Micro-analysing Anatomy Laboratory Pedagogy

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Abstract

Anatomy instructional methods research and the persistent debate regarding dissection have been criticised as being overly emotive and lacking the support of empirical evidence in both numbers and quality (Bergman, Van Der Vleuten, & Scherpbier, 2011; Winkelmann, 2007).

This doctoral thesis applies conversation analysis (CA), a qualitative research method, to reveal the extent to which social-interaction profoundly shapes laboratory teaching and learning. The aim is to describe the defining features of the radiography anatomy laboratory *community of practice*, a term originally coined by Lave and Wenger (Hellermann, 2008), in order to understand how members (i.e. demonstrators and students) enact and renew their participant roles through interaction. This applied-CA investigation examines how previously identified social interaction principles that guide everday conversations are altered and adapted in an institutional setting such as the anatomy teaching-learning laboratory.

In particular, this thesis builds upon the works of Benwell and Stokoe (2002, 2005), who in the context of university education in the United Kingdom (UK), have investigated how university tutors and students display and negotiate teaching-learning agenda and institutional membership roles, identities, and relationships during the tutorial openings. Similarly, the present investigation examines the social identities and relationships that are made relevant, embodied, and negotiated by the participants in the anatomy laboratory context. To study this, the CA method was applied to six video records of anatomy laboratory sessions. The recordings were made at pre-selected time points throughout the first-year radiography program at an Australian university. The CA analyses are grounded in previous investigations that conceptualise interaction as complex multi-layered social and cultural actions, which

the participants co-construct and make sense of by drawing upon and making relevant a variety of interactional resources such as body language, sentence structure, tone, membership, affiliation and the local interaction contexts (Drew, 2012a; C. Goodwin, 2013; Mondada, 2007; Streeck, 2009).

This investigation demonstrates that the seemingly ‘messy’ teaching-learning processes that often characterise laboratory classes can be systematically analysed and understood. Analyses show that participants collaboratively organise interactions by orienting to a set of implicit social and cultural principles that lead to emergent regular structures and patterns of interaction. Furthermore, data suggests that participants develop evolving cultural practices that are indicative of the formation of a community of practice. By making these practices visible, CA provides a means for anatomy educators to study, reflect upon, and reconceptualise their laboratory teaching practices. Additionally, guidelines may be recommended to educators to improve the quality of their pedagogical interaction. Most importantly, instructional approaches may be more accurately described before jumping to conclusions and interventions without a thorough understanding.

Declaration

This thesis contains no material which has been accepted for the award of any other degree or diploma at any university or equivalent institution and that, to the best of my knowledge and belief, this thesis contains no material previously published or written by another person, except where due reference is made in the text of the thesis.

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Glossary of Terms

Terms	Definitions
Anatomy/gross anatomy	Anatomy as a discipline encompasses various sub-disciplines, which include gross anatomy, topographical anatomy, sectional anatomy, histology, embryology, neuro-anatomy etc. (Drake, Lowrie, & Prewitt, 2002). In this thesis anatomy and gross anatomy are interchangeably used to refer to "the names, relations, courses, origins, and insertions of the bones, muscles, vessels, nerves and organs of the human body" (Dyer & Thorndike, 2000). A principal aim in studying it is to develop an understanding of the human form and structure, their relationships, and the scientific-medical language and terminology used to communicate this knowledge.
Embodied interactions	Refers holistically to the variety of physical body languages (such as gesture, gaze and body orientations) that are used in conjunction with verbal utterances in social interactions.
Epistemics	Refers to "what is known, how it is known, and persons' rights and responsibilities to know it" (Drew, 1991; Maynard, 2003; Pomerantz, 1980; Sacks, 1992; Terasaki, 2004)" (Heritage, 2012c, pp. 5–6). It refers to the social enactments of these elements in people's interaction with one another, which are partially represented in the display and orientation of epistemic status and epistemic stance.
Epistemic Stance	It "concerns the moment-by-moment expression" (Heritage, 2012c, p. 6) of the social relationships established by the more enduring epistemic domains of epistemic status. Epistemic stance is renewed and shifted with every utterance and turn. This shifting creates, maintains, or diminishes epistemic gradients between participants. A K+/- form can denote both epistemic stance and status where K+ means more knowledgeable and K- means less knowledgeable.
Epistemic Status	Refers to the territories of knowledge of the respective individuals, in other words, 'what they know', "how it is known and the persons' rights and responsibilities to know it" (Heritage, 2012c, pp. 5–6).
Membership categorisation	Refers to the study of how members of society socially display the formation and claims of identity categories through their interaction with each other (Stokoe, 2010).
Participation framework	Describes how participants are working: by themselves or with other students
Sequential Organisation	Refers to the "relative positioning of utterances and actions" (Schegloff, 2007a, p. 2), which can be used to examine the organisation of different aspects of the encounter such as turn-taking, topic organisation, and sequence organisation (Schegloff,

	2007a).
Sequence Organisation	It is a type of sequential organisation that is concerned with the specific organisation of sequences and actions, where “sequences are the vehicle for getting some activity accomplished” (Schegloff, 2007a, p. 2).
Turn-taking Organisation	Refers to how people take turns to speak (Sacks et al., 1974). Turn-taking organisation system allows participants of an interaction to change over in speakership from one person to the next so that speakers may display their understandings of the previous talk and actions (Ford, 2012; Sacks et al., 1974; Schegloff, 2000a)

Chapter 1 Setting the Scene

1.1 Context of the Study

To the outsider, anatomy might appear to be a unified discipline. It is not. As a scientific discipline, anatomy has many divisions. Anatomy, within the health science disciplines, refers to "the names, relations, courses, origins, and insertions of the bones, muscles, vessels, nerves and organs of the human body"[1] (Dyer & Thorndike, 2000). A principal aim in studying it is to develop an understanding of the human form and structure, their relationships, and the scientific-medical language and terminology used to communicate this knowledge. Thus, anatomy education sub-disciplines include gross anatomy, topographical anatomy, sectional anatomy, histology, embryology, neuro-anatomy *etc.* (Drake et al., 2002). In this thesis, 'anatomy' will refer only to gross anatomy, that is, macroscopic study of the whole body, rather than anatomical studies of more specialised sub-disciplines.

