how to execute the movement and all that kind of stuff," [John, student]. This point links to some of those made previously but I think it is worth re-iterating here to capture how students experienced the ABL approach as a pedagogical tool. However, despite the broad support for the use of ABL, the video content must be appropriate.

The dilemma of choosing appropriate ABL content mirrors those facing sport science practitioners, a need to utilise tacit and procedural knowledge but also for these to be theoretically informed (Fullagar et al., 2019a). Some feedback from students and discussions with the pracademics has led me to question my own approach to choosing ABL content and content for learning in general. In many ways deciding on ABL content, as in the actual content of a video or some other artefact, is a similar process to deciding what course of action to take with an athlete in a specific context. The lecturer is primarily leaning on their own practice knowledge - both teaching and applied practice - on the topic when choosing content. I do not have a defined process for choosing videos and this is mirrored by the pracademics. As Mary [pracademic] said:

> that's interesting, though I've never thought about where I kind of get… not where I get my information, but the type of information that I use.

This may not necessarily be an issue in terms of where the content comes from but more so what we are trying to get across in the content. In a sense I and the pracademics utilise tacit knowledge to deem what is appropriate. Again, an extract from my discussion with Mary [pracademic]:

> I definitely don't have criteria - except like my I would have a criterion in terms of like I wouldn't just go to somebody's blog page and go hey look, this is fact.

Upon reflection I am critical of my teaching practice in this regard. It could be argued that the lecturer is not always at fault here. Often with modules that are focused on people facing roles, such as coaching or professional practice modules, are considered less scientific than laboratory and technology mediated modules, such as biomechanics or physiology. As Margaret [pracademic] put it, some modules are perceived as being "not as sciency…, a lot of it is experience and maybe it's not, as academic compared to like physiology or exercise physiology." I think this is an interesting point and one that is supported by scholars who have advocated for a more holistic approach to examining sports performance (for example, Maguire, 2011; Woods et al., 2021a), but this reliance on personal knowledge and experience may lead to inappropriate or inadequate resources and this is reflected in some critical feedback from students.

Students pointed out that some of the early video content focused on elite level athletes who would have physical capabilities that are beyond those of the athletes that most of them would go on to work with. In particular it was noted that "some of the stuff you [the researcher] have there is high level athlete stuff… but very different to the athletes we'd be working with… A club footballer or whatever…" [Hugh, student]. The capabilities of the athletes that I used was not something I had considered and the pracademics that I spoke to were critical of this. For example, Margaret [pracademic] said that:

> the likelihood is that they [students] are not working with any of those [truly elite athletes] or some might, but majority won't be working with a lot of those, so bringing it back to your average every day Gaelic footballer or team sport athlete to give examples of these things [is beneficial] because it's obviously the more realistic it can be and the type of coaching cues that they're giving are going to be a lot more specific to potentially what they're actually doing.

This is not to say that all content should be focused on the average athlete that students may go on to work with but rather that I should ensure a range of contexts are available to students as Jack [pracademic] points out:

> Exposing [students] to different environments [is important because even] if they go that route with the kind of everyday person, whether it's from a health perspective or club level, sports or recreational sports - there is the minority that end up potentially at the elite end so… trying to expose… them to multiple different levels with regard to the kind of data that you're showing them or demonstrations, or problems [is important].

Upon reflection, I am critical of my use of ABL as a teaching tool only. As outlined in the chapter 3, on the description of Phase Two, the delivery of the ABL content developed as the term progressed from a starting point where the video was given before class to the end where students were finding or creating their own resources in the final weeks. The idea to move towards students finding and creating ABL content came from a DHAE group session. In finding and creating their own resources, students appear to appreciate the chance to summarise their learning and use ABL content as a resource to review what they have learned as well as a resource to kick-start their learning. Michelle [student] captured this point well:

> … but the one week that we [the students] did break into groups and we did the videos and you [posted them to the online portal] … maybe if we could have done that for more of the sessions because then all the technical aspects are in the videos, and you can go home and watch them and remember them instead of trying to remember them in the class and coming out and forgetting some of the points.

### 4.4.3 Complexity of ABL content

Previously it has been argued that practical classes are spaces for making sense of some of the complexities of applied practice. However, in trying to make sense of complex scenarios there is a danger that additional content will add to the complexity. During feedback sessions students said that they were "sometimes… a bit overloaded with the technical aspects" [Maeve, student] and the overall volume of content was "so much and you'd nearly forget some of it" [Emma, student]. Three students articulated this clearly and there was no disagreement among the student participants on this issue. When taken on their own merit these are legitimate criticisms of my teaching practice and warrant reflection. The idea of the approach was to help students learning, not hinder it. Students suggested that perhaps some additional highlighting of key points such as "a quiz of some form after reading/ watching information on the topic would further help reinforce understanding," [anonymous, student]. Another option would be to provide "a sheet or video of what you were doing," [Emma, student] or list of key points to accompany

videos. This is a valid suggestion as it builds on the previous sub-theme - 4.4.2 Appropriate ABL - where students advocated for the use of ABL content as both a teaching and learning tool. The difficulty with such an approach is that in providing summary points I would be telling students what is worth knowing and the whole point of the ABL process is to move away from such approaches to teaching.

Issues around the additional layer of complexity that an ABL approach brings were not discussed with the pracademic participants and they reported no such issues. The only issue with my use of ABL content was the use of elite athletes only early in the rollout and this is addressed in the previous sub-theme, Appropriate ABL. Overall, as will be outlined in subsequent sections, the ABL content was deemed positive. However, my teaching practice since the fieldwork of this research has evolved to reflect the students' comments around complexity. The videos are still quite similar, but the quantity of the reading content associated with each topic has decreased. Furthermore, instead of me supplying summary points, I have been asking my students to break into small groups to co-create a summary of key points at the end of each practical class. As discussed in Theme 1: Knowledge and Critical Thinking, one of the strengths of an ABL approach is that it helps develop conversations on topics. However, it must be accepted that doing this in a large group was not always conducive to the best learning experience for students who would have preferred "maybe even smaller groups [and space to] think about and have a bit of time to reflect on [content]," [Niall, student]. With complex topics and limited time to explore them it is important to balance learning content with the students' capacity to absorb the most pertinent information for their learning, and this is an ongoing balancing act that I did not, and do not, always get right.

### 4.4.4 Familiarity with ABL

Students were familiar with ABL approaches to learning and had "experienced it before" [Maeve, student], though none of them characterised or articulated those approaches as ABL. Students have been exposed to ABL or similar formats "more-so in recent years" [Michelle, student]. This highlighted to me that students understand when lecturers are trying to improve their learning experience. The students' familiarity with such approaches is encouraging as it means they are being exposed to more and more active learning approaches which, in my opinion, are beneficial. Discussions in chapter 3 support this viewpoint. Similarly, the pracademic participants spoke about using methods similar to ABL and those that encapsulated many of the tenets of active learning approaches but - as with the student participants - never articulated them as such. This

further demonstrates a previously made point that sport science educators acknowledge the need for appropriate teaching and learning approaches but have yet to engage in the vast amount of scholarship on such topics.

When discussing students' familiarity with an ABL process it was interesting that one student in particular had a strong understanding of the process and its use. This particular student had experience of police - known in Ireland as 'an Garda Síochána' - training and spoke about the use of a similar pedagogical tools:

> … type of learning experience where [Garda trainers] put stuff up online, maybe for the students to go and research… and then come into class and go through it or likewise in the physical aspects, they have to learn stuff like [Hugh, student].

An example this student gave was in the use of police batons and how trainees are taught both the skills of baton use and the laws that govern their use. This resonated with my own experience of teaching practical classes where an understanding of the context of application is developed in tandem with physical act of application in the real world. Furthermore, it reflects how sport science education can learn from and engage in teaching and learning practices in other disciplines – I have already highlighted potential learning that can be taken from medical and sports coaching education practices in chapter 2.

### 4.4.5 Practical classes feedback

Overall, it was clear that the students valued the practical classes and found them beneficial to their learning experience. Numerous students made positive comments about the practical class delivery. The practical classes were highlighted as being "engaging" [Niall, student], "insightful" [Paul, student] and "beneficial" [Maeve, student] and where most of their learning took place:

> I thought the practicals were very good like it's probably where we learned, well, I learned most of the stuff… [Emma, student]

> …learned more from the practicals than [they] did… with the actual theory side of the lectures. [Tom, student]

This positive experience is likely to be found in any practical class and may be due, in part, to the embodied learning associated with many sport science practical classes – it is likely that this is appreciated by people with a sporty background. The dataset shows that students are aware of embodied learning and "when they actually do the practical [they] learn a lot more by actually doing them [compared to] reading or being in a lecture" [Tom,

student]. One student commented that they enjoyed the classes because – "I suppose we weren't just sitting down" [Emma, student]. This is an element of most, if not all, practical classes in sport science education and I think it warrants further inquiry by educators on how embodied learning may be integrated in subjects that focus on the movements of the body.

As theory focused lectures and accompanying practical classes generally develop throughout a teaching semester, this combination can then become a version of recursive action research cycles of plan, enact, observe and reflect (McNiff, 2002; Rossi & Tan, 2012; Lê et al., 2015). Pracademics did not explicitly name or refer to this process but three of the five did refer to the combination of lectures and practical classes to build and develop ways to "learn [something] and then go on to actually do it and coach it was just kind of a good kind of complete completion of the circle of the whole process," [Bill, pracademic]. Margaret [pracademic] also spoke about the idea that theoretical knowledge should be accompanied by practical knowledge. This sentiment was prevalent among the pracademics who design content; and students appreciate the combination of both components. Jack [pracademic] said that:

> [every lecture] we do comes with at least two hours of practical work where straight away, day one we're putting them… into that context in a practical setting to… try and translate, I guess that whatever theory we're covering in a practical [manner].

## 4.5 Chapter Summary

This findings chapter outlines the key themes from my discussion with the student and pracademic participants. Although I acknowledge that I am part of the research process, and my interpretation of what the participants are saying strongly influences these themes, I believe it is important to outline what the participants said. As previously mentioned, the voice of sport science students and academics engaged at HE level is not as prevalent as it is in other areas - see for instance, the examples of sports coaching research as referenced in chapter 2.

The key themes that developed in my discussion with participants were Knowledge and Critical Thinking, The Art and Science of Sport Science Practice, and Reflections on the ABL Approach.

Theme 1 focuses on the notion of pedagogy and how to best support students to develop their learning journey. These findings support the use of student-centred approaches as evidenced by the students' experiences of the classes. It is notable that the other pracademics follow similar models of teaching or at least understand the importance of such approaches in sport science. It remains to be seen whether or not this something that is appreciated by pracademics alone or if academics in sport science without practice experience have similar views. Theme 2 looks at the notion of an art to science continuum in sport science practice. This is important because understanding the applied practice landscape - or at least an understanding of my students and my interpretation of the landscape - will inevitably influence the 'how' and 'why' (McNiff, 2015) of the types of knowledge deemed appropriate for practical classes in sport science education. It is evident from the findings, through both student and pracademic participants, that there is a range of knowledge required in sport science practice. Practice experience, an understanding of sport science practice and embracing the holistic nature of sport science provision may all assist lecturers in delivering their practical classes. Theme 3 then focuses on the implementation of the ABL approach to teaching practical classes. Student participants found the approach to be beneficial, however, there were areas for development. These areas included having appropriate online content and ensuring that the content is not too complex – particularly given this might be the first time a student is being introduced to a topic. Such areas for development are included in my discussions with the pracademics who offered examples of what they do in their practice.

Overall, the findings support the development of student-centred practical classes that emphasise co-constructive learning methodologies. Such an approach allows lecturers to not only support students in developing their own knowledge but also allows them to provide realistic examples and scenarios based on their own practice knowledge. ABL may be a useful approach to begin capturing such a learning process, but care must be taken to ensure the blended content is appropriate. Based on these findings there are clear implications for my teaching practice and the field of sport science education in general. These implications are explored in the following two chapters.

# Chapter 5 - Analysis

## 5.1 Introduction

My journey through the DHAE programme began with a sense of astonishment. I already knew I had undertaken the programme to better my teaching practice, that I was going to develop my knowledge of teaching and learning, and that I was entering a research world that was very different to my background in science. However, in the early days of the programme I was taken aback by how much learning there was to do. The fundamental pillars of adult education are built upon scholarship from the likes of Bourdieu, Dewey, Foucault, Freire, Habermas, hooks, Mezirow and many, many more – all of whom were new to me. Looking back, ideas such as democracy in the classroom or the transformative potential of education was not new but reading about the core concepts of an adult approach to education were. Discussing Freire's concepts of the banking of knowledge or praxis for example, often brought about moments of clarity on ideas that I may already have contemplated but had yet to hear of them articulated with such clarity or interrogated in such depth. A lot of what I learned in the early years of the DHAE programme I could link to applied sport science practice and the idea of working with others for their betterment. Working collaboratively, questioning orthodoxies, reflecting on practice are all focused on helping others to achieve – something I see education and sport science having in common. There is nothing new or ground-breaking about my research and I think I could argue that a lot of it is not novel in terms of adult education but what may be worthwhile is shining a light on how these ideas are applied in a sport science education context.

My research explores the teaching of sport science practical classes through the lens my own pedagogy. I have asked myself the questions, how can I include applied sport science practices in developing effective learning in practical classes with sport science students; and how can I support students to reflect on practice in a theoretically informed way through practical class content? The previous chapter outlined the key themes and sub-themes derived from my discussions with students from my EC practical classes over one semester and pracademics from other institutions. In outlining the findings, I acknowledge that I am part of the process of inquiry and that the themes I have presented have formed through my interpretations. This chapter reflects a deeper analysis of my interpretations of what was discussed between the participants and me. As described in previous chapters, sport science is a field of academia and practice made up of numerous

distinct but inter-related disciplines aimed at the understanding and enhancement of human sporting performance (Bishop, 2008; McCunn, 2019). The reader will have noted that chapter 2 outlined the dominant influences on both sport science as a field generally and on my teaching practice more specifically. Chapter 3 outlined how I incorporated these influences into an ABL approach to teaching which was then tested in the field. As previously discussed, ABL combines online sense-making content with student focused interactions in appropriate learning setting. This approach was examined with feedback from sport science students, and pracademics who concurrently engaged in sport science academia and practice. Each of the key findings for analysis was derived from the thematic analysis approach as outlined in the chapter 3.

This chapter, coupled with the findings outlined in chapter 4, form my reflections on the third and final phase of my fieldwork - as outlined in Figure 5.1. These reflections are informed by my own epistemological and ontological positions, and my interactions within and outside of this research. Of particular importance in crafting this analysis has been my concept of sport science, my position as an educator, discussions with my doctoral peers, my thesis supervisor, and my wider support network. The first section analyses the learning community that is at the heart of my research. My research was developed in response to what I was seeing in my everyday practice and criticisms from others of practical class teaching (for example, Coffee & Hillier, 2008; Kelly et al., 2009). The ABL approach to pedagogy was designed to bring about a student-centred approach to learning. The importance of dialogue within the group and reflection as part of the learning process are outlined. The second section of analysis focuses on the art or science discussion that dominates sport science discourse. It is clear that the literature recognises this discourse and often contributes to a dichotomising of the two positions. Some scholars (for example, Haff, 2010; Gamble, 2018; Jeffreys, 2020; Gamble et al., 2020; Szedlak & Gearity, 2020; Sandbakk, 2021; Woods & Davids, 2022) have advocated for an amalgamation of these twin branches and, although the pracademics only touch on the art or science debate, it is clear from their contributions that they see the development of a range of skills and knowledge as being central to success sport science education. A pracademic lens has been shown to be a valuable resource for educators across a range of fields (for example, McCabe et al., 2016; Willis, 2016; Collins & Collins, 2019; Dickfos, 2019; Hollweck et al., 2021). On the evidence of my research this appears to also be the case for sport science educators and the second section of analysis highlights how pracademics utilise their pracademic lens in their teaching.

The third section of analysis focuses specifically on the ABL process and how I tried to implement a particular learning environment in my classroom. The success or otherwise of my approach in this regard is evaluated in comparison with the adult education influences outlined in chapter 2. Appraising the ABL approach that I took to teaching practical classes is also an important step in evaluating my teaching practice and this is further developed in the fourth section of analysis. The student input is important here and, though it shows that the students were broadly positive in their interpretation of the approach, comparison with other literature shows there is space to develop the approach further. The final section of the analysis focuses on the use of research methodologies, how sport science could benefit from using a wider range of methods and how this fits into a student's overall learning journey. This continues the analysis of my pedagogy and highlights the importance of combining an understanding of learning journeys and the range of knowledge and skills to be developed. This section also highlights my own learning journey as I have carried out my research.

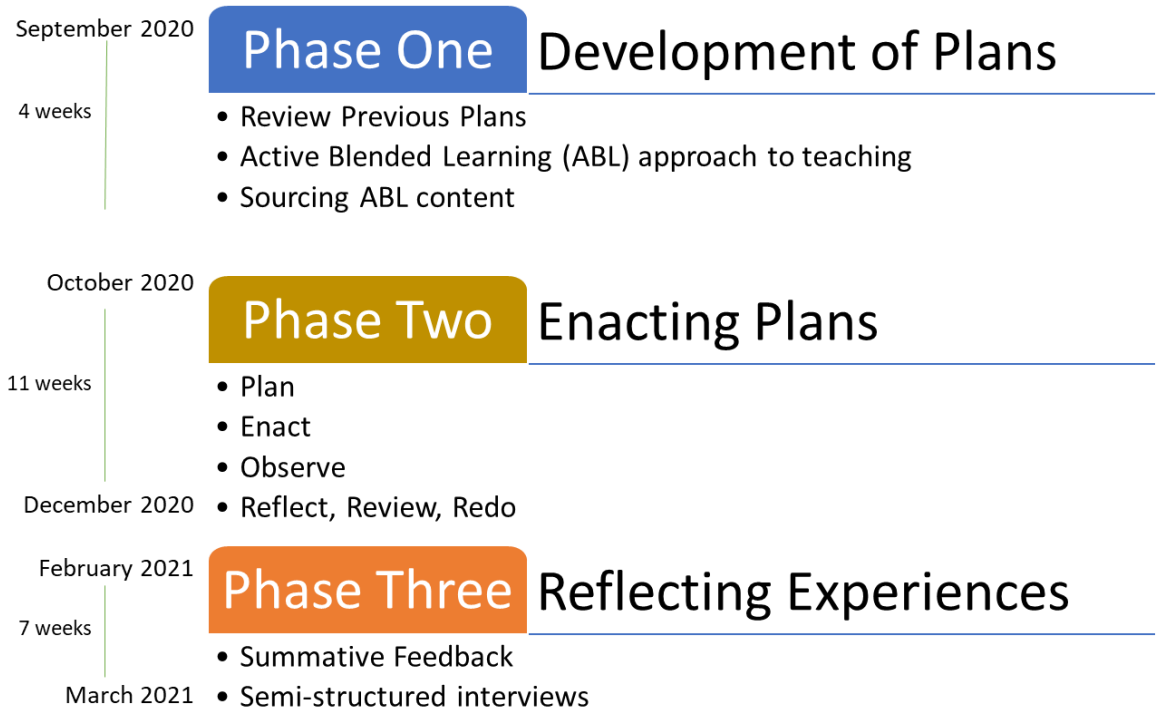



Figure 5.1: A timeline of the Fieldwork

Some brief excerpts from the chapter 4 have been included to give context to the analysis. A summary of themes and sub-themes identified from the dataset in chapter is available in Table 5.1:

**Table 5.1:** Themes and associated characteristics derived from fieldwork

| Theme | Characteristics |
|---|---|
| Knowledge and Critical Thinking | A focus on my own epistemology, how I wish to facilitate multiple types of knowledge and how my understanding of knowledge and knowledge informs my pedagogy. |
| The Art and Science of Sport Science Practice | Ideological discourses in the sport science community – 'what is sport science as a field of academia?', 'what is sport science as a field of practice?', 'how do these distinctions influence each other?' and 'what is important to become a successful practitioner? |
| Reflections on the ABL approach | My interpretation of how the students interacted with my pedagogy and how the approaches of other pracademics compare. |

## 5.2 Learners and Learning

Learners and learning analyses how embracing adult education principles such as learning communities, dialogue and reflection can be utilized to create a more vibrant and learner centred learning environment in sport science. My interest in teaching and learning strategies has largely been shaped by my experiences on the DHAE programme and the range of scholars and discussions with peers within it. However, how these strategies are employed is influenced by my pracademic experience and this section emphasises how pracademic experience can be beneficial to sport science educators.

### 5.2.1 Framing how sport science is taught

Issues related to the teaching of sport science and how it is education and practice are outlined in the chapter 2. These issues, such as developing the range of skills and knowledge required for practice and problems with knowledge translation into practice, have led me to interrogate my own teaching. There is already an awareness of the limits of didactic teaching methods that focus on students acquiring knowledge from lecturers (for example, Coffee & Hillier, 2008; Kelly et al., 2009) and an acknowledgement that practical classes are potential sites for such approaches (Ladyshewsky, 2002; Croker et al., 2010; Weeks & Horan, 2013). My general approach to adult education is scaffolded on principles such as student-centred, dialogue-based pedagogy that is influenced by the works of Freire (Freire, 1970; Freire & Shor, 1987; Freire & Macedo, 1995) and Mezirow (1997, 2003). My research highlights that this approach offers a route to developing knowledge and skills expertise in practical sport science classes that is appreciated by students and that pracademics are already actively engaged in such approaches.