Gross anatomy education is crucial for the health sciences[2], in particular medicine, physiotherapy and radiography (Sugand, Abrahams, & Khurana, 2010). Knowledge of anatomical structures and their functions is critical to clinical practice, and the development of clinical reasoning, diagnosis, and expertise in other areas of clinical sciences, such as pathology (Dyer & Thorndike, 2000; Sugand et al., 2010). Despite this, anatomy education is assuming a lesser role in the increasingly integrative health science curricula and within the modern research-oriented university sector. In addition, many university programs are tending to move away from the traditional Flexner mandated medical curriculum[3] (Flexner, 1910), which

[1] This will be the definition used in this thesis and the terms 'anatomy' and 'gross anatomy' will be used interchangeably.
[2] Herein, *health sciences* will be used to refer to medicine, physiotherapy, radiography, nursing, lifesciences, and other allied health professions in general unless otherwise specified.
[3] The Flexnerian medical curriculum model emphasised the important role of the scientific method and basic sciences such as physiology, anatomy and biochemistry in the training of physicians. It was

had also been widely adopted by many health sciences training programs. In some cases, separate formal anatomy education contact time had been completely removed and anatomy was fully integrated into the problem-based learning (PBL) or case-based curriculum designs (Cuddy, Swanson, Drake, & Pawlina, 2013; Drake, 2014) which were initially introduced in the 1970s and 80s (Neville & Norman, 2007).

The reduction in formal curricular hours has also led to a decline in financial resources allocated to anatomy departments (D. G. Jones, 1997; D. G. Jones & Harris, 1998; Pryde & Black, 2006). These curricular and financial changes are the reasons that many anatomy educators have reduced the use of anatomy laboratory teaching and the resource-intensive instructional methods involving cadaver dissection; in some cases, educators have altogether abandoned the use of cadaver-related resources (Basmajian, 1971; Collins, Given, Hulsebosch, & Miller, 1994; Fitzharris, 1998; McLachlan, Bligh, Bradley, & Searle, 2004; McLachlan & Patten, 2006; Pryde & Black, 2005, 2006).

The alterations and evolution of anatomy laboratory instruction have resulted in heated debates amongst anatomy educators: for example, many continue to insist on the irreplaceable value of the traditional method using cadaver dissection over other alternatives using resources such as prosections[4], potted specimens[5], anatomical illustrations, computer models, or other anatomical models (e.g. wax, plastic and other materials). The intense and often emotive debate (Bergman et al., 2011; Vorstenbosch, Bolhuis, van Kuppeveld, Kooloos, & Laan, 2011; Winkelmann, 2007) helps to recognise and appreciate the central importance of laboratory instructional

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not anticipated that such emphasis would come at the cost of clinical practice and developing humanistic values in physicians.

[4] Prosection is unlike dissection in that the user is not actively involved in the deconstruction process and the cadaver is previously dissected by other more experience experts or students.

[5] Potted specimens are like prosected specimens except that they are preserved in transparent vats. They are usually displayed on museum specimen shelves for study and display purposes.

approaches to anatomy education. This is because anatomy educators widely acknowledge and believe that the laboratory practical sessions provide invaluable opportunities for students to directly perceive and experience for themselves the anatomical structures described in textbooks and lectures; a view that has been validated by research suggesting that these experiences might help students visualise and experience real anatomy (Wilhelmsson et al., 2010). Nevertheless, a consequence of the debate has been the opportunity for educators to reconsider their instructional methods and tools in light of newer technological advancements in areas such as medical imaging, multimedia, and information communication technology (Lombardi, Hicks, Thompson, & Marbach-Ad, 2014; May et al., 2013; K. P. Murphy et al., 2014; Palombi, Pihuit, & Cani, 2011; Saltarelli, Roseth, & Saltarelli, 2014; Waters, Van Meter, Perrotti, Drogo, & Cyr, 2011).

Responding to the impetus for change, anatomy education research efforts have concentrated on evaluating and comparing the effectiveness of various laboratory pedagogy on student learning outcomes (DeHoff, Clark, & Meganathan, 2011; Dreher, DePhilip, & Bahner, 2014; Preece, Williams, Lam, & Weller, 2013; Saltarelli et al., 2014; Serrat et al., 2014; ten Brinke et al., 2014; Winkelmann, 2007). Yet, the paucity and poor quality of available empirical evidence slow and trouble the evolution of anatomy education and its laboratory instructional practices (Bergman et al., 2011; Winkelmann, 2007). Therefore, more empirical research is needed, and the quality of the research and reporting practices must be improved to advance existing anatomy laboratory instruction debates and for more reliable conclusions to be made about effective anatomy teaching and learning (Bergman et al., 2011; Winkelmann, 2007).

1.2 Problem Statement

Currently, anatomy laboratory pedagogical research is predominantly quantitative. The positivist-inspired quantitative research designs in anatomy education still place more emphasis on understanding the statistical relationship between instructional methods and learning outcome measurement criteria, rather than understanding the collaborative anatomy learning process from the perspectives of those directly involved in its teaching and learning. This approach reduces the fundamentally complex sociological phenomenon of anatomy laboratory instruction to a simple process-product relationship between instructional methods (process) and student learning outcomes (product). More critically, the process is only made known through researcher descriptions and never empirically substantiated by empirical observations or analysis of video records.

Approaching anatomy laboratory pedagogical investigations in this way creates the tendency for anatomy educators to treat instructional methods as a technique that is reproducible irrespective of time, place, and human agency. As a result, complex social and cultural teaching-learning processes that occur in anatomy laboratories have remained hidden within a pedagogical 'black box'. To date little is known about what laboratory participants do to teach and learn anatomy. Furthermore, instead of attempting to systematically study this 'black box', anatomy pedagogy research has hidden the socially interactive and dynamic processes behind generic instructional labels (e.g. dissection, blended/flipped learning, team-based learning, and problem-based learning). At best, research have only indirectly studied the social interaction process through participants' interpreted and recalled experiences, but never through direct analysis of the social interaction as they are occurring 'in the wild'. Thus, much of the existing investigations ignore the responsive and collaborative ways in

which students and instructors co-construct their learning dialogue. Consequently, and perhaps unaware to the researchers, they have foregone the opportunity to examine the unique, intricate, and skilful social interactions that are central to effective anatomy laboratory teaching and learning practices.