The findings of my research challenge my previously held view that the 'banking model' (Freire, 1970) is the dominant mode of delivery in sport science practical classes. That such a mode dominates was certainly my personal view at the start of my research, stemming from what I have seen as a lecturer and experienced as a student. However, having spoken with the pracademic participants, this view has been challenged – the pracademics specifically talk about facilitating learning focus on ways of encouraging students to make sense of complex issues. The caveat is of course that each of the pracademics I spoke to is concurrently working in practice. It remains to be seen if approaches akin to my own are widespread among those who are not involved in applied sport science roles. Furthermore, recent research among sport science students has highlighted the effectiveness of student-centred active learning approaches above more traditional content-centred lecturing methods (Knudson 2020; Wallace & Knudson, 2020; Navandar et al., 2021). The rise in such research has likely been, in part, due to COVID-19 restrictions.

Articles on the need to re-conceptualise sport science practice have been noticeable growing in prominence over the past few years (for example, Finch, 2011; Martindale & Nash, 2013; Ardern et al., 2019; Fullagar et al., 2019b; Taberner et al., 2019; Bartlett & Drust, 2020; Woods & Davids, 2022). Among this literature Fullagar et al. (2019b) emphasise the possibility of changes in approaches to sport science education in combating the disconnect between research evidence and applied practice. This is further

supported by research which highlights alternative approaches to practitioner education that focus on developing skills and knowledge beyond the dominant instructional paradigms (for example, Szedlak et al., 2019a; 2019b; Callary et al., 2022; Downes & Collins, 2022). My research, and particularly the way the academics spoke about the influence of their practice knowledge and the need to develop their students practice knowledge, may be seen as a demonstration of the type of change that is being sought. It may also, however, demonstrate that such approaches to education are already enacted – the pracademics I spoke to share my views on how to teach practical classes and the students I collaborated with spoke about how my approach was not novel. Therefore, it may be a case that this type of work is simply not illuminated enough to adequately challenge long held perceptions – perceptions that I held before conducting my research. My research appears to reflect a growing trend around the need to interrogate how we conceptualise and teach sport science.

The literature, as discussed in the chapter 2 and referenced above, highlights calls for changes in how sport scientists are trained, yet my research shows that some of this change is already taking - or has already taken – place in third level education settings. Knowledge does not come in one single form and my research indicates that sport science students and pracademics are aware of this. Although it was never explicitly addressed by either group of participants, it is clear to me from the analysis of findings that this is the case. The students spoke of how 'the book' cannot cover everything that can and will happen in the 'real-world'. The pracademics acknowledge multiple ways of knowing in how they blend practice and academic knowledge - theirs and their students - within their pedagogies but this is never explicitly addressed. It is likely that instructors are still overly influenced by the dominant instructional paradigms that research-based knowledge promotes and are also promoted by professional bodies in sport science fields (Szedlak et al., 2019b).

Literature that looks at knowledge development in sport science is sparse but when taken on the whole it does agree with this idea of multiple ways of knowing in applied sport science (for example, Fullagar et al., 2019b; Bartlett & Drust, 2020; Woods & Davids, 2022; Woods et al., 2022a; 2022b). The literature I reviewed contains two main strands of thinking about knowledge in sport science – the first is through frameworks for delivery and the second focuses on what Woods et al. (2022b, p.1) describes as "wayfinding through boundaries of knowing"; that is an inquisitive ethos based on the love of continued learning with those we collaborate with. The idea of frameworks for

delivery of practice is attractive as evidenced by literature on the topic (for example, Bartlett & Drust, 2020; Gamble et al., 2020). Such frameworks also appear attractive to pracademics as evidenced in some of the themes outlined in the chapter 4. For example, Jack [pracademic] spoke about using physiotherapy and medical educational models as a way of developing a range of skills and knowledge in sport science students. The wayfinding ethos means breaking free of dominance of research-based knowledge and embracing non-traditional approaches to research and education. Both frameworks and wayfinding share an allowance for individual and collective expression and inquiry whilst maintaining a clear focus – similar to how adult approaches to education are formed. How we talk about, develop, and teach these multiple ways of knowing appears to be less well developed.

### 5.2.2 Learning community

It will be recalled from chapter 3, that the ABL approach formed phase two of the research plan. Figure 5.2 offers a reminder of the key phases of my fieldwork. ABL provides online content to stimulate sense-making activities with focused student interactions (with content, peers, and tutors) in appropriate learning settings. I provided students with videos on key topics to provoke reflections, discussion, and hypotheticals prior to their engagement with the group in practical classes.

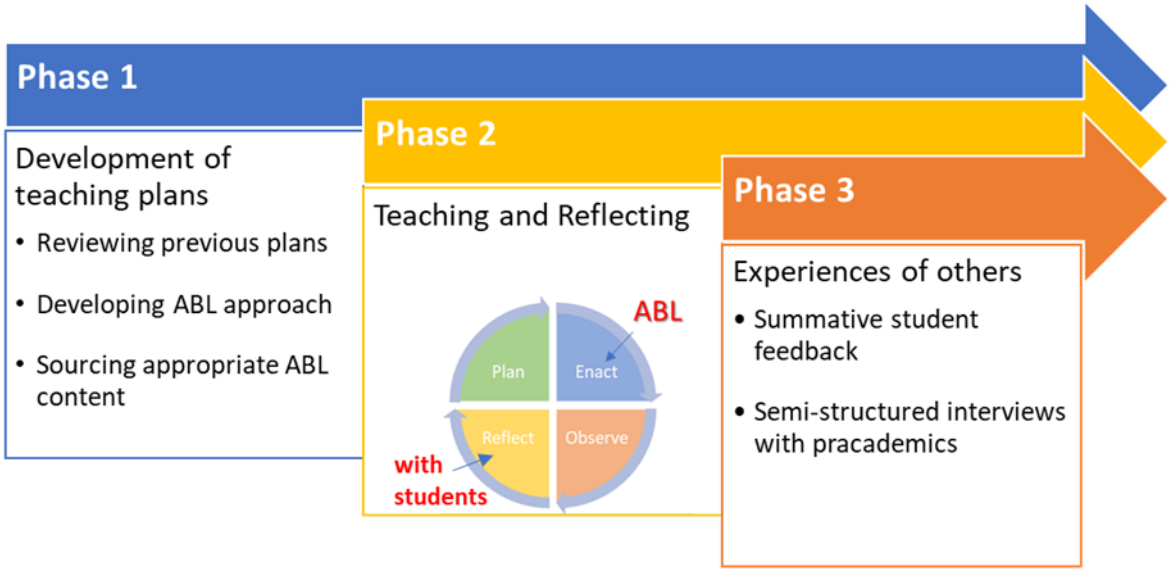



Figure 5.2: Key Phases of Fieldwork

The overarching aim of the ABL approach was to provide my students with learning experiences that emphasised opportunities to construct new knowledge rather than simply being taught by me; the drawbacks of didactic teaching methods in terms of developing practice skills and knowledge have previously been discussed in the Review of Literature and elsewhere (for example, Ladyshewsky, 2002; Weeks & Horan, 2013). Working as a learning community also improves students' ability to work with others to examine issues. It will be recalled from the chapter 2, that there are numerous criticisms of knowledge translation from sport scientists to stakeholders (for example, Bishop, 2008; Reade et al., 2008; Finch, 2011; Martindale & Nash, 2013; Fullagar et al., 2019b; Bartlett & Drust, 2020; Downes & Collins, 2022) and that educating other stakeholders forms a key part of a sport science role (Martindale & Nash, 2013; Bartlett & Drust, 2020). The ability to work as part of learning community is therefore central to the role of a sport science practitioner and should be developed during foundational learning experiences. Students observed that hearing different perspectives was an important benefit of the ABL approach. This will not only make sport scientists better practitioners, but a championing of these qualities may also serve to improve employability.

The student participants valued the ABL approach and found that coming to class with at least a foundational understanding of the weekly topic improved their learning experience. This finding is supported by Croker et al. (2010) who found pre-laboratory videos help student to develop as autonomous learners and have more to reflect on the topic. Power and Cole (2017) report similar benefits in developing practical nursing skills by modifying more traditional didactic deliveries. Findings also supports the assertion of Maunder (2017) that online learning should be linked and integrated into face-to-face teaching. The students, in particular spoke about how the group discussions on the videos were valuable to their learning. Croker et al. (2010) also noted that the use of pre-session videos allowed demonstrators more time for higher-level interaction with students, as well as the advantage of having reusable learning artefacts for future teaching. These findings are different to those of Lomer and Palmer (2020) who found that students preferred fact-to-face teaching above ABL approaches and highlighted a lack of active learning elements in the students experience. Furthermore, the authors highlight online learning elements as being less value for money, with a consumerist narrative from a student's point of view being dominant throughout (Lomer & Palmer, 2020). Whilst those teaching sport science practical classes can utilise approaches like ABL to stimulate student engagement in the learning process, it is important to ensure the active, in-class

component is nurtured and developed to create a positive community of learners. In documenting my teaching process, I have highlighted that what is already being done is a good foundation from which academics can develop their practical pedagogies. Furthermore, my experience is that big changes to teaching practice are not required; something that has also been demonstrated by others (for example, Bullock et al., 2016; Power & Cole, 2017).

Research by Jones and Turner (2006) and Araya et al.(2015) on a small cohorts undertaking a postgraduate programmes found that sports coaches develop their practice knowledge through communities of practice that are formed in class groups when they are provided with active learning situations relevant to their practice context. As with my research, the students in both were encouraged to critique, question, and co-construct knowledge with their peers in an effort to develop their practice. It is likely that academics are already implementing active learning principles in developing their practical teaching content. A greater appreciation of scholarship in this area and a foundational understanding of the underlying principles – such as those outlined by adult education theorists like Freire (Freire, 1970; Freire & Shor, 1987; Freire & Macedo, 1995) and Mezirow (1997, 1998; 2003) - may improve this understanding further.

Students enjoyed the practical classes and employers appear to value the multiple ways of knowing that can be developed in practical classes. This shows that teaching practical skills is valuable to both students and employers. My summative discussions with the students showed the practical classes to be "engaging" [Niall, student], "insightful" [Paul, student] and "beneficial" [Maeve, student] and where most of their learning took place – that is students claimed to learn more from the practical classes than the lectures. These findings are similar to those of Croker et al. (2010) who examined students' interpretation of pre-laboratory instruction videos. What is interesting about this comparison is that Croker et al.'s (2010) aims were similar to my own in implementing such an approach – namely to move beyond didactic demonstration and instruction in practical classes and towards student-focused learning of procedures to enhance more autonomous learning. This enjoyment and deriving of knowledge from their own enquiries and from each other is not surprising given the previously discussed research on why sport science students undertake degree programmes – their interest in sport (Spittle et al., 2021). Furthermore, research on UK physical education and sport science graduates has shown that students place substantial value on knowledge transfer and communication skills they see as being transferrable to applied practice (Sleap & Reed, 2006). This is also evident in the desires

of the post-graduates that I teach. From a broader perspective, classrooms can be collaborative spaces to enable learning to be a joyful experience, one in which everyone is invited to take part and engage (hooks, 2014). Lecturers and, on a more macro level, those who develop sport science education programmes can also be reassured that some research points to employers of sport scientists holding similar views (Dinning, 2017; Tsitskari et al., 2017). This may be evidence to support the development of practical class settings and further enhance their benefits.

This information should be viewed in the context of how the sport science profession functions and is currently experienced by graduates. It will be recalled from the chapter 2 that sport science graduates report significant difficulties in securing meaningful, reasonably paid positions straight out of undergraduate degree programmes (York et al., 2014; Doncaster, 2018; Dwyer et al., 2019). An undergraduate sport science degree is therefore unlikely to be sufficient for gaining meaningful employment in the field, yet of the skills and knowledge that students and employers claim to value most, practical classes are possibly the best site to consolidate these.

It is also worth highlighting that caution should be taken in inferring the findings of my research which involved taught MSc students; many of whom were already in some form of employment. My student participants may have already developed key skills and knowledge required in the applied sport science world or at least understand them. However, the recent growth of postgraduate programmes in sport science, allied to difficulties that those with bachelor's degrees hold point to issues with how undergraduate students are being prepared for applied roles. Obviously, there are a myriad of valid reasons for wanting to do a postgraduate programme, but anecdotal evidence suggests that the cascade of sport science graduates in recent years now means that a level nine qualification is required to secure a job in professional sport. The growth of BSc programmes in sport science or related courses has been exponential in the last two decades. According to historical CAO offers, there were two undergraduate degree options related to sport science in 2002. By 2012 eight institutes in the Republic of Ireland offered sport science degree programmes and by 2021 this had risen to thirteen institutes (CAO, 2022a; 2022b; 2022c). This, coupled with Ingham's (2022) estimation of 15,000 UK sport science graduates per year means it is becoming ever more difficult for recent graduates to stand out from the crowd.

### 5.2.3 Reflection as part of the learning process

As outlined in chapter 3, the role of self-reflection in learning is well established within the literature (for example, Moon, 1999; Sellars, 2017). Dewey (1910) emphasises the positive role that reflection could have on the critical thinking and the development of skills (Lew and Schmidt, 2011). The Freirean notion of praxis (Freire, 1970) highlights the symbiotic nature of reflection and action in learning and academic development. Kolb's (1984) model of experiential learning shows how a cycle of reflection leads individuals to conceptualise their experiences such that they can then generalise from one experience to another. The importance of dialogue in education has previously been discussed, but dialogue alone is not enough. Critical reflection is necessary for transformation and in this sense, praxis which can be viewed as the dialectal relationship between action and reflection (Zuber-Skerritt, 2001). Here action is associated with applications, activities, trials, or explorations, whilst reflection is associated with inquiry, critical evaluation, advancing knowledge via reflection, understanding and wayfinding (Zuber-Skerritt, 2001). From a pracademic perspective reflection-on-action helps lecturers to conceptualise not only learning and informing subsequent actions but it also allows for the building of theory (Moon, 1999). Reflection through a pracademic lens also allows for the identification of practical problems for students to solve and the development of technical and employability skills (Dickfos, 2019). As previously noted, the sport science pracademics that I spoke to describe and conceptualise themselves as pracademics and their ability to reflect on practice experiences influences their pedagogy. For example, see Margaret's [pracademic] description - chapter 4 - of how she brings real-world examples of practice into her teaching rather than working from "textbook" examples. This ability to recognise scenarios and reflect on past experiences and use them to inform teaching in the moment could be considered reflection-in-action and reflection-on-action - as associated with Schön (1983, 1987).

Schön (1983; 1987) argues that professional knowledge is central to how expert practitioners handle complex problems in practice. However, in sport science this is still often characterised more-or-less as some tacit art of practice. Schön (1983; 1987) also tells us that reflection-in and on-action can help to make such tacit knowledge more visible to practitioners when dealing with domain specific problems. Against this Maulini et al. (2022, p. 32), citing the work of Schön and others, describe how sports degree programmes are focused predominantly on developing knowledge and skills in relation to "technico-practical sport activities and biomedical skills" but this ignores the need to

"develop transversal skills, soft skills and critical-reflective skills". Schön's (1983, 1987) concept of reflection-in-action and reflection-on-action was most pertinent to the teaching of sport science students and the use of practice knowledge and innate knowledge by lectures and students to inform learning. As previously discussed in chapter 3, these concepts will be familiar to applied sport science practitioners and it is important that sport science lecturers are able to engage with this. This link becomes a form of reflective space, and this appears to be understood by pracademics to the point that they develop strategies to promote such reflections as discussed by Jack [pracademic] when he talked about encouraging students to reflect on their own sporting practices. Cushion and Partington (2016) highlights the important role that reflection plays in applied sports coach development so it is logical to extend this to applied sport science development and my research demonstrates that practical classes delivered through an ABL approach would be appropriate sites for this.

Students utilized reflection-on-action of their own sporting careers as a means of contextualising practical class content, as demonstrated by John [student] when he talked about how students had "probably seen most of those exercises before," and Philip [student] articulating how it was good "if you can relate to that yourself." These excerpts highlight that it is not the ABL content that is important but rather the link between the ABL content and the practical class topic. Research has shown that sport science students undertake their degree programmes primarily due their sporting background (Spittle et al., 2018). Academics may use these experiences to enhance student engagement. Jack [pracademic] and others, noted how students gain "a lot of their insight" from their own sporting experiences and it appears that pracademics are already engaging this tactic. Research on the origins of sports coach knowledge further highlights the important role that experiences as an athlete play (Irwin et al., 2004; Gilbert et al., 2006). Overall, reflective practices have been strongly associated in developing sports coach knowledge (Gilbert & Trudel, 2001; Knowles et al., 2006; Cassidy et al., 2008; Cushion & Partington, 2016). However, Knowles et al. (2006) points out that reflective practices among sports professionals is not without its issues and in particular there is a tendency to engage in technical reflection. A large study of applied science students (n = 690) concluded that self-reflection journals on how and what was learned leads to improvements in academic performance, but the extent of improvements is limited (Lew & Schmidt, 2011). Encouraging students to contextualise their reflections in their own sporting experiences and group dialogue may help to counter these issues.

Moon (1999) refers to the use of reflective thinking in the development of learning and practice. To do this requires temporal space and facilitation to help learners reflect. In providing ABL content prior to practical classes and encouraging them to engage with it well in advance the students were hopefully being given the time to assess the content and contextualise it in their own head. A contribution from David [student] supports this notion – "thinking about what's coming before the class started [so they] have an idea of what's going on". Paul [student] also talked about the benefits of having access to the practical class content "beforehand". Philip [student], highlighted how prior introduction to the practical class topic allowed students a "kind of wrapping your head around" theory before engaging in group reflections on it. This ties in with how pracademics spoke about "linking" theory and practice components of learning. The space between the ABL content being engaged with online and the actual discussion in class appears to be a crucial factor in but pre-class engagement also opens up more temporal space in the classroom. Croker et al. (2010), who employed a similar process to my own with pre-laboratory video content, found that giving students an understanding of the topic before starting instruction meant that instructors could spend more time on higher-level interactions with students. This is something that I would concur with, based on my own experience of the ABL process. These high-level interactions could be as a result of having less extraneous cognitive load (Paas et al., 2010). Extraneous cognitive load is the thinking capacity required to understand something unfamiliar (Paas et al., 2010). Szedlak et al. (2019b) posit that the use of pre-activity videos, such as in my ABL approach, decrease the extraneous cognitive load placed on students in practical learning environments.

Szedlak et al. (2019b) highlighted that the use of video artefacts outlining practice scenarios motivated practitioners to think more deliberately about their practice as they were engaged in internal learning through reflection. According to Moon (1999), internal learning promotes reflection on the meaning and relevance of context. By offering ABL content and then allowing space to reflect, there is further promotion of internal learning through internal dialogue. Reflection can allow students space to put information in an appropriate context, interrogate their own understanding and rework their own values and ideas. By providing the space between introduction to the topic and group discussion on it, ABL shifts the emphasis from descriptive accounts of what is happening in the moment to richer discussions which challenge ideas (Moon, 2007). Moon (2007) also suggests that part of learning is combining initial knowledge, which is what students might already

know about a subject prior to viewing ABL content or attending practical classes and external material, which comes from interactions with something outside such as another person's experiences or research findings. My research highlights that pracademics utilise methods such as ABL to combine these two components of learning – what the student already knows, internally as a sportsperson and what the pracademic can offer them in terms of both scholarly and practitioner experience, externally.

Reflective practice is a tool for developing learning and building student engagement. A recent, large-scale study of Australian undergraduate sport scientists (n = 311) reported that a primary reason for undertaking a sport science course was to remain associated with sport (Spittle et al., 2021). Within my practical classes I focused on both reflection-in-action and reflection-on-action; the latter of which draws on a student's affinity with sport by focusing on their sporting experiences. This method for engaging students is one that is supported by the dialogue I had with the pracademic participants. An ABL approach is more than combining online and fact-to-face teaching strategies. The active learning component encourages students to "do things and to think about what they do" (Armellini & Padilla Rodriguez, 2021, p. 18). By asking students to articulate how a topic relates to their experiences as athletes or practitioners, lecturers can develop their skills around reflection-on-action. The analysis of the key findings of my research show that students can be guided to become reflective in their learning if given the right environment. Furthermore, the pracademics encourage such approaches. By supporting their learning with online content that pertains to the classroom topic, lecturers can develop their reflection-in-action skills.

Reflective practice is commonplace among applied sport scientists – any professional conference will support this assertion. Therefore, pracademics who are, or who have previously worked as, applied sport scientists are likely already adept at being reflective practitioners. In fact, given the level of knowledge and expertise required to hold an academic position, I posit that all academics are reflective practitioners to a degree. It is clear from my research that pracademics utilise reflection on their own applied practice to inform their teaching practices. As reflective practice is seen as an antidote to the "complacency, habit and blindness" (Johns, 2017, p. 44) that we all experience in our working lives, it should be nurtured in sport science academics.

## 5.3 Blending my Practices

This section primarily concerns what is termed the art or science debate on sport science practice. ‘Is the practice of sport science an art or a science?’ is a dominant informal discussion in the field. This discussion centres around how sport science is conceptualised, mainly by practitioners and how these conceptualisations are challenged, debated, and leveraged. This section analyses how pracademic experience, reflection, and pedagogical tools, such as ABL, can be utilized to embrace both the art and science.

### 5.3.1 Pracademics use Art and Science

It is a common refrain on social media platforms and sport science blogs that formal education does not develop the types of skills and knowledge required in the art of practice (for example, Winkelman, 2019; Ingham, 2022;). Sometimes this discussion is not framed as science and art but technical and soft skills (for example, Ingham, 2018; Allen, 2022). The apparent dichotomy that this discussion presents is discussed in chapter 2 and highlights that sport science is strongly influenced by a duo of powers – research practices that dominate academia on one side and the way in which applied practice is conceptualised as an art form on the other. Discussions about the nature of sport science and how to develop appropriate practitioner education programmes are often focused on trying to balance developing the science and art of applied practice (for example, Haff, 2010; Connolly, 2016; Bartholomew, 2017; 2018; Gamble, 2018; Szedlak & Gearity, 2020; Woods & Davids, 2022). Allen et al. (2021) and Taberner and Cohen (2018) point out that rehabilitation practitioners need to blend evidence or research-based knowledge - ‘the science’ - with practitioner experience and practice-based knowledge - ‘the art’. Both academics and practitioners can, and do, use these powers to their own ends which deepens the sense of a dichotomy. More recently, some researchers have delved deeper into the supposed art of practice and outlined the importance of subjectivity, cognitive and psychosocial skills in sport science practice environments (Szedlak et al., 2019a; 2019b; Robertson & Joyce, 2019; Szedlak et al., 2020; 2021; Callary et al., 2022; Downes & Collins, 2022). An either-or dichotomy is not evident in this research, but I think more could be done to develop the range of skills and knowledge required rather than addressing one end of the spectrum or the other. From a practice perspective, Gamble et al. (2020) do address this blend by highlighting how sport scientists need to be data-informed rather than purely data-driven. This work, along with similar commentaries on sport science practice (for example, Bishop, 2008; Taberner et al., 2019; Bartlett & Drust, 2020), therefore represents what I believe is the key role that a sport scientist plays –

translating complex scientific information into appropriate, usable solutions for a range of stakeholders such as athletes, sports coaches, recruiters, and medical staff something that the 'science vs art' argument misrepresents. Part of my research as about setting the premise for blending skills and knowledge in sport scientists through their foundational education experiences.

The pracademics that I spoke to - with good practice knowledge and many years of experience as scientific academics - do question how sport science is conceptualised and posed the question – "is it a science or an art?" [Bill, pracademic]. In an academic sense, it is also clear that philosophical positivism (Uehara et al., 2016; Petrovic et al., 2017) and methodologies rooted in a hypothetic-deductive theory of scientific method dominate sport science research practices (Woods & Davids, 2022). Research is carried out largely by academics and this inevitably influences their teaching practice. Margaret [pracademic] talked about the "real shift to kind of… to make things very research driven" to the detriment of practical skills and development of practice knowledge. However, when viewing the conversations I had with others more broadly, it is clear that a fusing of practical and theoretical knowledge is understood by both students and pracademics as being important. From the students' perspective, acknowledgement centres around an understanding that theory alone will not be sufficient in applied practice. For example, Philip [student] stated that "not all things in the real world can be done by the book". The pracademic's perspective appears to be similar in this regard as this extract from the discussion with Margaret [pracademic] illustrates – "because the way we communicate now with athletes and coaches is not handled in the handbook or it is not handled in a hand-out," [Margaret, pracademic]. Bob's [pracademic] contributions also highlighted an understanding that – "having a blend of both" is important and this need to blend theory and practice knowledge is reflected in the literature.

For example, in their discussion about practitioner education for the UKSCA, Szedlak and Gearity (2020) highlight that theoretical and practical skills and knowledge are not mutually exclusive but Szedlak and Gearity are yet to see much evidence of their inclusion in practitioner education. Jack [pracademic] made a similar point and linked the primacy of research through a biomedical model to the relative youth of sport science field, which scholars have pointed towards as a potential reason for some of the issues we face around the primacy of research findings (Balagué et al., 2016). Despite conjecture about how sport science operates in practice, the findings of my research - in particular section 4.3.1 - point towards an agreement among students and pracademics on this

sentiment. In reality practitioners and academics do not operate exclusively based on an either-or dichotomy, and the pracademics aim to develop a range of skills and knowledge that spans the art-science of practice continuum. On a macro level there appears to be a cohort of scholars challenging what sport science is, how we conceptualise it and the primacy of positivist research (for example, Balagué et al., 2016; Szedlak et al., 2019a; Gamble et al., 2020; Woods et al., 2021a; 2021b; 2022a; 2022b; Woods & Davids, 2022). My research shows that this challenge is mirrored on a micro level by pracademics who go beyond didactic teaching of declarative knowledge to develop a range of practice-focused skills and knowledge. My research has shown me that there is evidence of a growing community of scholars and pracademics who do not see a dichotomy between the art or science of sport science but rather aim to weave and combine the two; it is a community which I now identify as part of.

### 5.3.2 Developing a range of skills and knowledge

Developing a range of skills and knowledge that is applicable to practice scenarios is something that students also seek. Applied sport scientists utilise a broad set of skills and knowledge to develop their practice (Fullagar et al., 2019a; Bartlett & Drust, 2020; Gamble et al., 2020; Woods et al., 2021a; 2022a; 2022b) and, whilst this is broadly understood by sport science academics, my research highlights that a deeper examination of what sport science is and how it is taught may help scaffold this understanding. It has previously been argued in the chapter 2 that sport science has developed in a manner that seeks to replicate the established biomedical model of scientific inquiry into human performance. It has also been argued that decision making in applied sport science is influenced by a multitude of interconnecting factors which require practitioners to create context specific responses rather than simply implement one-size-fits-all solutions (Ardern et al., 2019; Bartlett & Drust, 2020; Woods & Davids, 2022). Woods et al. (2021a; 2022b) highlight the diverse range of skills and knowledge required to be a successful sport science practitioner, which often blur the disciplinary boundaries found in HE sport science programmes. Gamble et al. (2020, p. 340) point out that, although empirical data and scientific measurements should inform decision making, when it comes to complex problems that incorporate human behaviour, practitioners must remain cognisant of the fact that data is “not sentient and we cannot expect them to do the thinking for us”. In this sense, sport science practitioners take on a degree of artistry (Woods & Davids, 2022) in their practice and implement processes that are heavily influenced by colloquial evidence – similar to clinical medical practices (Culyer &

Lomas, 2006; Sharma et al., 2015). The influence of evidence and knowledge beyond those created by positivist scientific inquiry are understood by sport science pracademics who have experience as applied sport science practitioners. The previous chapter highlights this.

For example, chapter 4, 'Theme 2: The Art and Science of Sport Science Practice' shows that both student and pracademic participants acknowledge the variety of skills and knowledge required to be a successful applied practitioner. The pracademics acknowledged the importance of bringing their practice knowledge to the classroom to counteract the dominance of research-based knowledge in education. For instance, Margaret [pracademic] spoke about how she would describe herself as "a pracademic, completely - like it that would fit into my whole teaching philosophy." Here Margaret was talking about how she brings her practice knowledge into the classroom and gives her experiences of working with other stakeholders and sport science service providers to improve a team's performance. This then feeds into Margaret's [pracademic] approach to pedagogy, particularly around the tasks and assessments she sets for practical classes. Similarly, Bill [pracademic] outlined how he pushes both the importance of research and the importance of learning how to translate or transpose that research in practical settings. In particular Bill [pracademic] spoke of the importance of practical classes in helping students to develop key "skills around observing, collecting data, simplifying it, feeding back in an appropriate way…". The way the pracademics spoke about their practice influencing their pedagogy reflects the combining of art and science principles that make for good practice in sports coaching (Connolly, 2016) and sport science (Gamble et al., 2020; Szedlak & Gearity, 2020; Woods et al., 2021a; 2022b; Woods & Davids, 2022). In a sense, the pracademics are ignoring the dichotomising of the powers of research and the art of practice and are focusing on amalgamating and moulding the key skills and knowledge.

### 5.3.3 Using a pracademic lens in sport science pedagogy

The pracademic lens is used a method of knowledge translation among the pracademics I spoke to, and the findings show that this is something that the students appreciate and seek out for their lecturers. Szedlak et al. (2019b) highlight the importance of knowledge translation and knowledge dissemination in educating developing sport scientists. Fullagar et al. (2019b) and Bartlett and Drust (2020) also point out the importance of knowledge translation in practice. Grimshaw et al. (2012) point out that those translating academic or research driven knowledge, such as systematic reviews or other syntheses of

research findings, need to identify the key points for dissemination to their target audience and tailor their language and knowledge translation artefacts so that they can be assimilated easily. Research-based knowledge needs to be disseminated in a manner that makes it accessible, credible, and meaningful so that students, and hence practitioners, can engage with it and incorporate it into their practice. In turn students may benefit from seeing how pracademics model the knowledge translation process in pedagogy and bring it into their own future practice.

The students and pracademics used phrases like 'science and art' or 'both' which reflect some of the conversations in literature cited previously but I found it interesting that our discussions ultimately contradicted the idea of a dichotomy in sport science. Nash and Collins (2006) give an instructive insight into how coach education can be maximised to promote the development of multiple ways of knowing. They point out that there are multiple knowledge systems at play when coaching and the same could be said for sport science practice (Nash & Collins, 2006). Whilst developing declarative knowledge is a strong point of coach education, the authors argue for more time developing their procedural knowledge base. This is supported in relation to sport science education by Bill [pracademic] who also highlighted declarative knowledge as a strength of most sport scientists, but their "interpersonal skills" and ability to "simplify things" is what will mark them out as better practitioners. In particular a combination of declarative knowledge and procedural knowledge appear to be key. I believe that my research demonstrates that there is acknowledgement of the need to develop multiple ways of knowing and that practical classes are opportune sites for the development of the range of knowledge that an applied practitioner may require. Furthermore, using pracademic experience is an important lens through which the pracademic participants deliver their lessons. Similar to Szedlak et al.'s (2019b) use of vignettes to translate knowledge to practitioners, my research shows that practical classes allow students to identify and engage with the scenarios that they see as having resonance with their future practice. There have long been criticisms of how sport science research is translated to real-world scenarios (for example, Burke, 1980; Bishop, 2008; Pyne, 2014; Buccheit, 2017; Coutts, 2020; Sandbakk, 2021) and, as mentioned in chapter 2, Fullagar (2019b, p. 1817) specifically argues for "educational strategies" that assist sport science students in understanding "real-world" contexts to promote practitioner competencies. From my discussions with pracademics and my own experiences this is already happening. Therefore, the perspectives of students, academics, practitioners, and stakeholders, should be further coalesced to create more effective sport

science practice. Greater discussion about the nature of sport science and in particular the art of practice would benefit the field in my opinion. From a tertiary education point of view, pracademics are ideally placed to lead this discussion as they are already viewing pedagogy through a pracademic lens.

This alternative way of thinking about the professional work of sport scientists is demonstrated in my research and elsewhere. In my research, the students specifically talk about "not all things in the real world can be done by the book," [Philip, student]. This shows that students accept the need to be able to take knowledge and skills and apply them in a manner that cannot be completely described. This echoes the views of Woods and Davids' (2022) recent publication where the authors argue that one way of conceptualising the work of a sport scientist is as that of an artisan. In looking at the profession in sport science in this way we can start to view sport scientists as those who think through making and doing as opposed to making and doing through thinking, the former of which promotes competencies such as skilled attentiveness and selective responses (Woods & Davids, 2022). In doing so sport science challenges the "hypothetic-deductive theory and of the scientific method that is dominant in sport science academia and promotes the development of knowledge through correspondence" (Woods & Davids, 2022, p.11). This conceptualising of sport science supports the discursive practices that I used in my research – the ABL approach was designed to promote dialogue in practical classes. The students and pracademic participants of my research also advocated for such approaches with students highlighting how beneficial it was to hear other perspectives and pracademics talking about facilitating learning. Pracademics specifically spoke about practical classes as sites to develop communication skills – skills that will be needed to navigate applied practice settings. In doing so pracademics lean on their experience and what they know about the art of practice. Schön (1983, p.241) outlines the "art" of practice as have a "a two-fold meaning" – it may refer to "intuitive judgment and skill, the feeling for phenomena and for action", which Schön refers to as "knowing-in-practice", but it may also refer to the practitioner's ability to reflect "in the context of action" on situations that are informed by practice knowledge. In much the same way that the pracademics use reflection-in and on-action, they also use varieties of practice knowledge to promote learning.

I believe that my research shows that this type of thinking and way of conceptualising sport science as an art of inquiry is not novel, nor is it contentious based upon my discussions with fellow sport science academics for my research. Rather, it is not given

the focus that it warrants. This lack of focus may be part of what Woods and Davids (2022, p. 12) describe as the "oft-unchallenged epistemic dualism" in sport science, that is the "separating of knowledge from the process of knowing". The dichotomising of sport science as traditional scientific inquiry is challenged by my research, specifically in practical class setting with pracademic lenses informing pedagogy.

## 5.4 Active Blended Learning

It will be recalled from chapter 4, that the student participants had broadly positive experience of the ABL approach. This section analyses why this was the case by evaluating the approach and what the participants said about it. There appears to be a close working relationship between the student-centred, dialogic approaches to pedagogy, and the use of pracademic experiences in teaching and learning.

### 5.4.1 Benefits of an ABL approach

In trying to balance the development of theoretical and practical knowledge and skills in students I have implemented an ABL approach to teaching a sport science practical class. This approach was specifically designed to address some of the difficulties facing sport science academics in trying to balance the simultaneous development of the art and science of practice as previously discussed. My experience, similar to that of Croker et al. (2010) - who similarly looked at enhancing the student experience of laboratory practicals through video resources - has previously been that students often arrive at practicals with no clear idea of the topic to be covered or the underlying scientific principles related to the practical elements. My pracademic experience and positioning also strongly influenced the ABL implementation. Furthermore, it allowed me to create a student-centred learning environment with dialogue at its core.

Sport science lecturers are met with both broad and specific dilemmas when teaching practical classes. It will be recalled from chapter 2 that lecturers face challenges in the teaching of practical skills in subjects similar to sport science – these challenges primarily revolve around providing learning experiences that emphasise opportunities to construct new knowledge rather than being taught in practical classes (Ladyshewsky, 2002; Coffee & Hillier, 2008; Kelly et al., 2009; Weeks & Horan, 2013). Furthermore, Keogh et al. (2017) point out the challenges faced by lecturers in developing both theoretical knowledge and practical competencies during their studies. It will also be recalled - from section 4.3 above on the art or science of sport science practice - that lecturers are faced

with developing a range of skills and knowledge required for applied sport science roles (Gamble, 2018; Szedlak & Gearity, 2020; Woods & Davids, 2022). Therefore, there is the broad implications of practitioner development and the specific issue of how to structure individual classes.

My research utilized an ABL approach to teaching practical classes to try and provide a strategy that allows opportunities to construct new knowledge in a collaborative manner. As outlined in chapter 2, Active learning stems from the cognitive, constructivist, experiential, and social theories of Vygotsky, Kolb, and Wenger (Lomer & Palmer, 2021). It aims to develop active student engagement through activities that are collaborative, practical, task-oriented, and experimental whilst highlighting the benefits of reflecting on such activities (Lomer & Palmer, 2021). Previously, Power and Cole (2017) reported benefits of an ABL approach to nurse practical skills education. El Sadik and Al Abdulmonem (2021) had similar success with the implementation of an ABL focused pedagogy on students taking anatomy practical classes. The findings of Power and Cole (2017) and of El Sadik and Al Abdulmonem (2021) call to mind the transformative nature of collaborative dialogue that Freire (1970) and Mezirow (1997) outline. The students in my research raised similar points in their feedback. Students found the overall ABL process to be "engaging" [Niall, student], "insightful" [Paul, student] and "beneficial" [Maeve, student] and where most of their learning took place. In presenting students with content prior to practical classes, students found they were able to "really focus in on the information being presented," [anonymous, student]. In a sense, the videos in the ABL gave students what Mezirow (1997) might refer to as a frame of reference for this discussions in class - "the video of the technical model that they're doing right… and come in here [the practical classes] then you kind of have that to compare against when you're watching," [Paul, student]. Student feedback supports this as they described already being initiated in the topic, were able to pre-conceive the content of the class and had space to reflect on the content prior to the class in the context of their own sporting background. This was articulated but John [student], Niall [student] and in particular Paul [student] who described having "understanding before you're actually doing it in the practical."

Maunder (2017) and Bullock et al. (2016) both highlighted the relative ease of incorporating an ABL framework into a pedagogical approach. My own experience supports this. Furthermore, an ABL approach can take advantage of most contemporary student's native familiarity with online media platforms (Roberts et al., 2012; Connelly

& Miller, 2018). Students in my research reported no issues with accessing or engaging with online content which is encouraging given a key component of ABL is the active learning component (Lomer & Palmer, 2021). The students appreciated a more open, discursive, and collaborative environment that encouraged them "to go and research stuff," [Hugh, student]. This is important as Keogh et al. (2017) found that for blended learning approaches to be effective sport science students highlighted the need for online material to be engaging and to complement face-to-face sessions. The students that took part in Keogh et al.'s (2017) focus groups were asked about the potential benefits of a BL approach to sport science education. Among their responses was to highlight the benefits of "extended time to work on content, usually theory, prior to a face-to-face session," (Keogh et al., 2017, p. 15). The participants in Keogh et al. (2017) are describing what I would term ABL. In fact, the Keogh et al. (2017) participants specifically state that giving content that outlines key theory prior to class would be beneficial to the student learning experience. This was in fact the case with my own students. The benefits of coming to class with a pre-existing idea of the content was spoken about by John [student], Niall [student] and Paul [student] who described the advantages of "understanding before you're actually doing it in the practical." David [student] also spoke about the importance of "thinking about what's coming before the class started [so as to] have an idea of what's going on." Overall, the students claimed to enjoy the practical classes and learn more from them than they did lectures. This is in keeping with previous literature on the use of ABL approaches to pedagogy (Croker et al., 2010; Lomer & Parker, 2021)

### 5.4.2 Why the ABL was deemed beneficial

The use of video content in educating sport science practitioners has recently been examined by Szedlak et al. (2019b) who implemented a range of written, audio and video vignettes to translate knowledge. In this research, the cohort of S&C coaches reported a preference for the use of video due to its ability to convey environmental specific context in conjunction with practical scenarios. The authors found that the vignettes prompted practitioners to reflect on key areas of their practice (Szedlak et al., 2019b). These findings are in keeping with my own findings where students found that the ABL content encouraged them to reflect on their own practices and project their minds towards future scenarios. The ABL content in my research allowed students to respond to what was most pertinent and meaningful to their own context. In this way the knowledge being developed move beyond those of a purely evidence or research-base. The use of pedagogical tools such as ABL, in practical class settings, encourages the fusing of elements of research

and practice knowledge, as discussed in more detail in the previous sections. Szedlak et al. (2019b, p. 9) recommend that "future research might also consider the use of vignettes based on actual video footage of experienced S&C coaches representing real-life, sport-specific coaching practice." Students noted this and highlighted that they found real-world practitioner instruction as beneficial to their learning. However, it should be noted that in comparison to Szedlak et al.'s (2019b) recommendations, the video content I used can be considered as educational and instructional, rather than documentary.

One difference between the findings of my research and that of Keogh et al. (2017) - which was conducted with a similar cohort - was that the student participants in my research had familiarity with an ABL approach whereas those in Keogh et al. (2017) had not. The authors noted that prior to their research, blended approaches had not been adopted in the sport science degree programme at Bond University (Keogh et al., 2017). This may reflect the increase in interest in blended approaches to learning that Armellini and Padilla Rodriguez (2021) discuss. This may be associated with the acceleration in advancing digital spaces due to COVID-19 as discussed in chapter 3 (Kang, 2021; Ní Fhloinn & Fitzmaurice, 2021); though a definitive link is yet to be established. The temporal and blended experience differences between students in Keogh et al. (2017) and my research does, however, further highlight the growing engagement of sport science academics in blended approaches.

Werthner and Trudel (2009) proposed three different types of learning situations that sports coaches learn through. Mediated learning takes place through the guidance of an instructor or facilitator in a workshop or clinic. Unmediated learning involves the coach seeking out information and then using this new information to test new ideas or coaching strategies. Internal learning involves the reflection and the reorganisation of existing knowledge to develop coaching strategies. The ABL approach I took incorporated all three learning situations. There was mediation from me in that I set the content and facilitated the practical classes and associated discussions. This was the dominant learning situation in my opinion. There was some form of unmediated learning in the latter classes where students sought out and developed their own blended learning materials, although again the topic was mediated. Finally, reflection was encouraged and developed through group discussions, questions about the students own sporting contexts and in particular the temporal space between engaging with the online video content and beginning the practical class. Reflection is further explored in the next section.

### 5.4.3 Improving the ABL approach

Although the implementation of the ABL approach can be deemed a success based on student feedback and use of similar approaches by pracademics, perhaps it could be improved further by the integration of problem or context-based learning strategies which take advantage of more unmediated and internal learning scenarios. A criticism of the implementation of the ABL pedagogy would be its integration into the practical class. Although the structure of the class allowed for dialogue before, during and at the end of each class, the sessions would often fall to didactic instruction between these intermissions. One way of improving this could be to include a situated learning strategy such as that implemented among sports coaching students by Jones and Turner (2006). Here the authors reported that PBL provided the students with the opportunity to: (1) apply theoretical knowledge in a practice-based situation; (2) examine coaching practice from different perspectives; and (3) engage in a deeper comprehension of coaching process complexities. Jones and Turner (2006, p. 1999) concluded that PBL "possessed the potential to help coaches towards the higher goals of transferable knowledge, considered flexibility, critical reflection and lifelong learning qualities." Morgan et al. (2013) had findings with sports coaching students and Martin et al. (2008) had similar success using PBL strategies to develop learner autonomy and employability skills in sport science students. Interestingly, the module examined by Martin et al. (2008) incorporated a transdisciplinary approach to sport science by including concepts from areas such as biomechanics, physiology, psychology, and nutrition. Whitelegg and Parry (1999) recommended a similar approach to teaching physics, CBL, whereby theory is placed in a specific real-world context to enhance engagement and learning. Sudibyo et al. (2016) proved the success of such an approach among sport science students by using sports actions to contextualise physics.

Further improvements in ABL may also come about as a result of greater collaboration between pracademics on the teaching and learning approaches they use. As previously mentioned in chapter 4, I felt that discussions on the use of ABL were somewhat disadvantaged by a lack of a common language on the topic, similar to issues Callary et al. (2022) report in defining psychosocial competencies. Lave and Wenger (1991), and Wenger's (1998) influential work on communities of practice highlight the importance of shared domains, identities, and practices in professional development. Furthermore, Ferman (2002) reported that Australian lecturers found professional development practices that were collaborative with peers to be most valuable to their practice.