Given the limited awareness of these pedagogical issues and the lack of corresponding research, current educational and teaching decisions appear to be empirically under-informed. Besides the need for further empirical research and improved reporting practices, anatomy laboratory pedagogy research is in need of a paradigmatic shift if we are to gain a more holistic understanding of face-to-face teaching-learning processes such as those that occur in the laboratory. It is imperative, for a field that is central to the various disciplines of health sciences, to understand the specifics of how teachers and students 'do' teaching and learning in the social fabric of the anatomy laboratory setting.

1.3 Aim and Scope

The thesis aims to improve current understanding of the anatomy laboratory teaching-learning process by unpacking the anatomy laboratory interactional 'black box'. The aim of the investigation is to describe the defining interactional features of the radiography anatomy laboratory *community of practice*, a term first coined by Lave and Wenger (1991). Furthermore, the investigation seeks to understand how demonstrators and learners, as members, enact and renew their participant roles and memberships through interaction. It will achieve this through the adoption of a fine-grained analysis of the actual talk that take place between demonstrator and student.

In order to achieve this aim the particular non-positivist research method known as conversation analysis, henceforth CA was chosen. CA not only provides a methodological tool for understanding laboratory interactions between students and

demonstrators in terms of a sequence of actions, but CA can draw upon an extensive and expansive body of research findings of naturally-occurring interaction, including those in educational settings (Benwell, 1999; Ford, 1999; Hellermann, 2005; Lerner, 1995; Macbeth, 2004; McHoul, 1978, 1990; Pea, 1993; Seedhouse, 1997; Stokoe, 2000). As will be shown in Chapters 3 and 4, CA is not a hypothesis-driven methodological paradigm. It is a naturalistic inquiry of social interaction using an iterative data-driven process where the conversation analyst derives both the research question and the account and understanding of the social interaction under investigation based on sequential analysis of participants' actions and responses (Sacks, 1995; Sidnell, 2010; ten Have, 2006). While it is possible to statistically analyse the interactional data, it is beyond the aim and scope of this present thesis.

In this study CA has been applied with the intention of describing pedagogical interactions and understanding the 'taken-for-granted' social and cultural principles operating in anatomy laboratory pedagogical interactions. In addition, the micro-analyses of interaction sequentially examine how laboratory demonstrators and students navigate and collaboratively construct their teaching-learning dialogue using their talk, body, and the objects in the laboratory environment. CA elucidates these implicit social practices through close examination of the characteristics and structures of people's utterances. More importantly, CA studies these characteristics and structures within the micro- and macro-contexts of the interaction while maintaining an awareness of the emerging patterns and relationships between individual utterances as interactions progress. It is believed that CA findings of teaching-learning interaction processes will be of direct practical benefit to educators who are regularly involved in such interactions with students. In following the empirical data-driven approach of CA, research questions have been developed

through iterative cycles of analysis, and the research questions are presented at the end of Chapter 4 - Methods.

The study does not attempt to draw any causal links between the teaching-learning processes being observed and analysed with the learning outcomes of students. Claims of such magnitude would require more complex study designs that require time and support of resources that far exceed those available during a doctoral degree. Nonetheless, this thesis takes the initial steps towards demonstrating that it is indeed empirically possible to study and understand the complex human interactions that take place in teaching-learning contexts.

1.4 Significance of the Study

The present investigation examines how novice anatomy learners and demonstrators formulate and understand each others' actions in the anatomy laboratory context as they create, renew and manage a community of practice (Hellermann, 2008; Lave & Wenger, 1991). This investigation makes a number of contributions to the field of anatomy education and CA.

First, CA methods and findings were used to study anatomy laboratory pedagogical interaction. Specifically the current study extends the study of instructional activities by describing and analysing the structure and characteristics of demonstrator-student interaction in the introductory phases and the openings of communication during the main table-talk phases of the laboratory sessions (See Chapter 4 for a definition of the three phases of the anatomy laboratory session). Second, the study targets the ongoing issue of anatomy pedagogical research being informed by research lacking direct empirical investigation of the laboratory teaching-learning processes. Third, since pedagogical talk is a central element of face-to-face teaching-learning experiences reifying the conceptual curriculum, by

studying laboratory interaction this study can offer a set of recommendations based upon the guiding social principles identified. Importantly, the research argues that the nature of anatomical knowledge, as well as procedural knowledge of how to conduct oneself in the anatomy learning laboratory, becomes inseparably interwoven into the social identities, relationships, and activities that participants co-construct, recognise, and orient to in their routine everyday pedagogical interaction.

The findings empower laboratory curriculum designers to make more informed decisions about the physical setup of the laboratory, the activities to select, and the laboratory resources to make available. Furthermore, the findings from this investigation demonstrate that the empirical data-driven CA approach may be an important and valuable alliance in the pedagogical training and ongoing professional development of educators. The alliance promotes reflexivity grounded in empirical data. More importantly, it encourages education evolution and development to initiate with observing and describing practices, which tempers the tendency to intervene without first gaining a thorough understanding.

1.5 Structure of the Thesis

This thesis consists of seven chapters divided into four sections: the background section (Chapters 1, 2 and 3), the method section (Chapter 4), the data analysis and discussion section (Chapter 5 and 6), and the conclusions and implications for pedagogical practice section (Chapter 7).

The investigation commences with the background section, which begins with Chapter 1 setting the scene and context for the study. Chapter 2, the first of the two literature review chapters, provides a historical overview of major issues and debates in the anatomy education field. Situating the anatomy discipline within a historical context helps to understand why existing anatomy laboratory pedagogical practice

and research continues to favour the use of human cadaver dissection as a gold-standard of laboratory pedagogy. It will also explain why anatomy education research remains entrenched within medical education contexts and why there are considerably fewer investigations in other health sciences contexts. The chapter ends by arguing that the existing positivist-inspired approaches to studying anatomy laboratory teaching and learning overly constrain and limit the scope and definition of research, which results in the neglect of social interaction that is the most fundamental element of any face-to-face laboratory experience.

Chapter 3 serves as an introduction to CA and the relevant seminal findings about *turn-taking*, *sequential/sequence organisation*, and *epistemics*, with particular reference to talk in educational contexts. Specific attention has also been given to the role of CA research in *embodied interaction* and *membership categorisation* relevant to this thesis. The literature review is iteratively informed by the understandings gained from the data analysis of this present investigation, and highlights CA works relevant and informative to the present analysis.