Pilkington (2014) and Asghar and Pilkington (2018) show the importance of professional dialogue in the professional development of academics, with communities of peer learners playing important roles in the relational and social aspects of professional learning. Whilst overall, the pracademics I spoke to employed methods similar to ABL for similar reasons, yet they had different ways of describing and talking about them and we lacked a common language. For example, one pracademic spoke about developing expertise in sport scientists through a layering of knowledge and experience. This is similar to the work of Benner (1984) but the pracademic had never engaged with Benner, nor any other scholarship on the topic. This shows that a coherent community of practice according to Wenger's (1998) description is still developing. Greater engagement of sport science lecturers with teaching and learning literature and practices, and more open discussion among peers, may help to develop teaching practice. I acknowledge that my engagement in such discussions was limited prior to beginning the DHAE course and how to encourage more of it warrants further investigation.

## 5.5 Developing my Pracademic Practice.

This section of analysis focuses on my journey as a researcher and how my practice has developed alongside and because of my research. Here I outline how a different approach may be taken by sport science academics – one which moves away from a purely declarative research-knowledge base and more towards developing a range of skills and knowledge. Crucial to this approach is an acceptance that students are on a lifelong learning path rather than towards a set destination. The influence of an approach to teaching and research is notable in my professional development - in particular McNiff's (2015) use of 'semi-wh' questions (how, why) which aim to offers explanations of practice.

### 5.5.1 Translating knowledge from research to student learning is difficult.

Sport science research contributes to the body of knowledge that can positively influence the performance of both practitioners and performers (Reade et al, 2008; Brink et al., 2018). However, how this knowledge is translated into practice and among other stakeholders has been repeatedly criticised (for example, Reade et al., 2008; Finch, 2011; Martindale & Nash, 2013; Fullagar et al., 2019b; Bartlett & Drust; 2020). The rapid growth of technology and the ability to measure vast amounts of metrics is likely to be contributing to this issue (Robertson & Joyce, 2019, Gamble et al., 2020). This rapid

growth in technology means that sport science educators are constantly required to understand the latest technologies, and this is then passed on to their students primarily in an instructional manner with an emphasis placed on knowing how to use technology in a valid and reliable manner, rather than knowing what to do with it. Hence, this emphasis on know-how skills for students needs to be accompanied by knowledge translation skills to close the 'know-do' gap (Graham & Tetroe, 2007; Szedlak et al., 2019b). Pracademics appear to be aware of this in their teaching and in particular in how they design assessments as exemplified by [Bill, pracademic] - "an effective assessment is such an important role of a lecturer in a subject that becomes practical…". This then challenges my own methods of assessment for the EC module, which essentially mirror those of professional S&C accreditation bodies such as the UKSCA. In their commentary on effective healthcare action in Canada, Graham and Tetroe (2007) remark that translating research findings from knowledge to action in order to at least diminish the gap between what we know and what we do is complex. This is undoubtedly also the case for sport science practice but the pracademics appear to be trying to tackle it.

Recent research and commentary in sport science has brought this issue into greater focus. A number of publications have begun to look beyond the dominant sport science practice of using positivist science to inform practice on complex systems (for example, Szedlak et al., 2019a; 2019b; 2021; Gearity et al., 2021; Callary et al., 2022). These authors have focused on the development of psychosocial skills among S&C practitioners which will allow them to better impact the complex system that is the human athlete. Such research also pushes back against the teaching of what Szedlak et al. (2019b, p. 199) term a "standardised competency-based curriculum within the instructional paradigm", despite such linear teaching practices being shown to have limited impact on practitioners' ability to apply psychosocial coaching skills (Paquette & Trudel, 2018). However, despite the aforementioned research on developing psychosocial skills in practitioners, Callary et al. (2022, p. 9) found that there is a "rather significant gap and difference," between what researchers and stakeholders understand of psychosocial knowledge. Using participatory action research, the authors collected the definitions of 13 researchers and 30 stakeholders with pedagogical, philosophical, psychological, sociocultural competencies being at the heart. I see these competencies as being part of the art of practice and it is encouraging to see research in this area. The lack of cohesion and understanding, however, that Callary et al. (2022) found reflects my own lack of clarity on what is the art of practice in sport science. I still struggle to define the depth and breadth of knowledge and skills that I am

trying to develop in my students – but I now appreciate that it is a range of knowledge and skills.

### 5.5.2 Using Benner's model as philosophy

As discussed in chapter 2, the work of Patricia Benner (1984; 2004), and in particular the novice to expert model, enhances my understanding of my practice by allowing me to conceptualise how student learning progresses with developments in skills and knowledge and how to recognise apt scenarios for their implementation. Benner's (1984) model holds particular resonance with my practice as it spans learning and practice scenarios, in keeping with my self-identification as a pracademic. In particular, viewing Benner's (1984; 2004) novice to expert model more so as a philosophy, as recommended by Altmann (2007), allows me to amend the theory and reconstitute it for my own use. To me, as a philosophy, Benner's (1984; 2004) work substantiates that students are working their way through a lifelong path, of which higher education is a part, but graduation is not the end point. This allows me, in my reflections, to counter arguments that HEIs do a poor job of preparing students for practice simply because they are not experts when they graduate. My realisation based on my research is that we are not trying to create experts, rather we are trying to help students develop their own expertise. Analysis of what the research participants said appears to show that similar thinking informs their understanding of a learning journey and an amended-Benner approach for sport science is offered below. Benner's model (1984; 2004) is based on a model of skill acquisition presented by Dreyfus and Dreyfus (1980). Bradley et al. (2022) base their rationale for improving sport science practice and employability based on developing the early stages of the Dreyfus' model (1980). My practice has evolved to use Benner's (1984) model in the same manner.

One way to at least begin to understand what skills and knowledge are important for sport science students to develop is to better understand their learning journey. Benner's (1984; 2004) novice to expert model highlights the systematic learning process that a nursing student moves through, developing knowledge, skills and understanding of a practice over time. Benner's (1984; 2004) model provides a framework to those, like me, who teach students in subjects that are required to blend scientific with socio-relational and contextual knowledge. The five-stage framework of nurse practitioner development can be applied globally to a nurse education setting or situationally to a particular clinical skill and it is particularly apt when conceptualising sport science practitioner development due to the intertwining of scientific and practice skills and knowledge in both fields.

Mary's [pracademic] description of facilitating learning and "not telling them everything" is reminiscent of Benner's (1984; 2004) work on developing from a novice to an expert practitioner. Part of the reason for eschewing a banking model (Freire, 1970) of education is that it is unlikely to provide value to students in their long-term development. Looking at practitioner development through this broader lens has implications for pedagogy among the pracademics I spoke to. Previously, I have mentioned that Margaret [pracademic] outlined how being a pracademic informed her assessment strategies. As previously mentioned, Bill [pracademic] emphasised the importance assessments that encouraging learning. Pracademics appear to value the long-term development of their students, but it is interesting that none of those that I spoke to were aware of work such as Benner's (1984; 2004). This similarities between nursing and sport science practitioner development have previously been outlined in chapter 2 and the novice to expert model has clear cross-over appeal for applied sport scientists yet this type of literature remains somewhat closed off to sport science academics. My research has shown me that pracademics and students are examining long-term development in the field but perhaps they are not fully utilising some of the resources available from adjacent fields.

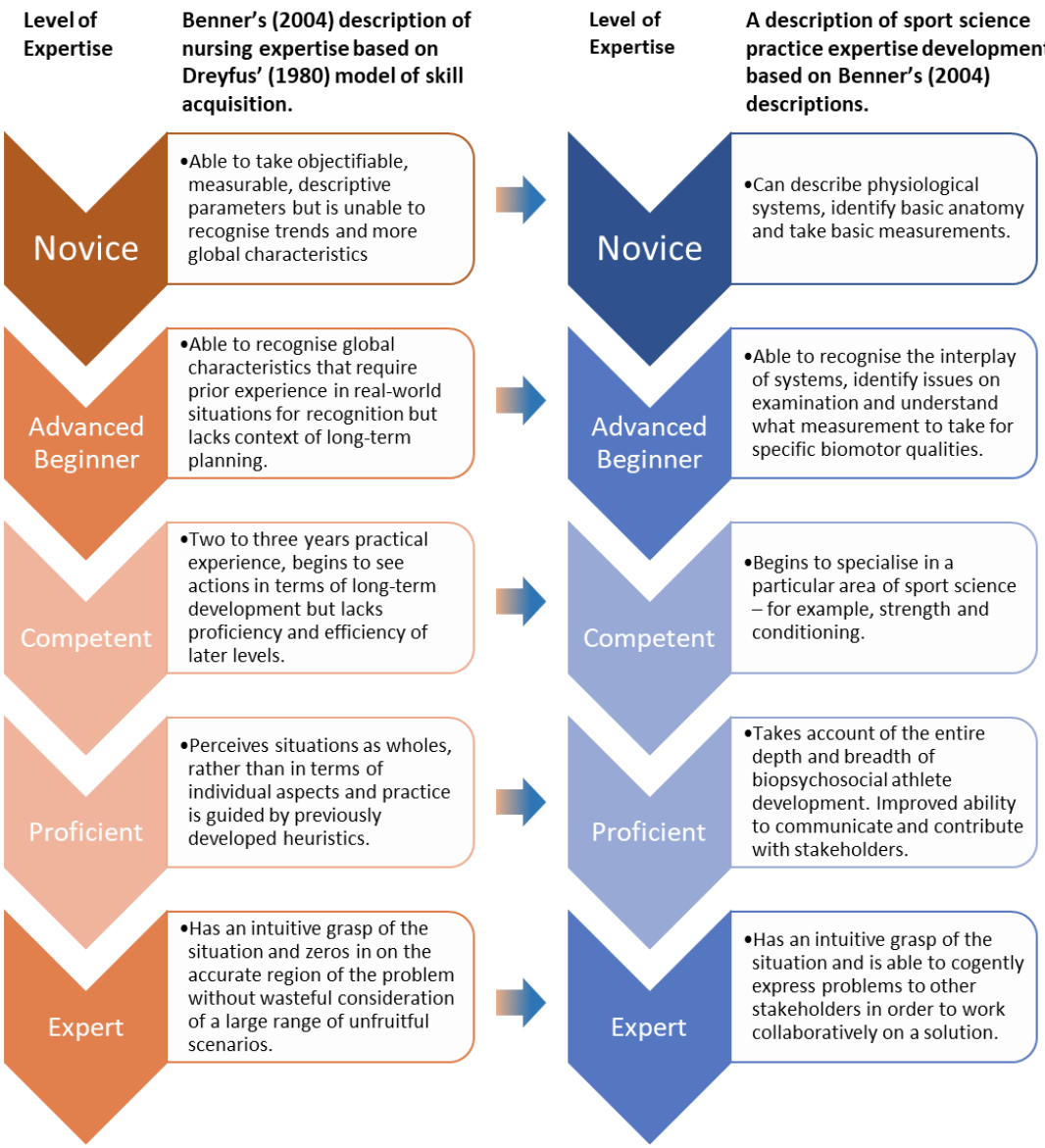



Figure 5.3: A description of sport science practice expertise development, based on Benner's (2004) description of nursing expertise using the Dreyfus and Dreyfus (1980) model of skill acquisition.

From an education perspective, it is useful for me to frame students' learning in terms of their development from novice to expertise. Benner's (2004) model, as presented in Figure 5.3, highlights a theoretical expertise development path for sport science practitioners. The first three levels, Novice, Advanced Beginner and Competent, as described by Benner (2004) reflect, in my opinion, the first two years of a sport science student's journey (Novice), the final two years of an undergraduate programme (Advanced Beginner) and finally, postgraduate experience or specialisation (Competent). The final two stages are somewhat harder to map onto a sport science framework and further research with proficient and expert practitioners is required to clarify the skills

and knowledge required in a succinct manner. Part of this is difficulties in interpreting how working from an intuitive base informs expertise as well as issues with defining concepts like intuition (English, 1993; Gobet & Chassy, 2008). Focusing on the first three levels and how they map onto a sport science programme is useful for me because it highlights a student's educational journey. Chapter 4 - section 4.3.3 - demonstrates that pracademics are cognisant of a student's journey but corresponding cognisance was not evident from the student participants. The pracademic participants spoke about how "every day is a learning day," [Bob, pracademic] and that we can create realistic practice scenarios in practical classes but "you can't simulate it to 100 per cent," [Mary, pracademic] but that there are chances for "lightbulb," [Margaret, pracademic] moments in a student's understanding of mixing theory and practice. Helping students to understand their own learning journey, and possibly informing them of models like the one presented above, may help develop more sustainable practice in sport science. Research by Sportsmith (2021a; 2021b; 2021c; 2021d) highlights that sport science practitioners come through an almost exclusively HE route, yet they do not remain in practice for long – the majority of survey respondents to Sportsmith were aged 35 years or younger, reflecting both the unsustainable work practices and relative youth of the field.

There are other reflections to be found in how Benner (1984; 2004) frames practice expertise development and how sport science practitioners are developed. In particular, Altmann (2007) argues that Benner's interpretive work could be more useful when viewed as more philosophical than theoretical – particularly as a framework that supports lifelong learning for practice. Examining scholarship on the novice to expert model may therefore allow sport science educators to scaffold their pedagogy for developing skills and expertise. Benner (1984) recommends that analytical and abstract methods be taught to beginners, and this is already evident in how sport science are structured in early years – such models will have resonance with how academics develop courses. Benner's (1984; 2004) model also points to the understanding of patient narratives as an important factor in developing nurse practitioners, particularly at later levels. This would also resonate with sport science practice in that practitioners will need to develop close working relationships with stakeholders such as athletes, coaches and fellow sport science practitioners (Bartlett & Drust, 2020). Jack's [pracademic] points about more, and ongoing, placements such as would be used in nursing, also points to a need for expertise to be developed in real-world, practical settings as Benner (1984; 2004) argues for.

However, on the contrary, it should be pointed out that one of the participants [Bob, pracademic], specifically argued for the inclusion of holistic modules that capture some of the practical skills required to work with people in a sport science role. Also, a major disagreement between my research and the benefits of creating an appropriate practical class setting is that Benner (1984, p. 184) wrote that "it is neither cost-effective nor practical to try to 'teach' [expertise] in formal educational programs." This particular point goes against the views of the pracademic and student participants who welcome efforts to develop practice-based expertise in practical classes. Perhaps if 'teach' was replaced with 'prepare' there would be more congruency, particularly given the desire of pracademics and Benner's (1984; 2004) model to frame education as part of a process of expertise development. Criticisms of Benner's work are not without merit, but one such criticism - that it is overly simple (Gobet & Chassy, 2008) - is potentially a strength when it comes to sport science academics using it to frame a student's learning journey.

### 5.5.3 Trying to ask better questions

How I look at my pedagogy has fundamentally changed during this research process. Gaining an understanding of qualitative research methodologies, different epistemologies and how research links with and influences teaching practice has been an important part of my journey. Freire (1970, p.52) posits the term "praxis" to describe the important relationship between reflection and action when searching for transformation. Whilst Freire's work focuses on creating a more just world, I think it also relates to how we carry out research and importantly implement learnings from research. Praxis in this context can therefore be viewed as the dialectal relationship between action (applications, activities, trials, or explorations) and research (inquiry, critical evaluation, advancing knowledge via reflection, understanding and wayfinding) (Zuber-Skerritt, 2001). When dualities like action or research, theory or practice, art or science are no longer viewed as do dichotomies but rather continuums, the possibilities for advancing knowledge and understanding suddenly become expanded. This way of thinking is evident in the dataset through the linking of theory and practice that both the student and pracademic participants spoke about. I see my own approaches to learning and pedagogy reflected in the what the participants shared with me. This give me a sense of collegiality with those in my field that I had not felt before. The findings and subsequent analysis tell me that sport science is not stuck arguing about what knowledge is more valid, the more important discussions have moved beyond that, and my research is a way of contributing to those discussions.

What I place value on from a research and pedagogy perspective have been greatly influenced by my research. Primarily this has come about through my interactions with scholars in adult education and the findings of my research. For example, my sport science background for a long time kept me focused on what McNiff (2015, p. 73) calls "full wh-" questions (who, what, when, which) in my pedagogy, those questions that offer descriptive answers – questions like who are the fast players on a team, what will be the outcome of a training intervention, when should athletes start their warm-ups, which physical quality is weakest in an athlete? These types of inquiry give descriptions of events or phenomena, but the findings may be limited by the context in which they were generated. "Semi wh-" questions (how, why), alternatively, offer explanations of events or phenomena (McNiff 2015, p. 74) and hence the context in which they are generated is implicit in the findings. This is not to say that these categories of questions are contrasting or incompatible, on the contrary they are likely complimentary. However, my pedagogy and general interest now has more emphasis on the 'semi-wh-' questions. Questions like how can knowing a player's speed profile influence programming and why is it important to know how students respond to a teaching method? This new emphasis is supported by the value that the students placed on the discussions during the practical classes, which Niall [student] remarked upon as being "very helpful". In the summative focus group session, students said that utilising the lived experiences of others is crucial when exploring discussions that might be dominated by 'semi-wh-' questions - "there might be someone in the group who has experience of it or had done it before and they can bring their experience," Tom [student]. They said that these sessions were where they learned most so this leads me towards continued reflection on why this might be the case. I can envision future research projects inquiring into this and other areas.

## 5.6 Summary

This chapter has sought to develop the core concepts of my research and try to clarify that which may not be immediately visible from the findings. Previous chapters have outlined the context of my research, focusing on the micro lens of my practice and the macro lens of what sport science is and how best to approach it. This context has now been applied to the findings.

Analysis concerning the learning environment, such as the one that I created through my ABL approach, highlights that creating a community of learners at its centre is beneficial

to students and is something that pracademics in sport science education seek. Previous research shows an awareness of the limits of didactic teaching methods (for example, Coffee & Hillier, 2008; Kelly et al., 2009) and a further acknowledgement that practical classes are potential sites for more communal learning experiences (Ladyshewsky, 2002; Croker et al., 2010; Weeks & Horan, 2013). A benefit of the ABL approach was that it allowed students to gain some understanding of the topic before taking part in discussions in class. This is in keeping with the findings research that is similar to my own on the use of ABL to create a vibrant learning community (Croker et al., 2020; Power & Cole, 2017). However, it must be noted that in implementing an ABL approach, emphasising and developing the activities and discussions that bring the online content into face-to-face teaching must be nurtured (Maunder, 2017; Lomer & Palmer, 2020). Finally, when analysing how students learned and pracademics set up learning experiences, it is clear that reflection is a key component of the learning process. This is something that the ABL approach gives students due to temporal space between viewing content and taking part in activities in practical classes. The work of Schön (1983; 1987), particularly on ideas reflection-in and on-action are instructive here in understanding how students and pracademics use past experiences to develop their learning and pedagogy.

My analysis on the art and science of sport science practice centres around one of the dominant discussions in sport science practice – is it a field of science or more of an artistic endeavour. It has become apparent from both the pracademic and student participants that although it is pitched as an art or science debate, this is not in fact the case. There appears to be a strong understanding among those that I interacted with that sport science practice encompasses both elements and it is more of a continuum than a dichotomy. Furthermore, this idea is broadly evident in literature on the topic of how sport science provision functions in practice (for example, Bishop, 2008; Taberner et al., 2019; Bartlett & Drust, 2020) and there appears to be a growth in recent years in literature exploring the combination of multiple ways of knowing in sport science practice (for example, Szedlak et al., 2019a; 2019b; Robertson & Joyce, 2019; Szedlak et al., 2020; 2021; Gamble et al., 2020; Allen et al., 2021; Callary et al., 2022; Downes & Collins, 2022). From the perspective of the pracademics that I spoke to, it is clear that their practice experience plays an important role in how to plan and conduct their classes and this can be viewed as lecturers delivering their pedagogy through a pracademic lens. Students also identified this as being an important part of their learning experience and seek out practice knowledge from their lecturers. This pracademic lens allows lecturers to develop multiple

ways of knowing in their students which has been identified as potentially an important development in how practitioners are educated (Nash & Collins, 2006). It is also clear that the benefits of pracademic experience, as identified in other fields, are applicable to sport science too. Having specifically targeted pracademics for my research, there is potentially scope to explore this topic further, questioning how prevalent are academics without a practical background and these academics approach their pedagogy in a different manner?

The students found the ABL approach to be broadly beneficial contextualising their learning, and in particular placing theory in practical context. This is in keeping with similar research on the topic (Croker et al., 2010; Power & Cole, 2017; El Sadik & Al Abdulmonem, 2021). Students deemed the ABL videos to be beneficial to their learning due to the realistic nature of the content – all videos included actual coaches instructing. Students already had a familiarity with ABL-type approaches before my research and this was not found to be the case just five years ago by Keogh et al. (2017). It is likely that advancements in digital spaces due to COVID-19 contribute to this (Kang, 2021; Ní Fhloinn & Fitzmaurice, 2021). Looking at the different learning situations via which student coaches learn, as described by Werthner and Trudel (2009), it appears that a range of learning situations - mediated, unmediated, and internal learning – all played a part in how the students engaged with and benefited from the ABL approach. Of course, no pedagogical approach is perfect and there are areas for improvement in how I implemented my pedagogy. The integration of problem or context-based learning strategies has previously been recommended (Whitelegg & Parry, 1999; Jones & Turner, 2006; Morgan et al., 2013) and this is something for me and those that wish to implement ABL approaches in the future to consider.

Overall, the students indicated that the ABL approach was beneficial to their learning experience. However, there were issues surrounding the types and amount of blended learning content that was provided prior to classes. These concerns mirror some of the experiences that the pracademics articulated, particularly on the types of examples that were given. The benefits of the ABL approach mirror those of other student-centred approaches in the literature and highlight practical examples of the dialogic philosophies espoused by Freire and Mezirow, as previously discussed. A key component of the ABL approach was that it allowed space for reflection between being introduced to a topic and attending the practical class on it. This, coupled with the emphasis that was placed upon reflecting the student's sporting own background, highlight the benefits of reflection on

and in action as described by Schön (1983; 1987; 1991). Students and pracademics both appreciated that the types of knowledge required in practice are not 'textbook' alone. They require practical development and the space to reflect on and in action to improve sport science provision.

A key component of any pedagogy is knowledge translation, and this is particularly so of sport science education. As previously noted, sport science research is dominated by positivist research practices (Uehara et al., 2016; Petrovic et al., 2017) that are situated in hypothetic-deductive theories of scientific (Woods & Davids, 2022). In practice sport science is different, with additional skills and knowledge on the psychosocial side of practice being important (Szedlak et al., 2019b; Gearity et al., 2021; Callary et al., 2022). If the aim of practical classes is in part to begin to prepare students for practice, then an important part of this is to begin to close the "know-do" gap (Graham & Tetroe, 2007, p. 21; Szedlak et al., 2019b). How pracademics conduct their practical classes and in particular their assessment of the knowledge developed in practical classes is important – this in particular has challenged my own pedagogy and assessment practices. Another challenge to my pedagogy has come from the work of Benner (1984; 2004) on the theory of novice to expertise in practice. In analysing this theory and how it frames a student's learning, it is clear to me that I have not been as cognisant as I should be to the development of a learning journey; in particular a reframing of Benner's (1984; 2004) theories towards more of a philosophical understanding of lifelong learning (Altmann, 2007) would improve my teaching practice. This resonates with how the pracademics spoke about their teaching and now informs my own thinking on the topic of a learning journey. Building on this development the analysis then looks at the type of questions that I am asking myself both from a research and pedagogy perspective. Here ideas of praxis (Freire, 1970) and McNiff's (2015) emphasis on asking questions that offer explanations of events and phenomena rather than descriptive answers, are instructive in analysing my own learning journey.

In this chapter I have analysed the main findings of my self-study research and highlighted key areas of development of practice – both my own and within the wider field of sport science education. In the final chapter all elements of my research are combined, connected and considered in relation to drawing out the implications of my self-study.

# Chapter 6 - Conclusion

## 6.1 Prologue

My gateway into sport science was my own participation in track and field and I have always been particularly drawn to how sport science tries to understand this most primal of sports. In 2008 Usain Bolt exploded into the world's consciousness, running 9.69 s to win the 100 m title at the Beijing Olympics and smash his own world record. The real surprise for track afficionados came when he broke the 100 m world record for the first time in May of 2008, running 9.72 s; prior to that season his 100 m personal best was 10.03 s. 10.03 to 9.69 s is a quantum leap in 100 m sprinting. Although speculative glances about performance enhancing drugs inevitably followed, Bolt's legitimacy was boosted by his stellar underage sprinting career – he had won the 200 m at the 2002 World u20 Championships at the age of 15. The most surprising part of his 100 m performances was that he did not fit the anthropometric profile of an elite 100 m sprinter (Charles & Bejan, 2009). At 1.95m tall, Bolt is 7cm taller than any other 100 m world champion in history (Wood, 2021). I recall Bolt being viewed as an exceptional talent over 200 m where the difficulties in accelerating from blocks that taller, rangier athletes experience are less consequential. Taller athletes can have higher top speeds thanks to long legs being able to apply greater ground forces (Weyand et al., 2000). When Bolt first set the 100 m world record in May 2008 the man who came 2$^{nd}$, then reigning world champion Tyson Gay, remarked that "It looked like his knees were going past my face," (Layden, 2008) such was his height. Tim Layden, a respected senior writer with Sport Illustrated remarked that the "performance inspired talk of athletic evolution," (Layden, 2008) and it did. As an undergraduate student in 2008, I remember discussing Bolt's performance in a biomechanics class where the lecturer remarked something akin to 'knowing what we know about sprint mechanics, Bolt should not physically be able to do this', an assertion that is supported by retrospective modelling of Bolt's performances (Beneke & Taylor, 2010)

This was the first time that I understood knowledge and understanding to be flexible and relational. Performances like Bolt's challenge what we think we know about sport science and what types of knowledge are fore fronted. Bolt and his coach, Glen Mills, obviously saw potential in the 100m that traditional knowledge of elite 100m sprinters did not. More tacit knowledge, practice knowledge and an understanding of their coach-athlete relationship was potentially far more beneficial to Bolt and coach Mills than

what published biomechanical analysis could tell them. That's not to say the coach Mills did not focus on the technical aspects of Bolt's sprinting – by all accounts he did (Korney, 2016) but it was not exclusively technical-rational knowledge that led him help produce the greatest sprinter of all time. Subsequent analysis of Bolt's performances have tried to explain why and how he was so fast (for example, Beneke & Taylor, 2010; Clark, 2022). Beneke and Taylor's (2010) explanation of Bolt's phenomenal performances is based on research conducted in advance of him coming to prominence and shocking the world. For example, one of the first recognised pieces of sport science research is cited; Hill, 1938. This type of retrospective research is useful in understanding phenomena and giving us declarative knowledge to improve sport science practice but so too is the tacit and situational knowledge of Bolt and coach Mills.

Part of my research has been about acknowledging and spotlighting that the range of knowledge and skills required by sport science practitioners is largely already held by sport science pracademics. I have found that practical classes may be ideal sites to develop and nurture this array of knowledge, but I have also been challenged to ensure that I am appreciating and developing the different types of knowledge that my students bring.

## 6.2 Implications of my research

The examination of my teaching practice through self-study was designed to answer two key questions - how can I incorporate applied sport science practices into practical sport science classes in order to facilitate an effective student learning environment; and how can I use practical class content to enable students to engage in theoretically informed self-reflective practice?

In response to these questions I have found that by acknowledging the multiple ways of knowing required in sport science practice and understanding how I, as a pracademic, and students conceptualise this is crucial in facilitating effective learning environments; and that the use of active learning approaches helps to develop learning communities through a focus on reflective engagement with theory and a scaffolding of practice-focused competencies alongside traditional forms of theoretical knowledge. It is important to note that in providing answers to the two key questions I have also found that a framing of higher education as a foundation for developing future expertise can assist sport science

educators in developing programmes to improve the effectiveness of practice and that pracademics may be uniquely placed to implement this approach.

Chapters 1 and 2 of my research outlined the context of my teaching practice and in particular situated my research within my site ontology (Schatzki, 2002). In chapter 3 the methodology and methods - including a specific ABL approach to pedagogy - that were used to examine my teaching practice are described in detail. Chapter 4 outlined the findings of my interactions with others on and about the ABL approach to pedagogy. Whilst the ABL approach formed the basis of these interactions, its primary function was to frame my interrogation of my teaching practice in a self-study style and engage in critical self-reflection. This process of reflection informs the analysis of findings, as laid out in the previous chapter.

This section addresses the issues of how my research adds to the field's understanding of sport science education at higher level. Implication of findings is considered in the areas of pedagogy, practice and developing sport science programmes.

### 6.2.1 Pedagogy

In keeping with previous research on the implementation of ABL approaches to learning (Croker et al., 2010; Power & Cole, 2017; El Sadik & Al Abdulmonem, 2021), my research highlights the benefits of such approaches. Students deemed the ABL approach I took to be beneficial in contextualising theory and understanding how it may be applied in practice. As outlined in the previous chapter, my research on the implementation of ABL in practical classes further supports previous assertions that practical classes offer rich opportunities for developing communal, socially constructive learning spaces (Ladyshewsky, 2002; Croker et al., 2010; Weeks & Horan, 2013). The benefits of such dialogic approaches to pedagogy have previously been espoused by Freire (1970; Freire & Shor, 1987; Freire & Macedo, 1995) and Mezirow (1997; 2003). Despite having great influence on higher education in general and there being a clear correspondence between educating students and working with athletes, theorists such as Freire, Mezirow and others have yet to receive meaningful interrogation by sport scientists.

Woods et al. (2021b) introduced the idea of 'enskilment' to sport science in relation to motor skill acquisition whereby the learning or mastery of a skill is seen as inseparable from performing the skill in appropriate context to deepening attentiveness to contextual factors and allow for a self-regulating learning process. An important component of

creating effective learning spaces practice contexts is the development of opportunities for reflection-on and in-action (Schön, 1983; 1987). ABL and the associated active discussions on topics created opportunities for both. Within my sport science practical classes, there was an appreciation from student and pracademic participants that such reflective practices could be used to develop practitioner knowledge by building on prior experiences. Furthermore, it is evident that among my participants the oft mentioned art or science dualism is considered as a continuum. This reflects a range of scholarship in sport science calling for the development of practitioner skills and knowledge to better integrate psychosocial and practitioner competencies with biomedically-focused didactic knowledge (for example, Szedlak et al., 2020; Gamble et al., 2020; Allen et al., 2021; Sandbakk, 2021; Szedlak et al., 2021; Callary et al., 2022; Downes & Collins, 2022). Such an approach to education would counter the dominant positivist research-informed practices that have traditionally been associated with sport science (Woods & Davids, 2022) and may help to close the "know-do" gap in sport science practice (Graham & Tetroe, 2007, p. 21; Szedlak et al., 2019b).

Issues of knowledge development are influenced by lecturers identifying as pracademics. The important role that pracademic experience can play in teaching and learning is evident across a diverse range of fields (for example, Bushouse et al., 2011; Collins & Collins, 2019; Dickfos, 2019; Hollweck et al., 2021). Student participants in my research were receptive to pracademic lenses and sought to develop practice knowledge in practical classes. According to my research, identifying as pracademic is instructive in how classes are planned, taught, and assessed. This allows the lecturer to model, scaffold, and build practical abilities in students. This novel research has specifically explored the concept of pracademic in a sport science education setting for the first time and contributes understanding to how sport science educators perceive and deliver their pedagogy. As previously discussed, Bradley et al. (2022) advocate for embedding entrustable professional activities (EPA) into sport science curricula as a way of improving the skills and competencies of sport science students. Bradley et al. (2022) developed this approach based off a similar expertise development dilemma as my research – developing pathways for all students to improve their practice and to act as a pedagogic strategy to improve employability. Finally, conceptualising a student's learning journey through a philosophical lens based on models such as Benner's (1984; 2004; Altmann, 2007) and viewing HEIs as a site to lay the foundations for developing

progressively towards expertise may be instructive when designing sport science education programmes.

### 6.2.2 Practice

My research is an in-depth examination of my teaching practice through a practice theory lens. Practice theory encourages inquiry of practice based on the interaction between individual actions and the social context in which they take place (Nicolini, 2012). This lens has been useful in framing how I can examine my role as a sport science educator in the wider contexts of the sport science practice and education. My understanding of the social and historical contexts of the field of sport science has developed considerably, as has my understanding of the place of sport science education within it. Schatzki's (2002) description of a distinctive site ontology encapsulating one's practice has been particularly instructive in helping me understand the importance of examining these contexts. In doing so I have developed a more nuanced understanding of the generally unchallenged epistemic dichotomy of art or science debate in sport science which functions to separate theoretical knowledge from the practical process of knowing (Woods & Davids, 2022). As referred to in the previous section, the contributions of the student and pracademic participants highlight to me that others in the field see the art and science of sport science as a continuum rather than a dualism and, whilst this is congruous with my position on the topic, it was not a position that I was overtly aware of others holding. In particular, the students descriptions of developing a range of knowledge is instructive and encouraging to me in trying to nurture multiple ways of knowing in my students.

Throughout this doctoral process there have been 'aha' moments. Most of these have been described in this and the previous section. However, the slow realisation of the power of a praxis view on personal inquiry (Freire, 1970; Zuber-Skerritt, 2001) and the need to ask better questions about practice (McNiff, 2015) have been the most revelatory. Coming from a discipline where research methodologies are rooted in philosophical positivism and hypothetic-deductive theory (Uehara et al., 2016; Petrovic et al., 2017; Woods & Davids, 2022), it required an almost complete relearning of what research is and could be. There is some evidence that my pracademic colleagues were already aware of the limitations of the dominance of one form of research in our field of sport science, but it was not something that I was fully cognisant of until I began the DHAE journey. My naive understanding of scholarship was something I explored from the earliest days of the DHAE programme when I wrote about the capricious nature of the world we live in

and how this is incongruous with much of our scientific methods. However, until when I began to explore the theoretical tenets of action research that it did become apparent that I really appreciated how such approaches could help me to improve not only my doctoral research but also my everyday practice as a sport science educator. This realisation reflects a positive outcome in my desire to use the DHAE programme as a sort of teacher training programme, as outlined in chapter 1.

Epistemology is not a word I was familiar with when I began the DHAE programme and other than describing it as the study of knowledge, I am not sure I could articulate its meaning much further. The idea of an epistemological chain though is something that does strike me as interesting and also useful when I think about how I have progressed. Grecic and Collins (2013) refer to an Epistemological 'Learning' Chain (ELC) when proposing a decision-making framework to assist coaches. Here ELC is "the interrelated/ connected decisions made that are derived from high-level personal beliefs about knowledge and learning" (Grecic & Collins, 2013, p.153). See Appendix J for a more detailed description of a sports coaches ELC. In many ways, I feel this DHAE journey has been about developing my own epistemological chain. It is a journey that undoubtedly began many years ago but with this programme and the development of this thesis, I now have a better understanding of knowledge, or more precisely combinations of different types of knowledge, which has improved me as both an educator and an applied practitioner. Instead of believing that there is knowledge out there and if somehow attained, I will be better at what I do, I now focus on having a journey full of curiosity, discovery, and intrigue to develop my range of skills and knowledge.

### 6.2.3 Programmes

Figure 6.1 is a restating of Figure 5.3 which offers a theoretical description of sport science practice expertise development based on the work of Dreyfus (1980) and Benner (2004). As previously mentioned in Chapter 5, the first three levels, Novice, Advanced Beginner and Competent can be viewed as the first two years of a sport science student's journey (Novice), the final two years of an undergraduate programme (Advanced Beginner) and finally, postgraduate experience or specialisation (Competent). Using these descriptions as a framework, it is possible to consider what a revised programme and approach to knowledge development in sport scientists might look like.

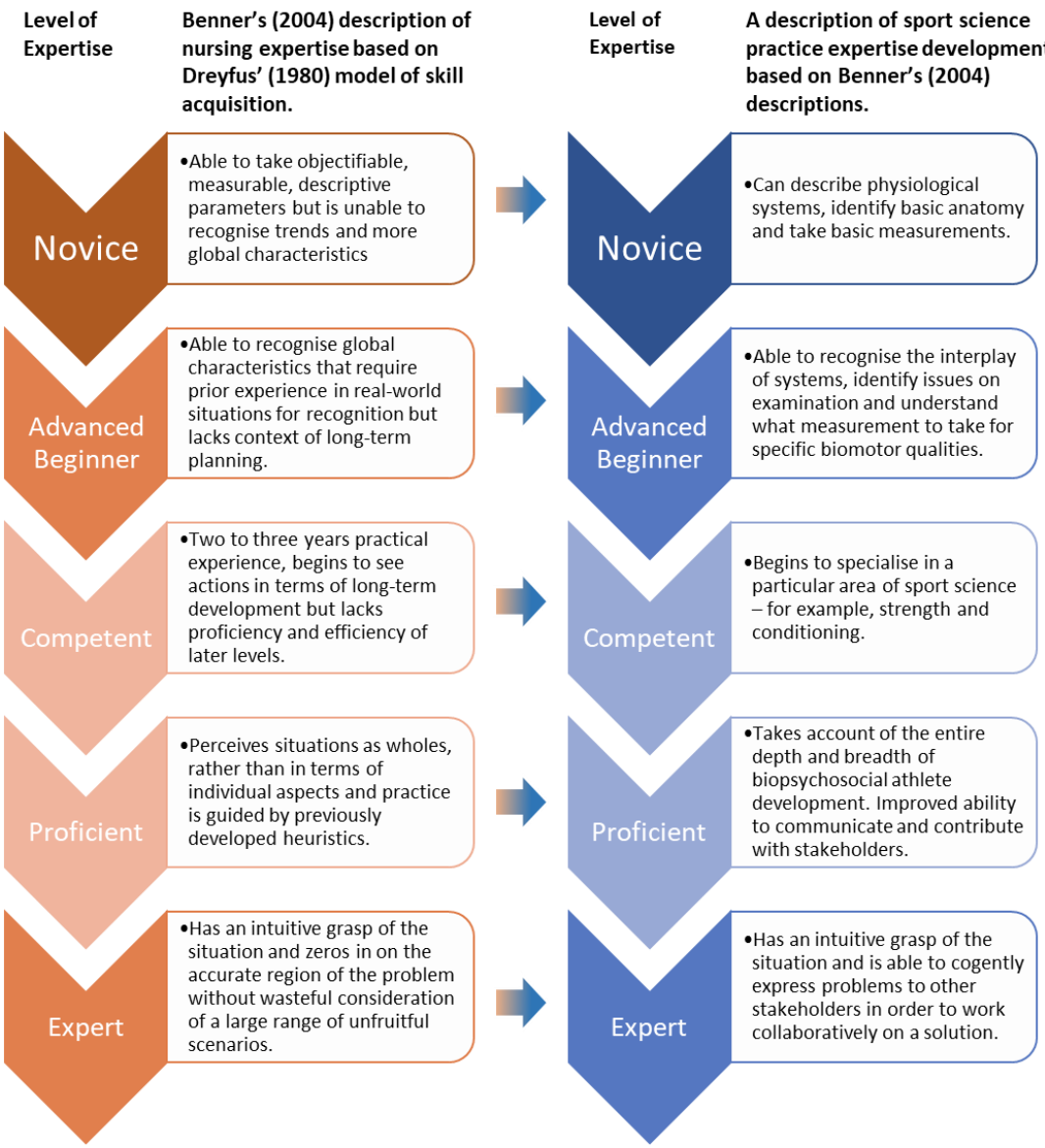



Figure 6.1: A description of sport science practice expertise development, based on Benner's (2004) description of nursing expertise using the Dreyfus and Dreyfus (1980) model of skill acquisition.

For the first and second year sport science students, considered Novice in Figure 6.1, the development of declarative knowledge is of primary importance. That is, the development of knowledge on the foundational principles of sport science – for example, being able to describe physiological pathways such energy systems and the ability to identify primary anatomical structures such as the origins, insertions and innervations of key musculature. However, foundational scientific concepts related to the physical and biological sciences are also required. Much of this information is accepted fact within the sport science community and there is often little subjectivity associated with modules during the first two years of a sport science students' education. This leads pedagogical approaches

towards what Freire (1970) describes as a 'banking concept of education' where the focus is on students being taught, rather than learning for themselves. This sentiment was shared by all pracademic participants, in particular Bill [pracademic] who outlined how being taught physics by a physicist may not be the most optimised mode of developing sport scientists. Scenarios such as this highlight the need to develop educational strategies that incorporate more active learning approaches, reflection on past experiences and current understanding, and collaborative dialogue to develop a more rounded understanding of the declarative aspect of a sport science student declarative knowledge development. Whilst developing declarative knowledge on foundational principles is an important component of the Novice stage, my research has shown that to develop sport science students for practice, we must be cognisant of the range of ways of knowing within sport science and focus pedagogy accordingly.

The theoretical description of the Advanced Beginner in Figure 6.1 continues the development of the sport science student and this should also be viewed through the lens of key educational theories. The Advanced Beginner level outlines an ability to recognise the interplay of systems, identify upon assessment a variety of key concepts and sport science specific knowledge, and an understanding of the practical skills associated with key concepts. It can build on the declarative knowledge developed during the previous Novice stage and take advantage of the pracademic nature of many sport science academics. The student and pracademic participants that took part in my research all outlined the importance of creating constructive learning experiences for the development of applied practice knowledge. Whilst not directly assessed in this research, it is likely that sport science specific constructive learning experiences would be difficult without the foundational knowledge of the Novice Stage.

My research points towards a characterisation of graduates being competent but not yet experts as being an important conceptualisation. As students transition from final year students to postgraduate practice or academic specialisation they can be described as reaching the third, Competent, stage whereby the sport scientist has some practical experience and can see actions in terms of long-term development but lacks the proficiency and efficiency of later levels. Much of the criticisms of sport science practice centres around a lack of proficiency, ineffective practice and a failure of degree programmes to prepare graduates for the real world scenarios (for example, Fullagar et al., 2019b; Bartlett & Drust; 2020; Winkelman, 2020; Ingham, 2022). However, when tertiary sport science education programmes are framed as a foundation for developing

future expertise, rather that the realisation of expertise, educators can focus on developing programmes that improve the effectiveness of sport science practitioners at later stages of their careers when they are more likely to have meaningful impact.

It is clear that theories of expertise development, such as Benner's (2004), can help conceptualise revised approaches to educating sport science students. As previously discussed, the final two stages, Proficient and Expert, are somewhat harder to map onto a sport science education framework as they go beyond the learning outcomes associated BSc and MSc programmes. However, it is beneficial to understand how practitioner expertise develops to the highest points. Using theory of expertise development, coupled with an understanding of adult educational theory and effective pedagogies will assist the field of sport science in developing appropriate education programmes, and in understanding the role of higher education in developing experts.