The method section (Chapter 4) describes the data collection and analysis processes. It begins by providing a methodological rationale for choosing CA to investigate the first-year anatomy learning laboratory sessions within the context of an Australian university undergraduate radiography degree program. It also contains detailed descriptions of the relevant curricular and institutional context, by introducing the participants and their recruitment. Following a description of the CA data analytical process, the specific research questions are presented. The chapter ends by providing an overview of the general observations and characteristics of the video record data set.

The two data chapters 5 and 6 present the findings. They focus on describing the defining features of the radiography anatomy laboratory community of practice in order to understand how demonstrators and learners as members enact and renew their participant roles through interaction. The chapters focus on the sequential organisations of demonstrator-student(s) interaction in two different phases of the anatomy laboratory: the introduction phase (Chapter 5) and the table-talk phase (Chapter 6). Chapter 5 emphasizes the changing interactional practices in the introduction phase at the beginning of the laboratory session. It highlights how the emergent customs for the laboratory community of practice depend and draw upon participants' mutual orientation to membership categories, and the displays and negotiation of epistemics that are affiliated with membership categories. Chapter 6 focuses on analysing how demonstrators and students collaboratively establish communication with one another to achieve different purposes. Furthermore, the detailed analyses examine, from the participants' perspectives, the cultural and interactional resources that are being made relevant for claiming and demonstrating understanding in their unfolding interaction from moment-to-moment.

The thesis ends with the conclusions and implications for pedagogical practice section in Chapter 7. The implications of the findings for anatomy laboratory pedagogy in university education are discussed. In closing, the chapter discussed the limitations and suggestions for future studies of anatomy laboratory instructional practice.

Chapter 2 Implications for Student Learning of the Dominant Medical-Dissection Teaching Model

2.1 Introduction

The chapter is divided into five sections. Following the introduction (Section 2.1), the chapter provides an overview of the general laboratory instructional practice of gross anatomy in the university education context from various geographical locations from around the world (Section 2.2). The overview highlights existing limitations and gaps in anatomy laboratory education research that focuses on technologies and pedagogical practice. Following this (Section 2.3), the chapter turns briefly to explicate the intertwined culture and historical influences of medicine and the anatomy discipline, which leads to the aforementioned anatomy laboratory instruction and research practices. Armed with a general understanding of the historical context and relationship between anatomy and medicine, the chapter turns to a critical review of the existing and relevant research on laboratory instruction (Section 2.4). The chapter concludes (Section 2.5) by arguing that existing positivist-influenced approaches unnecessarily constrain and limit the scope of anatomy education research. In so doing they undermine the goal of adopting an evidence-informed pedagogical teaching approach.

2.2 Current State of Gross anatomy Laboratory Instructional Practices in English-Speaking University Education Settings

In this section, a narrative review of current anatomy curriculum research practices and their key finding are presented. It is not a systematic literature review of anatomy curriculum instructional practice around the globe. Most gross anatomy laboratory instruction complements lectures, and in some anatomy programs, tutorials/seminars may also be used (Collins et al., 1994; Drake et al., 2002; Drake, McBride, Lachman, & Pawlina, 2009; Kramer, Pather, & Ihunwo, 2008; Mattingly & Barnes, 1994;

Meehan-Andrews, 2009; Pryde & Black, 2005, 2006; Vishnumaya & Ramnarayan, 2009). Nevertheless, significant variations exist in respect to how the instructional modalities are combined, as well as how much contact time is allocated for each instructional approach (Collins et al., 1994; Craig, Tait, Boers, & McAndrew, 2010; Drake et al., 2002; Drake et al., 2009; Fitzharris, 1998; Heylings, 2002; D. G. Jones & Harris, 1998; Kramer et al., 2008; Plaisant, Cabanis, & Delmas, 2004; Pryde & Black, 2005, 2006). For example, anatomy curriculum survey data from North America, UK, and Australia gives an indication of the variations in the total gross anatomy laboratory instructional hours, and anatomy lecture hours (see Table 2-1 page 13). Please see Kramer et al. (2008) for survey data on Africa. Historically, there is a demonstrable decrease in total anatomy instructional time, which according to more recent data appears to be showing signs of stabilising, but many anatomy laboratory dissection programs have remained dominant in numerous medical anatomy instructional programs (Collins et al., 1994; Craig et al., 2010; Drake et al., 2002; Drake et al., 2009; Fitzharris, 1998; Heylings, 2002; D. G. Jones & Harris, 1998; Kramer et al., 2008; Plaisant et al., 2004; Pryde & Black, 2005, 2006).

The trend towards other curricular designs (e.g. PBL, case-based, or systems-based approaches) has resulted in educators questioning and moving away from the use of traditional anatomy dissection laboratory (Drake et al., 2009; Hopkins, Regehr, & Wilson, 2011; McLachlan & Patten, 2006). This is shown in the large variations in total anatomy instructional hours identified by anatomy curriculum survey data from various geographical locales (See Table 2-1 p. 13). Despite this, many researchers have reported that programs with laboratory instruction have generally maintained a 2–3:1 ratio of anatomy laboratory hours to lecture hours (Drake et al., 2002; Drake et al., 2009; Fitzharris, 1998; Heylings, 2002). Notably,

although studies like the ones carried out by Drake et al. (2009) have found that anatomy curricula employing a prosection anatomy laboratory approach used less hours compared to student-dissection approaches, the difference in the number of hours were not statististically significant. Nonetheless, the evidence indicates that anatomy laboratory instruction continues to be valued by educators, and in some programs it is the dominant mode of instruction. The concerns with the data summarised in Table 2-1 are the inconsistent reporting practices and the age of the literature, which provides little insight into whether such a ratio is still maintained today and their effects on the quality and outcome of the education.

Table 2-1 Summary of results from survey studies of medical schools' gross anatomy curriculum in English speaking countries. The table illustrates the inconsistencies of data reporting practise, which makes the task of studying the trends in anatomy curriculum design practices more challenging.