## 6.3 Becoming a critically reflective practitioner

> Teachers worth their salt want to do good work
>
> - Brookfield (2017, p. 81)

My approach to this research reflects a form of critical reflexivity espoused by Stephen Brookfield (2017) in 'Becoming a critically reflective teacher'. Brookfield (2017) advocates going beyond the act of remembering to incorporate sceptical analysis of thoughts, memories and feelings for critical reflection. This means treating oneself as a study subject, such as conducting self-study research on teaching. In keeping with this description of self-inquiry, I have taken a deliberate, contemplative rational approach to examining my teaching so as to avoid getting caught up in the immediacy of feeling something. For example, when being challenged in the classroom or having a great experience in the classroom, the goal - according to Brookfield (2017) - is to avoid being immediately reactive and become more objective in assessing teaching practice through contemplative critique of what has happened. The objective of such an approach is to gather and interpret facts to come to a better understanding of an authentic voice and aligning teaching practice to wider values and ideals. This reflects the conversations with colleagues that I mention in chapter 1 where notions of pragmatic pedagogy and practice become intertwined with idealist notions of education and what sport science is. Brookfield (2017) argues that such an approach not only benefits the teacher and their

teaching practice but also the students. This is something that I agree with. The first part of this dual benefit is derived from teachers making decisions based on critically informed logic and students get a better educational experience. The second benefit is particularly applicable to my practice as a sport science educator, as the students benefit from observing reflective practice and then developing this technique themselves. Having discovered 'Becoming a critically reflective teacher' (Brookfield, 2017), I found that much of the discussion on teaching practice accurately framed my approach to self-study.

Brookfield (2017) outlines four lenses that should be looked through when gathering data for reflective analysis. These lenses are students' eyes; colleagues' perceptions; personal experience; and theory (Brookfield, 2017). The students' eyes is perhaps the most important of the four lenses according to Brookfield (2017). Brookfield (2017, p. 67) posits that:

> In order to make good decisions about the ways we organize learning, construct assignments, sequence instruction, and apply specific classroom protocols we need to know what's going on in students' heads.

This lens corresponds with my use of weekly formative feedback and a summative focus group session with the students. The value of these feedback sessions was in gaining insight into how the students felt about my teaching practice specifically but also about the field of sport science and sport science practice more widely (Brookfield, 2017). This lens provided context and allowed me to make decisions on what was beneficial for the students. Whilst there were clear benefits from student participation in my research and Brookfield (2017) advocates strongly for the inclusion of this lens, it must be pointed out that my methods deviated from Brookfield's (2017) position that student anonymity is an important component of gaining accurate information.

Discussion with colleagues offers opportunities to ask for advice and feedback from colleagues, or to articulate dilemmas in a more coherent manner. Such interactions are termed looking through the colleague perception lens (Brookfield, 2017). Whilst this type of reflection is often informal – Brookfield (2017, p. 70) notes that it is often "in corridors, cafeterias, and sometimes online the real work of teaching is shared," – it may also be engaged in a more formal manner. This was the approach that I have documented in my research. I utilized critical friends to whom I described problems, outlined preliminary solutions, and asked for their suggestions on my process. In doing so I gathered advice on how to frame and implement my pedagogy, discovered others were using similar

teaching methods to me for similar reasons and developed a greater understanding of my practice.

The personal experience or autobiographical lens focuses on thinking about one's own experiences. For example, I drew upon Schön's (1983; 1987) descriptions of reflection-in and on-action to explore my own experiences through recursive action research cycles in Phase Two of the fieldwork, as well as positioning my practice with the site of sport science education. I also used cognitive reflection on my experiences of teaching and being taught, my experiences in sport science practice and reviewing and planning with the recursive research processes. My reflection process is discussed in detail in the next section.

The theory lens focuses on teachers taking an evidence-informed approach whereby pertinent literature is consulted before making teaching decisions, deciding on topics, or planning interventions (Brookfield, 2017). Brookfield (2017) also tells us that teachers should be in regular consultation with theory so as to gain insight into dilemmas before and after they are encountered. This lens is evidenced by my examination of the historical, social, educational and practitioner contexts of sport science education as discussed in chapter 2. A deeper interrogation of this lens also highlights that theory has allowed me to frame and interpret what I was seeing in practice but could not fully describe. For example, my reading of the work of Benner (1984; 2004) lead me to a better articulation of what a successful sport science student's journey to effective practitioner may look like. I distinctly recall a DHAE group supervision session where I described how sport science graduates are criticised for a lack of practice knowledge without having any regard being given to how practitioners develop such competencies. As Brookfield (2017, p. 151) states "reading educational literature can help us investigate the hunches, instincts, and tacit knowledge that shape our pedagogy". Furthermore, the theory lens is reflected in my research as Brookfield (2017) advocates for teachers contributing to theory through their own pedagogical insights. As referenced in chapter 1, part of the motivation of doing a self-study of my teaching practice is to contribute to the field of sport science education in a meaningful way.

Brookfield's (2017) four lenses provide me with a scaffold to view my research as a whole and to coalesce the range of contexts, experiences, viewpoints, and theoretical arguments that inform my teaching practice. Using the four lenses as prompts will assist me with future dissemination of my research and allows me to better articulate the processes that I took to better understand my teaching practice and effective sport science practice.

Furthermore, from a personal and professional development perspective, the four lenses allow me to position myself as a learner in my own teaching practice. This supports my desire to develop my teaching practice and to use this doctoral programme as a form of teacher training, as outlined in chapter 1.

## 6.4 Developing my own reflective practice

Being a reflective practitioner has always come reasonably easily to me but formalising that reflective process has been incredibly difficult. My reflections tend to be very cognitive in nature. I run stories through my head – real or imagined – that reflect what I am considering. Shaping them into physical words on a page feels unnatural. My thinking process is one of "working-out and working-through of knowledge" (O'Neill, 2015, p. 9). I 'storify' (Aura et al., 2021) my reflections in my own head. Often the same stories develop through various drafts before ever being finalised. Some stories have very specific narratives and are set around specific dates that have been or that will come. Others develop as mutations of previous stories and continue to swirl around my head. For example, I have had countless meetings and discussions with my head of department about this thesis – all of them completely imaginary. This was not always my notion of 'reflective practice'. As discussed in chapter 1, vignettes and anecdotes are included to offer the reader insight and invite the reader to reflect and respond from their own practice perspective. These vignettes and anecdotes are all the result of storied cognitive reflections.

My notion of reflective practice was one that is formalised by writing the reflections down, using prompt questions and critiquing one's own writing. I do not fully understand why this is the case. Perhaps it stems from my own educational experiences whereby reflections were encouraged but always formalised within the confines of an A4 sheet. Within sports coaching literature formalised reflection has been written about extensively and models to promote reflective practice have been put forward. For example, Trudel and Gilbert (2013, p. 22) recommend that "the settings in which coaches work must be re-engineered to include formal, regular and guided support to help coaches engage in reflective practice and critical reflection". Examples of reflective processes in sport science are similarly constrained to linear processes (for example, Roy, 2018). I do not disagree with this notion of developing reflective practice. I also do not disagree with how reflective practice is recommended to students – for example, University of Galway has resources on how to develop reflective writing skills (National University of Ireland,

Galway, 2022) that I have shared with my students. However, struggling with my own reflections and developing my own reflective process has been an evolving process throughout my research journey. I have written reflections but most of which I do not find meaningful or valuable. They felt forced at the time and read as such. I find that the immediacy of the written reflection, despite often offering a fresh perspective and accurate detail, lacks the depth of analysis required to make events meaningful. I also find that the lack of interaction and outside perspective curtails my interpretations of what took place. Reflecting with, among and to others is my notion of reflective practice.

The objective-rational scientist in me has really struggled with the legitimacy of this reflective process but in exploring critical reflexivity among other scholars I draw solace in my individualised approach. I think of my storied reflections as McCormack (2014, p.163) articulates his reflective writing process as:

> a method of self-support in the border country of dissertation writing, one that supports emergent learning and that acts as an epistemological resource in using [thinking] processes that are congruent with the discipline of adult education.

A discussion with one of the lecturers on the DHAE programme first highlighted the value of my convoluted thinking process. My thinking process of telling stories in my head focuses on the storied experiences that I have or envision having. Connelly and Clandinin (1991; p. 121) make the distinction between 'story' and 'narrative' with regards to inquiry in that people live storied lives and tell the stories of those lives, whereas narrative research describes such lives by collecting stories and writing narratives of experience. My reflective process is one of storied reflections to tell the stories of my self-evaluation. Often my articulations about my research or contributions to conversations with classes are done through metaphors. As mentioned previously, I tend to storify my point through metaphors (Aura et al., 2021; Munby, 1986) and this reflects how I teach. The implementation of metaphors and a storified pedagogy (Aura et al., 2021) all stems from my storied reflections.

Continued engagement with the DHAE programme and adult education literature has further questioned my previous understanding of legitimate reflective practice. hooks (2014) challenged the traditional theory-driven outlook as being the only legitimate vehicle for academic study. hooks (2014) challenges instruments of power and repression in education and highlights the need to deconstruct biases and rethink teaching practice. Although hooks (2014) did not directly address reflective processes her overall message

of transgression resonated with me and helped me to question the orthodoxies that I had blindly followed as a supposed rational scientist. As someone whose education had been rooted in developing rational-theoretical knowledge but whose applied practice was primarily one of co-constructive, relational, and tacit knowledge, this brought a profound sense of belonging with the space that the DHAE programme had created. To develop this understanding has required many, many storied reflections but without an appreciation for there being more than one way to reflect on practice, I am not sure I would have gotten to here.

Ultimately, it is these storied reflections over an extended period of time that have led to the culmination of this thesis.

## 6.5 Contribution to sport science education

My research contributes to sport science education in both a theoretical and practical manner. From a theoretical perspective, my research offers two main contributions. Firstly, the application of a pracademic lens to sport science education and secondly, applying a pragmatic approach to applying theory from a range of disciplines to address my research question. Practically, my research offers an example of the implementation of an active learning approach to education. The homogeneity of positivist research designs within the field of sport science and a lack of interrogation of sport science education practices have been discussed in chapter 2. This, in part, meant that I had to develop my own theoretical understanding of sport science education to structure and assess my teaching practice. From a practice point of view, it meant looking to other fields to examine approaches to practical class teaching and considering what was congruent with my approach. To do this I centralised my own position as a sport science pracademic and explored scholarship from other areas of education to frame and interpret my research.

Placing sport science educational practices in the context of sport science practice is a key theoretical contribution of this thesis. I have previously outlined my pracademic identity and my research shows how an understanding of both education and practice can be leveraged to develop positive pedagogical outcomes. Figures 2.1 and 3.1 have visualised how a variety of academic and practice influences have influenced my pracademic identity. Figure 6.2 offers a visual representation of how these influences combine to form a supporting structure to my pracademic identity. The review of

literature highlights that sport science education is an under-researched area despite an understanding of what sport science is and how it functions being important factors in the development of sport science education programmes – this thesis highlights the lack of research into sport science education that is cognisant of the ways of knowing required in sport science. In examining some of the criticisms of sport science practice (for example, Balagué et al., 2016; Buccheit, 2017; Fullagar et al., 2019b; Bartlett & Drust, 2020; Couts, 2020; Gamble et al., 2020; Jeffreys 2020; Ingham, 2022; Woods & Davids, 2022) and applying an educational framework that has been highlighted as beneficial in trying to address some of these issues (for example, Ladyshewsky, 2002; Croker et al., 2010; Weeks & Horan, 2013), I have demonstrated that viewing education through a practice lens that is specific to the field of study is beneficial. The review of literature also highlights that higher level education generally and sport science adjacent fields, such as coaching, are well researched and may offer important insights into effective development of sport science education programmes. An ability to draw on such insights is strengthened by a pracademic lens as programme developers can identify commonalities and differences between other fields of educational theory and sport science education.

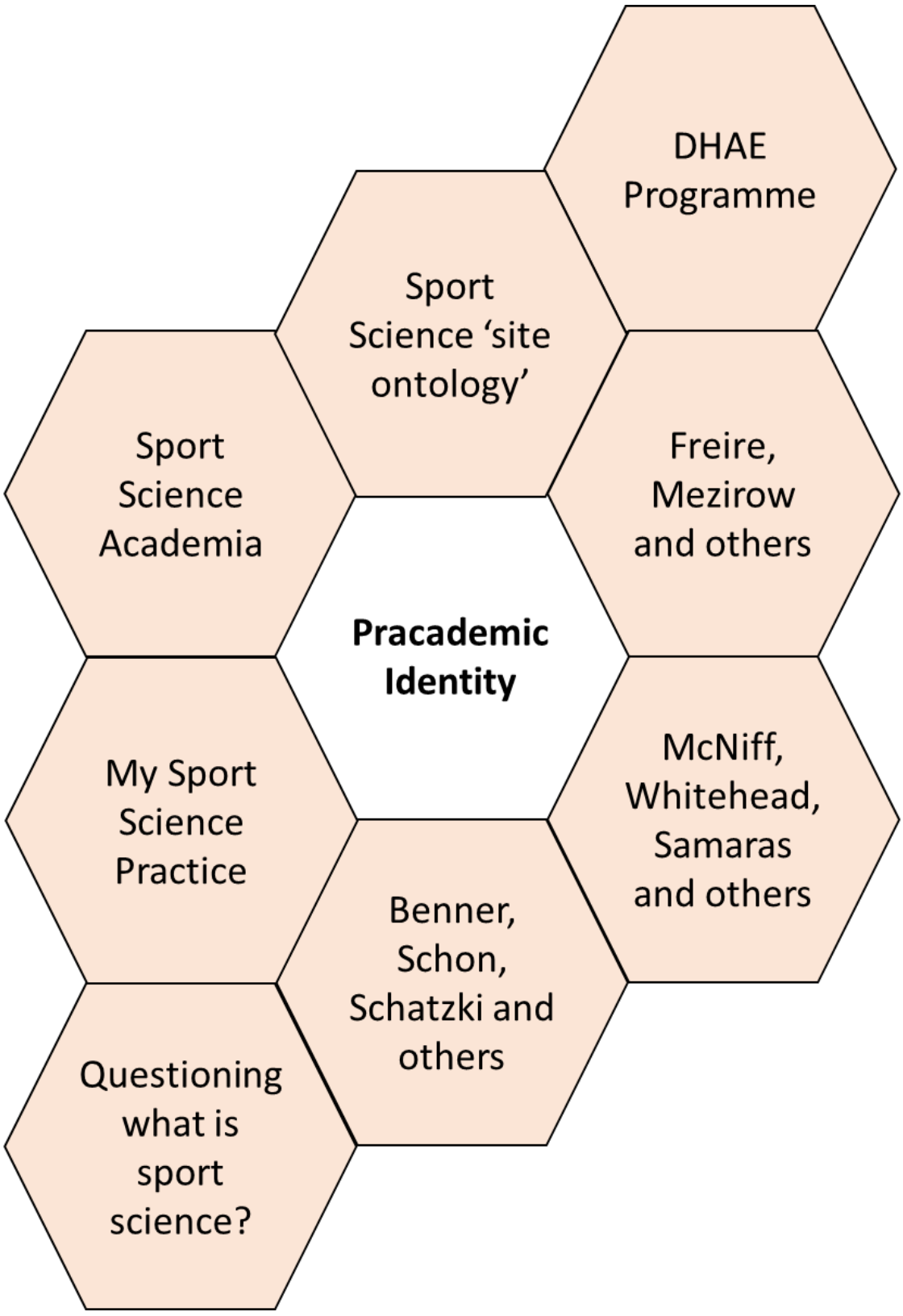



Figure 6.2: A visualisation of supporting influences on my pracademic identity.

The second contribution to theory of sport science education is a general to specific view of the field. Broadly sport science education can be likened to any field of higher education but there are also specific elements that are more nuanced and sport science specific. Throughout the thesis I have drawn on a range of scholars and areas of scholarship. In doing so I have applied what may be described a pragmatic approach to the use of adult education theorists to frame and theorise my pedagogical approach – I have utilised theory from a range of disciplines to address my research question. Central to pragmatic approaches to research is keeping a focus on the issues relevant for making decisions and taking action (Glasgow, 2013). Biesta & Burbules (2003), drawing heavily on the work of Dewey, posit that a pragmatic approach to education research offers the researcher an evolving working perspective which provides a clear understanding of the possibilities and limitations of research in, about, and for education. I have used scholarship that focuses on the macro issues that impact higher education pedagogy and micro issues related specifically to my own research methodology and sport science education. Broad understandings of adult education have been drawn from the work of Freire (1970; Freire & Shor, 1987; Freire & Macedo, 1995) and Mezirow (1997, 2003). Specific aspects of my research methodology have drawn from scholars in the areas of education and sociology on topics such as professional development (for example, Benner, 1984, 1996, 2004; Schatzki, 2002, 2005; Posner, 2009), reflective practice (for example, Schön, 1983, 1987; Moon, 1999), knowledge development (for example, Polanyi, 1962; Nonaka & Takeuchi, 1995, Nash & Collins, 2006), active learning (Lomer & Palmer, 2013, 2021; Armellini & Padilla Rodriguez, 2021) and qualitative research methodologies (for example, Whitehead, 1989; McNiff, 2002, 2013; Samaras, 2011; Samaras et al., 2019; Braun & Clarke, 2022). Finally, an understanding of sport science practice has been drawn from a range of scholars in the area (for example, Haff, 2010; Bartlett & Drust, 2020; Szedlak et al., 2020; Gamble et al., 2020; Szedlak & Gearity, 2020; Allen et al., 2021; Sandbakk, 2021; Szedlak et al., 2021; Callary et al., 2022; Downes & Collins, 2022; Woods et al., 2022a, 2022b; Woods & Davids 2022). This approach offers not only a methodological example of how to interrogate practice in a specific discipline but also how to theorise education within a specific discipline by adopting both a macro and micro lens to pedagogy.

My research offers a practical example of the implementation of an active learning approach to sport science education, one that is cognisant of the ways of knowing required in sport science practice. Chapter 4 outlines the student participants' broadly positive

experience of the ABL approach. Specifically, I implemented an ABL approach to the teaching of sport science practical classes which fostered the development of socially constructed knowledge among the students, allowed for reflection on their past experiences and theoretical content, and highlighted the benefits of the use of pracademic experiences in teaching and learning. As discussed in chapter 2, lecturers face challenges in the teaching of practical skills in subjects where theoretical knowledge and practical skills become intertwined and there are challenges primarily in providing learning experiences that emphasise opportunities to construct new knowledge rather than being taught in practical classes (Ladyshewsky, 2002; Coffee & Hillier, 2008; Kelly et al., 2009; Weeks & Horan, 2013, Keogh et al., 2017). This is mirrored by sport science lecturers needing to develop a range of skills and knowledge for applied sport science roles (Gamble, 2018; Szedlak & Gearity, 2020; Woods & Davids, 2022). Previously, an ABL approach to practical class education has been shown to develop these skills in science students (for example, Croker et al., 2010) but my research is the first example of such an approach among sport science students. Much of the research to date on sport science education, whilst informative and important in its own right, had limited regard for the practice requirements of sport science (for example, Keogh et al., 2017; 2021. My research is the first known documentation of the implementation of an ABL approach to sport science practical education and this offers sport science lecturers a practical example upon which to develop their own pedagogical approach.

## 6.6 Limitations

Limitations of my research stem from three main sources: the overall methodology of self-study; the methods of data collection; and a lack of understanding of the skills, knowledge and competencies required in sport science practice.

My research is a small-scale qualitative study in which I selected some of my students and pracademic colleagues to participate. Limitations include the researcher bias and the self-analysis nature of the data collected. Alongside this limitation, I faced the challenge of managing an extensive review of literature on my site of practice (Schatzki, 2002), coupled with an extensive methodology to gather input from student and academic participants – all whilst maintaining analysis of my own teaching practice as the heart of my research. As such the findings and analysis of my research may not be generalisable to other sport science academics without them also interrogating their teaching practice. Also, the research design and desire to situate my self-study within my site of practice

limited analysis of student content creation in weeks 10 and 11 of Phase Two due to time constraints. The full extent to which COVID-19 limited my research cannot be known but known limitations are set out in chapter 3.

"Local solutions" (Jeffreys, 2020, p. 4) are an important part of sport science practice and the lack of site-specific sport science practice research in Ireland limits my research. Sport science in Ireland is broad in terms of its application but lacks depth in some areas, such as S&C, compared to others, such as exercise physiology. As outlined in chapter 1, the field of S&C is prominent in Ireland and many of the roles of the S&C coach incorporate what may be more accurately described as sport science in other jurisdictions. My research is heavily influenced by my perspective of sport science practice, and as S&C is the area of sport science that I identify most with, this has had a strong influence on my research. Furthermore, the perspectives offered by the student and pracademic participants in my research relate to their experiences as sport scientists working in sport in Ireland. There is limited research on sport science practices in Ireland and my research has relied on scholarship in the area from other jurisdictions. Ireland is a unique environment for sport science provision as the main elite level sports teams are amateur. The dominant sports in Ireland are Gaelic games and whilst the number professional sport science roles in the GAA is increasing, this evolving landscape yet to be documented. This landscape is likely to be different to other countries given Ireland's unique sporting culture (Rouse, 2015).

The ethical issue of power dynamics between my students and I is a limitation. Feedback from students was considered an integral part of my research and the conduct of our discussions, and open dialogue with my students is in keeping with my social constructivist position. As mentioned in the previous section, Brookfield (2017) advocates for anonymised feedback from students to minimise power imbalances but this was not always possible in my research instance. It is notable that such challenges did not arise when formative feedback moved to the anonymised written responses in the final weeks of Phase Two, as outlined in chapter 3. Another limitation is that my research did not assess any conceptual shifts that students may have had as a result of their participation in this study.

Equitable and ongoing access to the VLE was an important and presumed part of my research but this may not always be the case. Although not an issue during the fieldwork of my research, student access to VLEs can be complicated. Access to appropriate devices and a degree of digital literacy is required. For example, in 2021 issues arose regarding

the issuing of government grants for students in Ireland (Wilson, 2021). This led to students undertaking the EC module in 2021 being unable to register for their course and therefore being unable to access to the VLE until midway through the semester. Lecturers should consider such issues when planning their pedagogy.

Perhaps the biggest limitation to my research is the lack of a clear definition of the skills, knowledge and competencies required in sport science practice. Although there has been an increase in scholarship on this issue in recent years, there remains a lot 'unknowns' about how effective sport science practice functions, and likely even more 'unknown unknowns'. Whilst my research demonstrates that both pracademics and sport science students acknowledge the requirement of range of skills and knowledges, what constitutes this range is less clear. Developments in our understanding of psychosocial competencies and research that looks beyond hypothetico-deductive methodologies to analyse sports performance in a more holistic manner is certainly required.

## 6.7 Future Research

My research and the process I undertook throughout offers me a new perspective on my teaching practice. I do not claim that my research is generalisable to all sport science academics, but it does aim to provide insight into relevant and contemporary concerns of continuous professional development in sport science education. As previously outlined, there are limits to my research and these limitations offer potential future lines of enquiry in exploring sport science education.

Previously, I have identified myself as a pracademic and analysis of findings in chapter 5 highlights the benefits of applying a pracademic lens to teaching sport science practical classes. Aside from modules on foundational sciences - such as physics and chemistry - I would consider all of my colleagues to be pracademics. Similarly, colleagues in other institutions have remarked that they observe the same. Furthermore, I cannot think of many lecturers from my own BSc or MSc degrees who would not be considered as a pracademic. The identity, role, and application of a pracademic lens in sport science education requires further examination. For example, it was beyond the scope of my research to ask where did the pracademic participants develop their conceptions of learning and education? Were they influenced more so by academic or practitioner experiences and how do these experiences interact with each other? My analysis indicates that practitioner experiences play a big role in conceptualising sport science and designing

educational strategies, but deeper examination is required to find out how this interacts with students and what their perspectives are.

From my perspective teaching is more about being the ‘guide at the side’ than the ‘sage on the stage’. Teaching is not about doing the same thing all the time but implementing the right practice at the right time. Like working with athletes, it can feel like a bit of a high wire act at times. One misstep such as giving too much information at the wrong time can leave a student confused and uninterested. Teaching requires a knowledge of a topic as well as organisational, pedagogical, motivational, and critical thinking skills. How I have tried to blend some of these skills and knowledge has been explored in my research, but deeper interrogation is required. As discussed in chapter 2 there is a growing awareness of the need to develop a range of knowledge and skills such as psychosocial skills in sport scientists. Chapters 4 and 5 highlight an appreciation among my participants of these issues, as evidenced by the science and art of practice discourse. However, despite recent good work in trying to define professional competencies in sport science practice (Callary et al., 2022), more research is required to gain a better understanding. For example, scholarship on sports coaching knowledge and skill development is far more advanced and this is reflected in literature concerning how sports coaches are educated. As described in chapter 2, sport science has much to learn from sports coaching in this regard. Also discussed in chapter 2 are conceptualisations of nurse practitioner development. Although my research has attempted to map a sport scientists learning journey onto Benner’s (1984, 2004) model, a more participatory research approach is warranted where a range of educators, students, practitioners, and stakeholders examine how to better understand sport science practitioner development.

As referred to in chapter 5, the integration of problem or context-based learning strategies in practical class teaching has previously been recommended (Whitelegg & Parry, 1999; Jones & Turner, 2006; Morgan et al., 2013). This was not explicitly considered when designing the ABL approach. Although contextualising classroom content is key component of ABL, the use of specific strategies in designing practical class activities was beyond the scope of my research but warrants future consideration.

## 6.8 Concluding remarks

As I conclude this thesis I return to the central inquiries of my research: examining my teaching practice so I can support effective learning and support sport sciences students

to approach the complexities of practice in a manner that is theoretically informed whilst embracing the multiple ways of knowing required for practice. I have argued that an understanding of context in which sport science practice takes place is crucial to creating more effective practitioners and this has become central to my teaching practice. Developing an understanding of practice and the need to develop a range of knowledge and competencies has become central. I have examined how similar fields of scholarship - nursing and sports coaching, for example - address the education and learning journey of practitioners. The examples of this scholarship continues to influence my teaching practice. The ABL process that I implemented back in the midst of the COVID-19 winter of 2020 continues to form the basis of much of my practical class teaching. However, I now question the how and why of what I do to gain more insightful explanations of my process (McNiff, 2015, p. 74).

As a pracademic, I have gained confidence that the personal and practitioner knowledge that I utilise in my teaching practice are important and valid. They are appreciated by students and their use is supported by sport science colleagues. Chapter 2 of my thesis is critical of the dominance of philosophically positivist research, and its influence on the field of sport science. This argument is not to call for an overhaul of sport science inquiry but rather to reiterate the importance of situating my observations within the core of my enquiry – my teaching practice (Woods & Davids, 2022). This self-study research is focused on my practice for the approval of the academy but also to act as a resource or example for my sport science colleagues. In placing my personal experience of teaching sport science into public knowledge I hope that others may learn from it, adapt it their contexts and in turn offer their experience and expertise. I learn a lot while teaching, it is my hope that others do to and that the students we encounter can continue to develop and grow.

# Final Epilogue

> Arriving at one goal is the starting point to another.
>
> - John Dewey (1903)

Back in the practical class, we are still working on acceleration mechanics. Our discussion has moved somewhat beyond the content of the video that the students viewed before the class and now they are asking how much influence we can have over an athlete's acceleration ability. Mark makes the point that track sprinters have ample time and opportunity to work on the finer aspects of sprinting – it is all they train for. Two full training sessions per week might focus exclusively on acceleration. However, he rightly compares this to team sport athletes who may have 15 minutes per week to focus on acceleration alone. As sport scientists we are often time poor but information rich. Being able to percolate all the scientific research and relational information and then distil it into an impactful training programme is difficult. It is an interesting discussion though and one that evolves throughout the semester.

"*OK, let's get everyone back in here for a minute,*" I call out to signify that it is time to finish today's practical class. It is 3:40pm on a Friday afternoon and students are probably done for the day and I most definitely am. I am drenched in that feeling of being exhilarated but tired from teaching. The students have been chatting amongst themselves throughout the class and that is usually a good sign. Everyone huddles around each other marking a collective space in the vast sports hall. We talk about some key points of the class, note some aspects that need to be revisited and I lay out a tentative plan for the following week.

At the end of the class two students hang around to chat about a specific part of today's topic. I outline my understanding of the theory behind it and offer some examples of how I use that particular training modality with my athletes. The crux of the matter is that theory provides an anchor for understanding movement but like any anchor there is a bandwidth within which the athlete's movement must be placed. It is not one fixed point for all. The students reciprocate with their understanding and outline some of their own training methodologies. We agree that we have generally similar approaches, but they are administered differently due to our unique contexts.

Finally, I gather up any remaining equipment and pack up my bag to head home. I notice the two students walking towards the door. They are deep in conversation as one holds the door for the other. They leave, taking the class with them.

# Appendices

## Appendix A: Pracademic Information and Informed Consent form


### INFORMATION AND CONSENT FORM FOR RESEARCH PARTICIPANTS

### Academic-Practitioner Participant Information Sheet

**Purpose of the Study.**

I am Desmond Earls, a doctoral student, in the Department of Adult and Community Education, Maynooth University.

As part of the requirements for a Doctorate in Higher and Adult Education, I am undertaking a research study under the supervision of Dr. Michael Murray.

The study is concerned with the interplay between the art of coaching and the teaching of sport science subjects.

**What will the study involve?**

The study will involve an interview about what the art of coaching means to you as a practitioner and how this influences your role as an academic. This interview will take place via telephone call, Microsoft Teams or some other mode of your choice. Interviews will last no more than 45 minutes and will take place at a time that is convenient to you.

**Who has approved this study?**

This study has been reviewed and received ethical approval from Maynooth University Research Ethics committee. You may have a copy of this approval if you request it.

**Why have you been asked to take part?**

You have been asked because you hold a teaching position in an Irish third level institute and provide sport science support to teams and/or individual athletes.

**Do you have to take part?**

No, you are under no obligation whatsoever to take part in this research. It is entirely up to you to decide whether or not you would like to take part. If you decide to do so, you will be asked to sign a consent form and given a copy for your own records. If you decide to take part, you are still free to withdraw at any time without giving a reason and/or to withdraw your information

up until such time as the research findings are published. A decision to withdraw at any time, or a decision not to take part, will not affect your relationship with Maynooth University.

**What information will be collected?**

The interview, with your permission, will be recorded. This conversation will be used to elicit a worldview of sports science professions and how graduates are prepared for practice. The recording will be used to help the researcher review key elements of the interview and will not be published or directly referred to in the research findings.

**Will your participation in the study be kept confidential?**

All information that is collected about you during the research will be kept confidential. No names will be identified at any time. All hard copy information will be held in a locked cabinet at the researchers' place of work, electronic information will be encrypted and held securely on MU PC or servers and will be accessed only by the principal investigator (PI), Desmond Earls.

No information will be distributed to any other unauthorised individual or third party. If you so wish, the data that you provide can also be made available to you at your request.

It must be recognised that, in some circumstances, confidentiality of research data and records may be overridden by courts in the event of litigation or in the course of investigation by lawful authority. In such circumstances, the University will take all reasonable steps within law to ensure that confidentiality is maintained to the greatest possible extent.

**What will happen to the information which you give?**

All the information you provide will be kept at Maynooth University in such a way that it will not be possible to identify you. On completion of the research, the data will be retained on the MU server. After ten years, all data will be destroyed (by the PI). Manual data will be shredded confidentially and electronic data will be reformatted or overwritten by the PI in Maynooth University.

**What will happen to the results?**

The research will be written up and presented as a doctoral thesis and may be published in scientific journals. A copy of the research findings will be made available to you upon request.

**What are the possible disadvantages of taking part?**

I do not envisage any negative consequences for you in taking part.

**What if there is a problem?**

At the end of the interview, I will discuss with you how you found the experience and how you are feeling. If you experience any distress following the interview you may contact Aware counselling service (www.aware.ie; 1800 80 48 48). You may contact my supervisor, Dr. Michael Murray (michael.j.murray@mu.ie) if you feel the research has not been carried out as described above.

**Any further queries?**

If you need any further information, you can contact me:

Desmond Earls

[redacted]

desmond.earls.2019@mumail.ie.

If you agree to take part in the study, please complete and sign the consent form overleaf.

**Thank you for taking the time to read this information.**

## Consent Form

I……agree to participate in Desmond Earls' research study titled: "An exploration of the applicability of an Active Blended Learning approach to teaching Sport Science practical classes".

**Please tick each statement below:**

The purpose and nature of the study has been explained to me verbally & in writing. I've been able to ask questions, which were answered satisfactorily.

☐

I am participating voluntarily.

☐

I give permission for my interview with Desmond Earls to be audio-recorded

☐

I understand that I can withdraw from the study, without repercussions, at any time, whether that is before it starts or while I am participating.

☐

I understand that I can withdraw permission to use the data right up to submission of thesis, which is envisaged to be in summer of 2022

☐

It has been explained to me how my data will be managed and that I may access it on request.

☐

I understand the limits of confidentiality as described in the information sheet

☐

I understand that my data, in an anonymous format, may be used in further research projects and any subsequent publications if I give permission below:

☐

**Please select as appropriate**

I agree to quotation/publication of extracts from my interview

☐

I do not agree to quotation/publication of extracts from my interview

☐

I agree for my data to be used for further research projects

☐

I do not agree for my data to be used for further research projects

☐

Signed……. Date…….

Participant Name in block capitals ……..

---

*I the undersigned have taken the time to fully explain to the above participant the nature and purpose of this study in a manner that they could understand. I have explained the risks involved as well as the possible benefits. I have invited them to ask questions on any aspect of the study that concerned them.*

Signed……. Date…….

Researcher Name in block capitals ……..

*If during your participation in this study you feel the information and guidelines that you were given have been neglected or disregarded in any way, or if you are unhappy about the process, please contact the Secretary of the Maynooth University Ethics Committee at research.ethics@mu.ie or +353 (0)1 708 6019. Please be assured that your concerns will be dealt with in a sensitive manner.*

*For your information the Data Controller for this research project is Maynooth University, Maynooth, Co. Kildare. Maynooth University Data Protection officer is Ann McKeon in Humanity house, room 17,*

*who can be contacted at ann.mckeon@mu.ie. Maynooth University Data Privacy policies can be found at https://www.maynoothuniversity.ie/data-protection.*

# Appendix B: Student Information and Informed Consent form

## INFORMATION AND CONSENT FORM FOR RESEARCH PARTICIPANTS

### Student Participant Information Sheet

**Purpose of the Study.**

I am Desmond Earls, a doctoral student, in the Department of Adult and Community Education, Maynooth University.

As part of the requirements for a Doctorate in Higher and Adult Education, I am undertaking a research study under the supervision of Dr. Michael Murray.

The study is concerned with the interplay between the art of coaching and the teaching of sport science subjects.

**What will the study involve?**

The study will involve you taking part in your Explosive Conditioning as normal. You will be asked to view material in advance of each practical class (maximum 5-minute video) and then in class you will reflect on the video and how the topic of the video feeds into your understanding of the class topic. Further group reflection such as a focus group on the entire 11-week module delivery will take place at the end of the semester. The final reflection will take no more than 40 minutes, all other reflections will take place in class-time.

**Who has approved this study?**

This study has been reviewed and received ethical approval from Maynooth University and the Institute of Technology Carlow Research Ethics committees. You may have a copy of these approvals if you request it.

**Why have you been asked to take part?**

You have been asked because you are an undergraduate student undertaking a postgraduate degree in a discipline of Sport Science.

**Do you have to take part?**

No, you are under no obligation whatsoever to take part in this research. It is entirely up to you to decide whether or not you would like to take part. If you decide to do so, you will be asked to sign a consent form and given a copy for your own records. If you decide to take part, you are still free to withdraw at any time without giving a reason and/or to withdraw your information up until such time as the research findings are published. A decision to withdraw at any time, or a decision not to take part, will not affect your relationships with Maynooth University or IT Carlow. Additionally, you will not be disadvantaged academically by not taking part or by withdrawing consent at any time.

**What information will be collected?**

Group reflections, with your permission, will be recorded. These conversations will be used to construct feedback from the group to the researcher. The audio recordings will be used to help the researcher review key elements of the reflections and will not be published directly the research findings.

**Will your participation in the study be kept confidential?**

All information that is collected about you during the research will be kept confidential. No names will be identified at any time. All hard copy information will be held in a locked cabinet at the researchers' place of work, electronic information will be encrypted and held securely on MU PC or servers and will be accessed only by the principal investigator (PI), Desmond Earls.

No information will be distributed to any other unauthorised individual or third party. If you so wish, the data that you provide can also be made available to you at your own discretion.

It must be recognised that, in some circumstances, confidentiality of research data and records may be overridden by courts in the event of litigation or in the course of investigation by lawful authority. In such circumstances the University will take all reasonable steps within law to ensure that confidentiality is maintained to the greatest possible extent.

**What will happen to the information which you give?**

All the information you provide will be kept at Maynooth University in such a way that it will not be possible to identify you. On completion of the research, the data will be retained on the MU server. After ten years, all data will be destroyed (by the PI). Manual data will be shredded confidentially, and electronic data will be reformatted or overwritten by the PI in Maynooth University.

**What will happen to the results?**

The research will be written up and presented as a doctoral thesis and may be published in scientific journals. A copy of the research findings will be made available to you upon request.

**What are the possible disadvantages of taking part?**

I do not envisage any negative consequences for you in taking part.

**What if there is a problem?**

At the end of each class, I will discuss with the group how you found the experience and how you are feeling. If you experience any distress following the class or group reflection you may contact SpunOut.ie for information on youth mental health (www.spunout.ie, 01 675 3554) and/ or Aware counselling service (www.aware.ie; 1800 80 48 48). You may contact my supervisor, Dr. Michael Murray (michael.j.murray@mu.ie) if you feel the research has not been carried out as described above. You may also contact Dr. Paula Rankin as Head of the Department of Science and Health at IT Carlow (paula.rankin@itcarlow.ie; 059 9175540) if you feel the research is not being carried out as described above or if you have concerns about how your participation may impact on your learning experience.

**Any further queries?**

If you need any further information, you can contact me:

Desmond Earls

[redacted]

desmond.earls.2019@mumail.ie.

If you agree to take part in the study, please complete and sign the consent form overleaf.

**Thank you for taking the time to read this.**

## Consent Form

I……agree to participate in Desmond Earls' research study titled: An exploration of the applicability of an Active Blended Learning approach to teaching Sport Science practical classes.

**Please tick each statement below:**

The purpose and nature of the study has been explained to me verbally & in writing. I've been able to ask questions, which were answered satisfactorily.

☐

I am participating voluntarily.

☐

I give permission for group reflections with Desmond Earls to be audio-recorded

☐

I understand that I can withdraw from the study, without repercussions, at any time, whether that is before it starts or while I am participating.

☐

I understand that I can withdraw permission to use the data right up to submission of thesis, which is envisaged to be in the summer of 2022

☐

It has been explained to me how my data will be managed and that I may access it on request.

☐

I understand the limits of confidentiality as described in the information sheet

☐

I understand that my data, in an anonymous format, may be used in further research projects and any subsequent publications if I give permission below:

☐

**Please select as appropriate**

I agree to quotation/publication of extracts from group discussions

☐

I do not agree to quotation/publication of extracts from group discussions

☐

I agree for my data to be used for further research projects

☐

I do not agree for my data to be used for further research projects

☐

Signed……. Date…….

Participant Name in block capitals ……..

---

*I the undersigned have taken the time to fully explain to the above participant the nature and purpose of this study in a manner that they could understand. I have explained the risks involved as well as the possible benefits. I have invited them to ask questions on any aspect of the study that concerned them.*

Signed…….  Date…….

Researcher Name in block capitals ……..

*If during your participation in this study you feel the information and guidelines that you were given have been neglected or disregarded in any way, or if you are unhappy about the process, please contact the Secretary of the Maynooth University Ethics Committee at research.ethics@mu.ie or +353 (0)1 708 6019. Please be assured that your concerns will be dealt with in a sensitive manner.*

*For your information the Data Controller for this research project is Maynooth University, Maynooth, Co. Kildare. Maynooth University Data Protection officer is Ann McKeon in Humanity house, room 17, who can be contacted at ann.mckeon@mu.ie. Maynooth University Data Privacy policies can be found at https://www.maynoothuniversity.ie/data-protection.*

# Appendix C: IT Carlow Confirmation of Ethical Approval

INSTITUTE of TECHNOLOGY CARLOW
Institiúid Teicneolaíochta Cheatharlach

## ETHICS IN RESEARCH COMMITTEE APPROVAL

| | |
|---|---|
| Faculty/Campus: | Science |
| Department: | Science and Health |
| Research Proposer: | Des Earls |
| Ethical Application Number: | 292 |
| Project Title: | An exploration of the applicability of an Active Blended Learning approach to teaching Sport Science practical classes |
| Thesis Adviser: | None |
| Medical Consultant: | None |
| Evaluation Date: | 9th December 2020 |

| | | | | |
|---|---|---|---|---|
| 1. | Procedures have been followed according to those laid down by the Institute | Yes ☑ | No | ☐ |
| 2. | Ethical approval granted | Yes ☑ | No | ☐ |
| 3. | Referred for resubmission | Yes ☐ | No | ☑ |

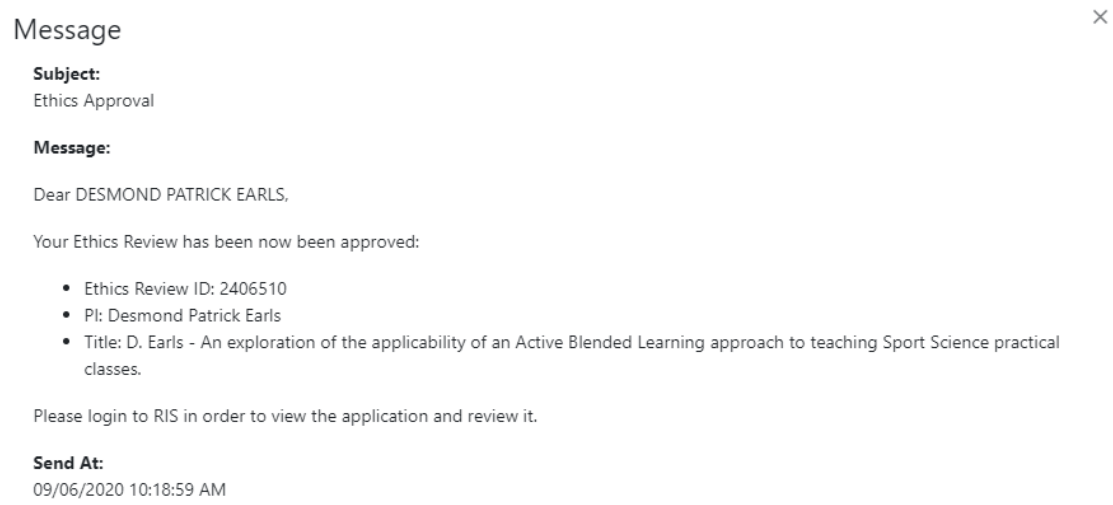
Reason for resubmission

**Signed**:

**DR BRIAN JACKSON**
Vice-Chairperson

Date: 17th December 2020

# Appendix D: Maynooth University Confirmation of Ethical Approval



Message

**Subject:**
Ethics Approval

**Message:**

Dear DESMOND PATRICK EARLS,

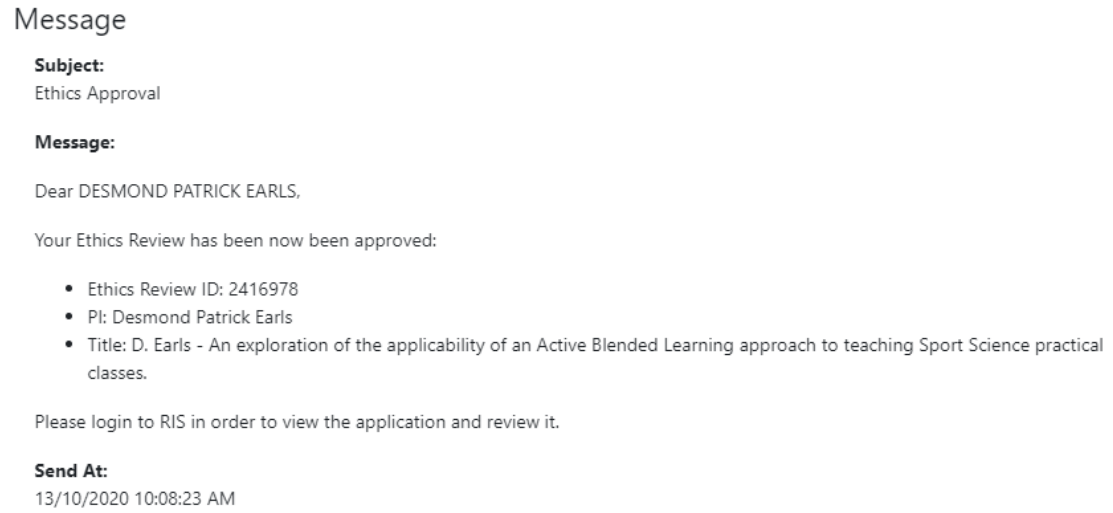
Your Ethics Review has been now been approved:

- Ethics Review ID: 2406510
- PI: Desmond Patrick Earls
- Title: D. Earls - An exploration of the applicability of an Active Blended Learning approach to teaching Sport Science practical classes.