Locale (Number of Responding Schools/Size of Pool)	Author(s) and Publication Year	Average Total Instructional Hours	Average Total Lecture Hours	Average Total Laboratory Hours	Ratio of Laboratory Hours to Lecture Hours
Australia and New Zealand (19/21)	Craig, S., Tait, N., Boers, D., & McAndrew, D. (2010)	171 (SD=116.7; Range=56–560)	Not reported	Not reported	Not reported
UK and Ireland (16/28)	Heylings, D. J. (2002).	124.5 (SD=57.3; Range=20–219)	34.4 (SD=32.3; Range=3–138)	Not reported	50% (2:1)
US and Canada (47/~80)	Fitzharris, T. P. (1998)	Inconclusive ~150-170 (SD=n/a; Range=n/a)	Not reported	Not reported	38.4% (2.6:1)
United States* (83/141)	Drake, R. L., Lowrie, D. J., Jr., & Prewitt, C. M. (2002)	167 (SD=39; Range=55-252)	Not reported	Not reported	34% to 89%
United States* (65/155)	Drake, R. L., McBride, J. M., Lachman, N., & Pawlina, W. (2009)	149 (SD=36; Range=56-231)	43 (SD=19; Range=0-78)	94 (SD=29 Range=20-160)	~45.7% on average Calculated based on the averages

* Includes osteopathic medical schools

The persistence of anatomy laboratory instructional programs throughout the major evolution and revolution of curriculum designs (i.e. PBL, case-based, or systems-based approaches) is evidence for the belief amongst anatomy educators that anatomy ought to be learned and taught in a context where it is seen, touched, and physically manipulated (J. E. F. Fitzgerald, White, Tang, Maxwell-Armstrong, & James, 2008; Older, 2004; Turney, 2007; Yammine, 2014). Theoretically, the variety of instructional modalities (i.e. tutorials, dissections and/or practicals), when consciously deployed, provides students and educators with different social interaction formats and novel observational and hands-on experiences (Terrell, 2006). This is supported by evidence that reveal students consider these complementary instructional modalities to be critical to their learning (Azer & Eizenberg, 2007; Hall et al., 2014; Percac & Armstrong, 1998), justifying current efforts to improve anatomy laboratory teaching and learning. Yet, these efforts to improve and tailor anatomy laboratory instruction to fit modern-day university contexts are stifled by increasing health sciences student populations and decreasing teaching staff and resources (Craig et al., 2010; Cuddy et al., 2013; Drake, 2014; Drake et al., 2009; Kramer et al., 2008; Pryde & Black, 2005, 2006).

Further complicating the situation, anatomy educators and researchers can become paralysed by the exponential increase in the availability of novel information and multimedia communication technologies. This makes attaining the goal to empirically identify the most effective and efficient means of laboratory instruction more challenging. One of the reasons being that Computer-Assisted Learning (CAL) approaches have ushered in novel face-to-face instructional models such as the *blended learning model*, which challenge and blur the traditional conceptions of teaching-learning activities, social interaction formats, and boundaries between

lectures, tutorials, and laboratories. CAL is purported to have the potential to change the teaching-learning activities as well as teacher-student interactional practices in anatomy education programs in a profound and lasting way (Aziz et al., 2002; Chen et al., 2010; Hopkins et al., 2011; M. J. Lewis, 2003; Tam, Hart, Williams, Heylings, & Leinster, 2009; Veneri, 2011). For example, 3D medical images (Holubar et al., 2009; May et al., 2013), virtual dissection table, simulation technologies (Canty, Hayes, Story, & Royse, 2015), and medical devices such as laparoscopes and ultrasound probes (Knobe et al., 2012) have been increasingly introduced and adopted for teaching and learning in the gross anatomy laboratory. These technological alternatives complement existing traditional contact formats, and at times they are also used as stand-alone replacements of physical face-to-face contact formats (Bacro, Gebregziabher, & Ariail, 2013; Bacro, Gebregziabher, & Fitzharris, 2010; Jamero, Borghol, & Mihm, 2009; Nieder & Borges, 2012). However, the CAL-led transformation in education remains to be seen and its effects on the anatomy laboratory teaching-learning processes remains to be empirically investigated.

The investigations into these instructional alternatives have led some researchers to investigate only the technology, as if it were a self-sufficient and self-contained form of pedagogy (e.g. Knobe et al., 2012; Lim, Loo, Goldie, Adams, & McMenamin, 2015; May et al., 2013; Preece et al., 2013; E. F. Wright & Hendricson, 2010), whilst overlooking the crucial contribution of social interaction processes. Herein lies the other important challenge that anatomy educators and researchers have to encounter when trying to find the most effective and efficient anatomy laboratory instructional methods. To the researchers' credit, in some cases, the technologies under investigation had been designed to replace face-to-face teaching

and learning that can act as a self-contained pedagogy (e.g. Schoenfeld-Tacher, McConnell, & Graham, 2001; Serrat et al., 2014). Nevertheless, in the majority of cases, the technologies under investigation might have been more suitably conceptualised as instructional tools that assist or augment teaching-learning interaction instead of stand-alone instructional methods (e.g. Lim et al., 2015; May et al., 2013; Preece et al., 2013; E. F. Wright & Hendricson, 2010). Recognising and understanding the role of technology in instructional is critical. As will be seen in the analysis of Chapters 5 and 6, besides the physical configurations of the laboratory space, the laboratory participants use and recognise the different ways that instructional tools and various objects to convey meaning and knowledge in the jointly constructed laboratory instructional processes.

As a result of the CAL technology and its associated research for implementation in the anatomy laboratory, the field of anatomy laboratory pedagogical research has become divided. Generally speaking, anatomy educators and scholars appear to fall into three camps along a continuum of pro-dissection to non-dissection. At the pro-dissection end of the spectrum, supporters favour dissection as the laboratory instructional method of choice (Marks, Bertman, & Penney, 1997; Mutyala & Cahill, 1996; Older, 2004; Parker, 2002). At the opposite end of the spectrum are the supporters of non-dissection and pro-technology, who believe that teaching with technological alternatives, such as medical imaging and the Virtual Human Dissector ©, is equally as effective as dissection, if not more so (e.g. Collett & McLachlan, 2005; N. A. Jones, Olafson, & Sutin, 1978; McLachlan, 2004; McLachlan et al. 2004; McLachlan & Patten, 2006; Nnodim, Ohanaka, & Osuji, 1996). Between these two extremes, there are the educators and researchers calling for more empirical research and for an evidence-based direction to emerge

(Bergman et al., 2011; Wilhelmsson et al., 2010; Winkelmann, 2007). Thus, the anatomy pedagogical debate remains unresolved.