Please login to RIS in order to view the application and review it.

**Send At:**
09/06/2020 10:18:59 AM

Figure D.1: Screenshot of confirmation of ethical approval for research by Maynooth University Social Research Ethics Subcommittee



Message

**Subject:**
Ethics Approval

**Message:**

Dear DESMOND PATRICK EARLS,

Your Ethics Review has been now been approved:

- Ethics Review ID: 2416978
- PI: Desmond Patrick Earls
- Title: D. Earls - An exploration of the applicability of an Active Blended Learning approach to teaching Sport Science practical classes.

Please login to RIS in order to view the application and review it.

**Send At:**
13/10/2020 10:08:23 AM

Figure D.2: Screenshot of confirmation of amendments to ethics application to allow for postgraduate student participants.

**Table E.1** Online ABL Content

| | Topic | Practitioner | Organisation | URL |
|---|---|---|---|---|
| 1 | Linear Warm-Ups | Ben Yauss | LA Galaxy | https://www.youtube.com/watch?v=kfQYzcIP2nw |
| | Multi-Direction Warm-Ups | Ben Yauss | LA Galaxy | https://www.youtube.com/watch?v=LBCCz3rNsXk |
| 2 | Low Amplitude Plyometric Hops | Jason Hettler | ALTIS | https://www.youtube.com/watch?v=bNjQ2gOizAI |
| 3 | Jump Profiling | Cody Bidlow | Athlete.X | https://www.youtube.com/watch?v=f-IBrOcATBI |
| 4 | Maximising Plyometric Effectiveness | John Sheppard | John Sheppard | https://www.youtube.com/watch?v=PtoM-d_pZv0 |
| 5 | Change of Direction | Lee Taft | Basketball Speed | https://www.youtube.com/watch?v=JSm58RMOMe4 |
| 6 | Deceleration | Jonas Dodoo/ Damien Harper | Speedworks | https://www.youtube.com/watch?v=0NUQm82LRmw |
| 7 | Acceleration | Jason Hettler | ALTIS | https://www.youtube.com/watch?v=mYrzRsZm8HU |
| 8 | Maximum Velocity | Jonas Dodoo | Speedworks | https://www.youtube.com/watch?v=cT17J7hgtgA |
| 9 | Resisted Sprinting | Loren Landow | NSCA | https://www.youtube.com/watch?v=uwDEyE6phDc |
| 10 | *Students select video of their choice* | | | |
| 11 | *Students develop a resource* | | | |

*Note*. Uniform Resource Locators (URLs) are correct as of 15/02/20

**Table E.1** Online ABL Content

| | Topic | Practitioner | C |
|---|---|---|---|
| 1 | Linear Warm-Ups | Ben Yauss | I |
| | Multi-Direction Warm-Ups | Ben Yauss | I |
| 2 | Low Amplitude Plyometric Hops | Jason Hettler | |
| 3 | Jump Profiling | Cody Bidlow | |
| 4 | Maximising Plyometric Effectiveness | John Sheppard | Jo |
| 5 | Change of Direction | Lee Taft | |
| 6 | Deceleration | Jonas Dodoo/ Damien Harper | S |
| 7 | Acceleration | Jason Hettler | |
| 8 | Maximum Velocity | Jonas Dodoo | S |
| 9 | Resisted Sprinting | Loren Landow | |
| 10 | *Students select video of their choice* | | |
| 11 | *Students develop a resource* | | |

*Note*. Uniform Resource Locators (URLs) are correct as of 15/02/2023

# Appendix F: Sample Practical Class Lesson Plan

D. Earls v. 2020

## Practical Class Plan

| | | | | | |
|---|---|---|---|---|---|
| **Module:** | Explosive Conditioning | **Week:** | 2 | **Date:** | 09/10/2020 |
| **Topic:** | Jump Profiling | **Key Exercises:** | | | Pogo Jumps; Countermovement Jump (CMJ): Drop Jump (DJ) |

**Pre-Practical Activity:** Video engagement https://www.youtube.com/watch?v=f-IBrOcATBI

**Prompt Questions:**

- Have you used any of these jumps in your programming or own training?
- What do you agree with/ disagree with?

- Can you give an example of when you would use each type of jump in a training programme?

**Pre-Practical Activity Questions**

- Did you find the video that was provided prior to the class helpful?; Please elaborate.
- How does this movement link into sporting movements?
- How might you use this movement if working with an athlete in the future?
- What would you change about the video that was provided prior to the class?
- Have you any questions for me or is there anything you would like to add?

| Activity | Resources | Objectives | Time |
|---|---|---|---|
| Pre-Practical Activity Discussion | n/a | See Pre-Practical Activity Questions above. Gain insight into what others thought of the video. Utilise any students questions/ queries/ disagreements in the class. | 10 |
| Review last week | n/a | Discuss previous topic; brief practice of low amplitude plyos; discuss difference between these exercises and exercises in video | 10 |

| | | | |
|---|---|---|---|
| Demo Pogos | See TM booklet | Instruct Pogos TM, demonstrate movement | 10 |
| Pogos Activity 1 | n/a | In pairs; students teach each other Pogos; point out any technical errors | 5 |
| Pogos Activity 2 | med balls; mega bands | In pairs; discuss and practice progression/ regression of Pogo based on four criteria discussed last week | 5 |
| Discuss Pogos | pen + paper | Groups of 6-8; discuss key points of exercise; categorise exercise; give use context. Share with wider group | 10 |
| Demo CMJ | See TM booklet | Instruct CMJ TM, demonstrate movement | 10 |
| CMJ Activity 1 | n/a | In pairs; students teach each other CMJ | 5 |
| CMJ Activity 2 | med balls; mega bands; contact mat | In pairs; discuss and practice progression/ regression of CMJ based on four criteria discussed last week | 5 |
| Discuss CMJ | pen + paper | Groups of 6-8; discuss coaching cues we might use in CMJ; Share with wider group | 10 |
| Demo DJ | See TM booklet | Instruct DJ TM, demonstrate movement | 10 |
| DJ Activity | plyo boxes; contact mat | In pairs; students teach each other DJ; what happens when we alter box height? | 5 |
| Discuss DJ | pen + paper | Groups of 6-8; discuss key points of exercise; categorise exercise; give use context; how might you progress/ regress on between sessions and within sessions? Share with wider group. | 15 |

# Appendix G: Braun and Clarke's (2013) 15-point checklist for Thematic Analysis

**Table G.1** 15-point Criteria for Thematic Analysis

| Process | No. | Criteria | Response |
|---|---|---|---|
| Trans-cription | 1 | The data have been transcribed to an appropriate level of detail, and the transcripts have been checked against the tapes for 'accuracy'. | Formative and summative feedback, and interview transcripts transcribed to an appropriate level of detail and checked against recordings. |
| Coding | 2 | Each data item has been given equal attention in the coding process. | Yes |
| | 3 | Themes have not been generated from a few vivid examples (an anecdotal approach) but, instead the coding process has been thorough, inclusive and comprehensive. | Themes, as described in chapter 4, were developed from a complete coding process of the entire dataset. The coding process was thorough and comprehensive. Each theme was developed based on numerous codes gathered across all transcripts. |
| | 4 | All relevant extracts for all each theme have been collated. | Yes |
| | 5 | Themes have been checked against each other and back to the original data set. | Yes |
| | 6 | Themes are internally coherent, consistent, and distinctive. | Yes |
| Analysis | 7 | Data have been analysed - interpreted, made sense of - rather than just paraphrased or described. | Yes, as evidenced in chapters 4 and 5. |
| | 8 | Analysis and data match each other – the extracts illustrate the analytic claims. | There is a coherence between chapters 4 and 5 |
| | 9 | Analysis tells a convincing and well-organised story about the data and topic. | Yes |

| | | | |
|---|---|---|---|
| | 10 | A good balance between analytic narrative and illustrative extracts is provided. | Illustrative extracts have been used in chapter 4. |
| Overall | 11 | Enough time has been allocated to complete all phases of the analysis adequately, without rushing a phase or giving it a once-over-lightly. | Yes |
| Written report | 12 | The assumptions about, and specific approach to, thematic analysis are clearly explicated. | Yes, stated in chapter 3 |
| | 13 | There is a good fit between what you claim you do, and what you show you have done – ie, described method and reported analysis are consistent. | Yes |
| | 14 | The language and concepts used in the report are consistent with the epistemological position of the analysis. | Yes |
| | 15 | The researcher is positioned as *active* in the research process; themes do not just 'emerge'. | Yes |

*Note*. Adapted from Braun & Clarke, 2013 (p. 286)

# Appendix H: Indicative Questions to Participants

## H.1 Student Participants Formative Feedback

- Did you find the video that was provided prior to the class helpful?; Please elaborate.
- How does this movement link into sporting context?
- What theory supports your understanding of the movement?
- Have you programmed this movement in the past? How might you use this movement if working with an athlete in the future?
- What would you change about the video that was provided prior to the class?
- Have you any questions for me or is there anything you would like to add?

## H.2 Student Participants Focus Group

- Can you give a brief overview of how some of you found the EC practicals?
- The method of teaching I used is called Active Blended Learning. This is where we use some form of online communication to begin the learning process before face-to-face sessions - has anyone experienced this method before I used it?
- Did you find the videos before class helpful?
- What would you change about the approach I took to teaching these practicals?
- How well do you think practical classes prepare you for future practice?
- We progressed from a group feedback scenario to individual written feedback. Did you find one or the other feedback methods more comfortable or effective?
- Can you give a brief summary your experience of the ABL approach?
- Is there anything else you would like to add?

## H.3 Pracademic Participant Interviews

- How did you get into sport science?
- How do you balance your academic and practitioner roles?
- What are the differences between sport science practice and academia, and does one inform work in the other?
- Can you give specific examples of how your practice has made you a better academic?

- Do you think practical classes are important for sport science students? Why do you think this?
- What are you trying to achieve in your practical classes?
- Do you have a particular method or approach to teaching your practical classes?
- Do you encourage students to start practical work early? If yes, why, and what value do they place on it?
- Do you use active learning strategies in your practical class teaching?

# Appendix I: Codebook Developed from Discussions with Participants

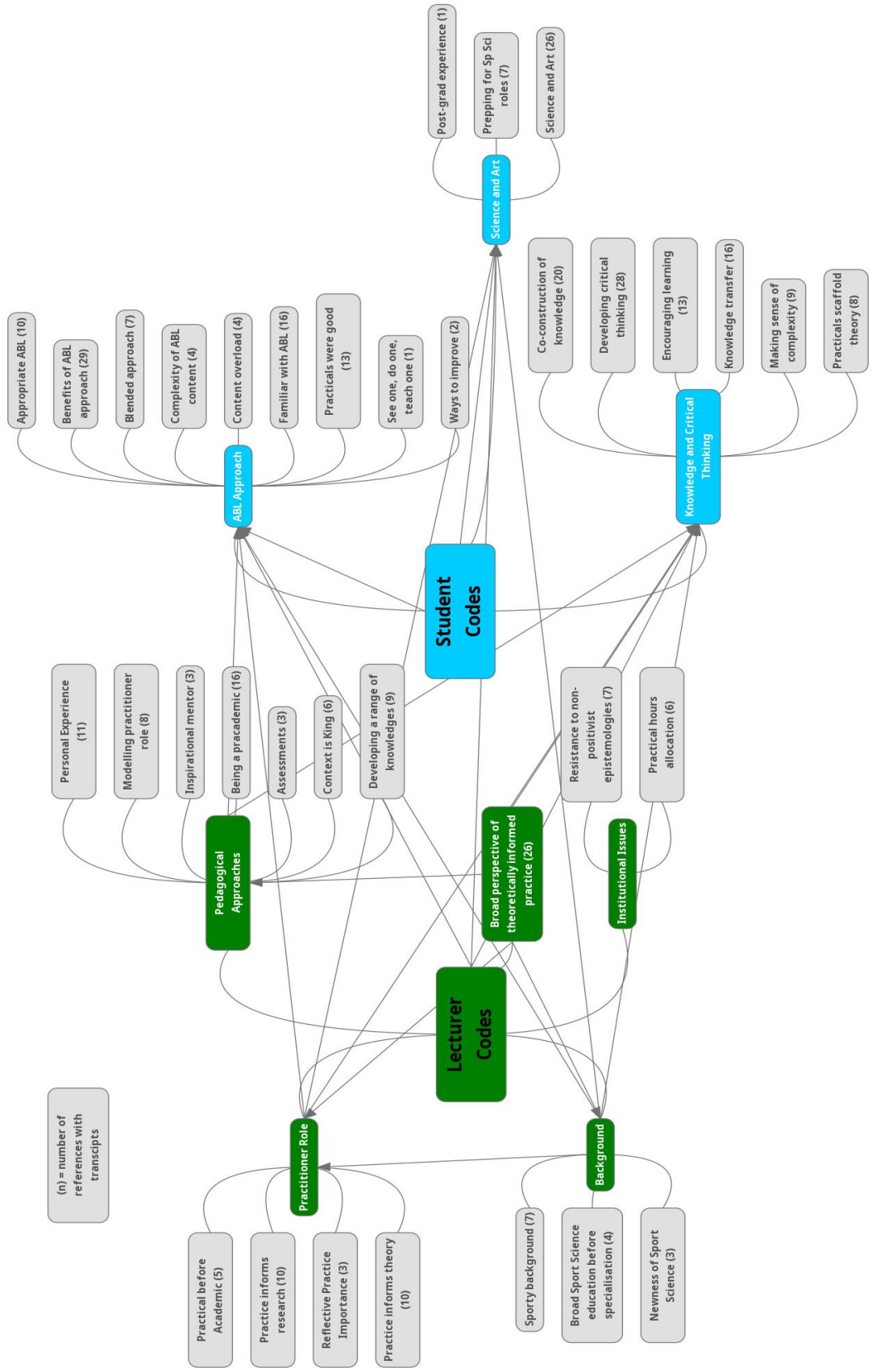



Figure I.1: Coding of transcripts

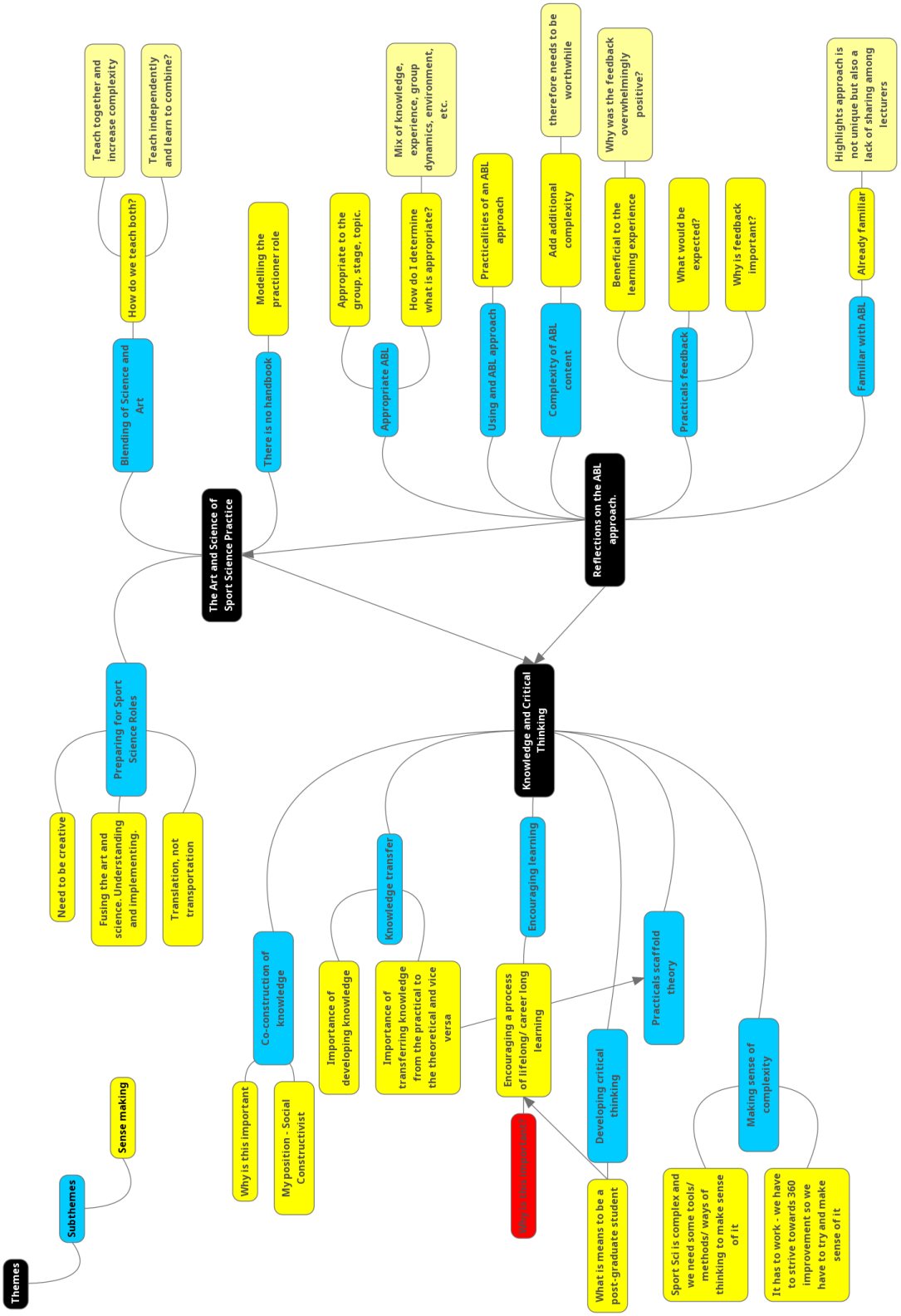



Figure I.2: Developing Analysis from Findings

*Note*: Themes were derived from findings. Themes, sub-themes and sense making comments represent a collation of codes to guide analysis

# Appendix J: Example of Naive to Sophisticated Epistemological Chain

| Naïve Sport | Epistemological Chain | Sophisticated Sport |
|---|---|---|
| The sport believes that there is a 'best way'. A model, truth or truths that needs to be achieved and embedded This model / truth is based on that sport's uniqueness. It comes from the sport's tradition, culture, and experience of what 'works'. Simple competencies are evident and measureable. The sport will copy what its competitors are doing. It will aim to simply modify what works for others but do it better. | **Epistemology** ↓ | The sport believes that knowledge can be discovered in many places. It promotes a constant journey of discovery-innovation, experimentation and reflection to create new knowledge and gain an edge over competition. It aims that knowledge will be created and owned by the team, staff, and its athletes. It will look to different sports, and different domains for new ideas. It doesn't discount any potential angle or opportunity to learn. |
| Leaders and followers; Rules, systems, and processes to follow; autocratic, disciplined; information protected / hidden. | **Environment** ↓ | Learning environment created; Innovation, recognition that competencies can be combined and weighted in different scenarios to become very complex so appreciate difference and uniqueness of ideas. Open communication, discussions and flow of ideas. |
| Transactional and dictating behaviors, centralized power relationship, behavior expectations to be followed, failure to perform highlighted. | **Relationships built** ↓ | Transformational leadership providing intellectual stimulation. Actions taken based on long-term nested plans and goals that support innovation and constant progression. Devolved responsibility and ownership Trusting, caring, nurturing, autonomy-supportive behaviors. |
| Passed down from above. Against Intelligence (IQ) and technical performance outcome measures. | **Goal setting** ↓ | Negotiated with team – all performing a complimentary role to achieve organization's goal. Emotional and Social Intelligence.Development of whole person. Focus on processes as well as outcomes. |
| Follow pre-determined plan, curriculum, training schedule based on historical data and replicating what has been done previously. | **Methods** ↓ | Self-determined by staff and athletes through discussion, support and mentoring. Experimentation evident – aim to gain a competitive advantage. |
| Success or failure determined by tangible markers or results; e.g., outcome performance markers – times, distances, Win/loss records etc./, | **Judgements made** ↓ | Dependent on how the player develops as an athlete and person, whilst working towards the athlete led targets. Decisions based on "is the athlete now an autonomous decision maker confident in their own ability to source, analyze, create and apply knowledge and learning to meet their personal goals?" Judgements made in a collegiate manner with all those involved having equal input into the process. |
| Sport's leadership review performance and modify targets and delivery plan to achieve performance outcome goals. | **Future direction** ↓ | Future path determined by athletes' progress towards their holistic development. Individual development plans are updated in negotiations with all interested parties |

Figure J.1: An Example of naive to sophisticated epistemological chain development with reference to talent development in sport. Taken from Grecic and Street (2019, p. 7)

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