To advance this debate, more empirical evidence is needed to steer the discussion away from the anecdotal, emotive, and historically- and culturally-centred arguments that claim cadaver dissection as the gold-standard of anatomy teaching and learning. Critically, it is import to note that, despite anatomy education being a foundational core discipline to all health sciences, the debate has been exclusively concerned with anatomy teaching and learning in medical education contexts. This is problematic considering that in the modern era of anatomy education, educators are increasingly catering to learners from a variety of backgrounds and destined for a variety of health sciences careers, not just medicine. This means that existing research approaches and the continued focus within a medical education context do not provide the necessary evidence and perspective to support the modern anatomy educator.

In conclusion, anatomy educators and researchers are increasingly acknowledging the role and value of more interactive and collaborative modes of teaching and learning (S. Ghosh, 2007; Krontiris-Litowitz, 2008; Martínez & Tuesca, 2014; Mohandas Rao, 2006; Noël, 2013; Shankar & Roopa, 2009; Vasan, DeFouw, & Compton, 2011; Vasan, DeFouw, & Holland, 2008). Despite some growing awareness of the important role and value of teaching-learning interaction, currently no anatomy laboratory pedagogy research exists that utilises video recording and analysis to investigate actual laboratory interaction processes (Hopkins et al., 2011; Lim et al., 2015). In Chapter 5 and 6 detailed video analysis of laboratory instructional interaction provides insight into how the participants jointly structure and contribute to such interactional processes. Next, to better understand the general

state of anatomy education described above, the review turns to a brief discussion of the disciplinary roots of anatomy from a cultural and historical perspective.

2.3 Learning by Doing: A Cultural and Historical Perspective to Understanding Anatomy Laboratory Instruction and Research

Recognising anatomy's past facilitates an understanding of why current anatomy laboratory instructional culture continues to favour dissection over other laboratory-based teaching methods. It also assists in comprehending why anatomy laboratory research almost exclusively focuses on medical education contexts. Furthermore, it provides insights into the challenges that medically-qualified anatomy instructors may face when teaching students of health sciences other than medicine, in a non-traditional laboratory setting with different instructional tools and approaches.

2.3.1 Anatomy Teaching and Learning by Dissection-A Cultural Heirloom

Anatomy is one of the oldest science disciplines in Western medicine. Its long heritage continues to influence the cultural practice of anatomy laboratory instruction and anatomy laboratory research. This influence is most evident in the belief that dissection, which is a pedagogical approach almost exclusively used by medical students, is the gold-standard of anatomy laboratory instruction irrespective of the health sciences discipline context. Meanwhile, this influence is also reflected in anatomy education research that predominantly focuses on the medical education context. Figure 2.1 (p. 19) illustrates the historical trajectory of anatomy as an academic discipline, the impact of technology upon establishing the dissection teaching and learning approaches, and its inseparable ties with medicine. The figure shows three periods of anatomy progress that are highlighted in red, green, and yellow. The corresponding coloured text boxes represent significant historical events that occurred during that time period. The black text boxes represent technological

events, and blue boxes represent key events in medicine and other health sciences professions.

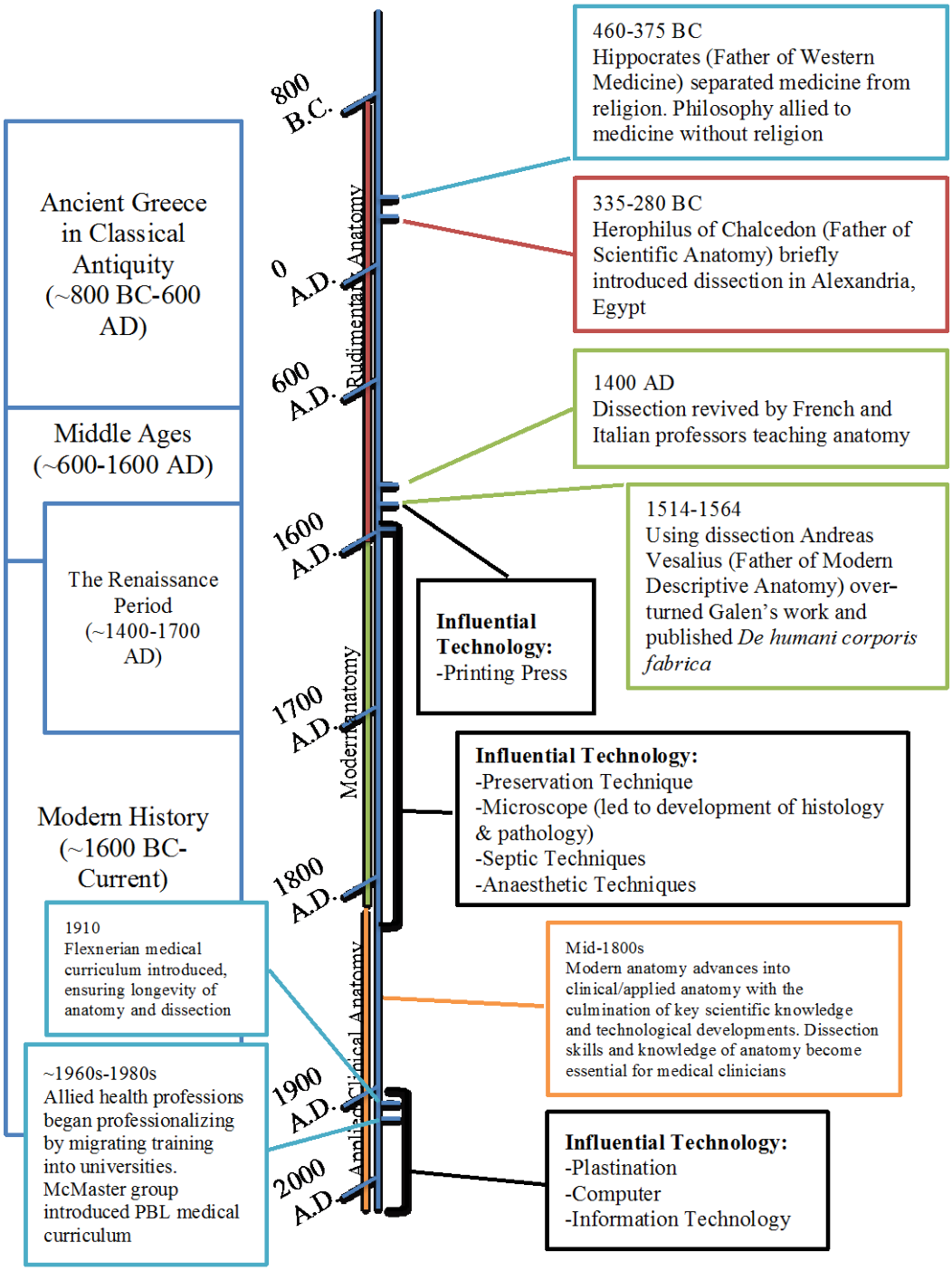


Figure 2.1 Historical time-line summarising key events and progress of anatomy and medicine.

In present day, the term anatomy has become inseparably linked with the idea of dissection or cutting up of dead bodies. However, as shown in Figure 2.1, prior to

Herophilus, dissection was not always highly regarded or even used within anatomy. After Herophilus (335–280 B.C.), who performed the first historically-documented dissection on the dead and the living (vivisection) in Alexandria of Egypt, dissection lapsed for more than 1000 years because of an outcry from physicians who morally and ethically rejected the anatomy knowledge gained from vivisections (Duffin, 2010; Kudlien, 1970). Furthermore, medical historians believe that in this early part of history, knowledge of anatomy was used by medical practitioners to treat wounds and injuries, but the full value of possessing anatomical knowledge for understanding and treating diseases was most likely not fully appreciated and realised until much later (1400–1800s) (Duffin, 2010; Elizondo-Omaña, Guzmán-López, & García-Rodríguez, 2005; Kudlien, 1970).

Anatomy and dissection fully developed its prominence in the education and practice of medicine from the 1400–1800s with the advancement of scientific knowledge and surgical technology. Specifically, the revival of dissection in the 1400s was significantly aided by the invention of the printing press, which allowed Vesalius to widely publish his famous book *De humani corporis fabrica* (Elizondo-Omaña et al., 2005). Through his book he corrected Galen's inaccuracies, which were the results of anatomical knowledge gained from dissection of animals instead of humans, and advocated that human anatomy should be learnt by individuals systematically performing dissections themselves (S. K. Ghosh, 2015). The work improved affordability of detailed anatomical knowledge and helped to popularise the use and value of dissection. At this point no preservation technique was available and universities would commission elaborate and intricately detailed wax models of dissection to allow students to study anatomy when dissection was not available (Duffin, 2010). Improving and innovating creative means of using technology, such

as wax modelling and printing, had begun to pave the way for new forms of anatomy education (i.e. by prosections with the invention of preservation techniques and using technological alternatives such as images and models).

From the mid-1800s, other notable technological and scientific advancements ensured that anatomy and, more importantly, dissection became an essential core discipline in medical training. The advancement in surgical technique and autopsy methods led to a professional need for a more careful and thorough understanding of anatomy, if these interventions were to be successful. Not surprisingly, therefore the practical and clinical relevance of anatomy in medicine promoted the importance of human dissection in medical professional training, and led to the scholarly investigation of anatomy education in medical education contexts by many researchers. In addition, the invention of more advanced embalming and preservation techniques further enabled anatomists to preserve bodies for dissections as well as creating specimen jars in addition to the wax models of dissection (Duffin, 2010).

The privileged position afforded to anatomy by medicine was further consolidated by the Flexnerian curriculum revolution in early 1900s, which gave dissection a central place in the university medical curriculum (Flexner, 1910; Frenk et al., 2010). The curriculum now required anatomy departments to allocate sufficient curriculum hours to allow each medical student to learn anatomy by dissection. However, anatomy educators were soon faced with not just teaching in medical education contexts. Importantly, as the professional training programs for other health sciences, those besides medicine, gradually began to ‘professionalise’ and migrate into the university context beginning in the 1960s, many of which adopted similar curriculum models as medicine (Lecca, Lyons, & Valentine, 2003). This historical perspective helps to clarify that teaching anatomy to an increasingly

diverse student populations is a relatively recent characteristic of modern university contexts. Moreover, over time dissection became characterised by single individuals performing the act with students passively observing.

The influence of this traditional dissection approach on anatomy laboratory teaching is difficult to evaluate due to major existing gaps in the literature, and the limited available evidence indicates that the dissection process and experience is far from being standardised (Winkelmann, 2007; Winkelmann & Guldner, 2004; Winkelmann, Hendrix, & Kiessling, 2007). Nevertheless, all dissections are carried out with the goal to visualise anatomical structures by cutting up and removing tissue. From personal experience, this may be done by following detailed dissection manuals or improvised ad-hoc by the dissector. However, the structures that are made visible and preserved (e.g. nerves, arteries, muscles, tendons, fascia, etc.) depend on the skills, knowledge, and the decisions of the dissector. Furthermore, the availability of expert advice and supervision, and the number of students sharing a cadaver varies greatly from one university to the next.

2.3.2 The Emergence of Modern Blended Instructional Approaches

The significant exponential advancement of technology in the late 1900s alongside the changing university context (e.g. novel curriculum shift, diversification of different student populations requiring anatomy education, and massification of university education with depleting financial resources) have provided the impetus for anatomy education to embrace blended instructional approaches instead of relying primarily upon the traditional time-tested approach of dissection. During the latter half of the 20th century, such blended approaches have gradually dominated anatomy laboratory education.

From early 1970s, novel curriculum designs such as PBL created by McMaster University Canada (Neville & Norman, 2007) shifted the curricular focus towards the creation of an integrated science approach emphasising the acquisition and application of scientific knowledge via clinical problems. This de-emphasised the disciplinary boundaries (and therefore instruction) of basic sciences such as anatomy. In this climate the discipline of anatomy has gradually lost the protected time and the associated resources that made dissection possible (Drake, 2014; Drake et al., 2009; Pryde & Black, 2005). This problem was further exacerbated by the advent of scientific disciplines that were unknown even 20 years prior, as more disciplines were included in the already crowded curricula.

A further challenge to the supremacy afforded to dissection has been the proliferation of other health science disciplines requiring anatomy education, but not necessarily dissection-based instruction. As the target populations of anatomy instruction diversify, medical students are no longer the majority of students that anatomy educators instruct, which begins to call into question the relevance and appropriateness of dissection as the primary form of anatomy laboratory teaching and learning. However, despite the increasing influx of other health sciences professions into universities, the dissection-based instruction culture has remained entrenched in its belief in dissection as the gold-standard. At the same time, university education has become ‘massified’, which has led to increased student numbers without an appropriate match in funding (Altbach, Reisberg, & Rumbley, 2009; Hornsby & Osman, 2014; Frenk et al., 2010); a trend that is motivating anatomy education to consider alternative approaches to the resource-intensive cadaver dissection (Collins et al., 1994; Drake et al., 2009; D. G. Jones & Harris, 1998; Pryde & Black, 2005, 2006).

Concurrently, as previously mentioned, technological advancements started to change the practice of anatomy and also ushered in the information age, which has made content knowledge ever more readily available and accessible. Specific to anatomy, the development of embalming and preservation techniques such as plastination were essential to provide more accessible anatomy resources that led to anatomy museum specimens and exhibits such as Body Worlds. In addition, advancement in medical imaging technology (e.g. computed tomography-CT, magnetic resonance imaging-MRI, and ultrasound) provides new instructional resources and approaches to making visible and learning anatomy of the living body (McLachlan & Patten, 2006). Such technology complements, but now arguably, is starting to replace dissection (Basmajian, 1971; Collins, Given, Hulsebosch, & Miller, 1994; Fitzharris, 1998; McLachlan et al., 2004; McLachlan & Patten, 2006; Pryde & Black, 2005, 2006). More recently, the combination of medical imaging and digital scanning technology with 3D printing technology provides a novel way of producing anatomically accurate models (Lim et al., 2015; McMenamin, Quayle, McHenry, & Adams, 2014). The use of these other modalities is becoming increasingly more ubiquitous, as will be shown in the literature reviews later in the chapter. Highlighting the plethora of instructional tools and approaches that are now available in anatomy laboratory education reveals a particular problem faced by medically-qualified laboratory demonstrators who might have learnt anatomy primarily by dissection.

Further complicating the issue, medically-qualified laboratory demonstrators, who are in the early stages of their career, often use their employment opportunities to refresh and further their anatomical knowledge as well as to fulfil career advancing requirements. Thus, acquiring and developing their pedagogical

knowledge and skills may not necessarily be aligned with their goals and priorities depending on the individual. This calls into question whether their different needs and interests impact upon their readiness and desire to acquire and develop their pedagogy, and to provide relevant anatomy instruction to health sciences' students. Further research is needed in this area to better understand anatomy laboratory demonstrator needs and expectations from the work experience. Nevertheless, regardless of whether the approach uses dissection or a blend of dissection with other instructional tools, social interaction remains the constant in all such anatomy laboratory face-to-face teaching and learning. As will be seen in Chapter 6, the decisions in terms of *what* and *how* the different tools are deployed and employed in the laboratory instructional context of other health sciences disciplines such as radiography. A different empirical investigation methodological paradigm will be needed to develop insight into the interactive teaching-learning processes of the anatomy laboratory. The proposed alternative methodological paradigm will be presented and discussed in Chapters 3 and 4.

2.3.3 Summary

Human dissection remains central to the cultural practice of instruction within the anatomy discipline (Elizondo-Omaña et al., 2005; McLachlan & Patten, 2006). Critically, the main research and educational focus of anatomy has been on medical anatomy. The persistence of the dissection culture in the research as well as in laboratory instructional practices testifies to the strong influence of history on the anatomy discipline. This general historical account also highlights the technological and curricular influence on anatomy laboratory instructional culture. These technological and educational shifts suggest that the anatomy laboratory is arriving at yet another turning point in its history. The impact of technology on anatomy

laboratory instruction and research will be further discussed in the following section. In general, all health science professions to some degree share a common set of anatomy basics, but beyond the basics each profession will have different needs for anatomy that are likely to vary in terms of depth of understanding, regions of the body, and anatomical structures to know. The question is, how will these trends shape and alter the present and the future of anatomy laboratory instructional practice and research? More importantly, how will educators trained in traditional dissection approaches adapt their instructional practices to fit the blended anatomy laboratory approach of the future? The present investigation begins to address these questions through empirical observation and analysis of demonstrator-student interaction in the radiography anatomy laboratory.

2.4 Anatomy Laboratory Instructional Research

Currently, the rapid pace of contextual changes, such as increasing student enrolments along with increasingly limited resources and funding, creates a challenging situation for anatomy educators to adapt and evolve the anatomy laboratory and its instructional practices (Collins et al., 1994; Drake et al., 2009; D. G. Jones & Harris, 1998; Frenk et al., 2010; Pryde & Black, 2005, 2006). This has challenged the still relatively-young and developing research field of anatomy education to produce quality findings at a pace that can keep up with the changes in the broader context. The limited access to quality evidence to inform anatomy laboratory instruction has added to the challenges of making informed decisions in an increasingly complex educational landscape (Bergman et al., 2011; Winkelmann, 2007).

2.4.1 The Investigation into Anatomy Laboratory Processes using a Curriculum Studies Approach

Some research has adopted a macroscopic perspective to identify the laboratory curricular characteristics and factors that influence the effectiveness and quality of students' anatomy learning. These studies have investigated the types of instructional resources and methods employed, the impact of formal contact hours, and the effect of laboratory process factors upon student performance in relation to medical licensing examinations (Craig et al., 2010; Cuddy et al., 2013; Drake, 2014; Drake et al., 2009; Kramer et al., 2008; Pryde & Black, 2005, 2006).

In a series of investigations conducted across eight medical schools in the Netherlands, the impact of different curriculum designs on instructional time and student learning of anatomy was investigated (Bergman, Prince, Drukker, van der Vleuten, & Scherpbier, 2008; Prince et al., 2003). The researchers found no correlation between curriculum designs (PBL versus traditional) and medical students' performance in the anatomy knowledge dimension of professional standardised testing. Instead, the researchers suggested that increasing the total anatomy instructional time per se appeared to be associated with an improved student performance (Bergman et al., 2008; Prince et al., 2003). However, a 2009 study conducted by Drake et al. challenges the proposed effect of total instructional time. Using census survey data of anatomy programs from 130 allopathic and 25 osteopathic medical schools in the United States, Drake et al. (2009) showed that total anatomy laboratory hours are not significantly different between courses using different combinations of dissection, prosection, or a mixture of both. Furthermore, a more recent study (n=6411 examinees) conducted by Cuddy et al. (2013) showed that medical students' performance on Step 1 (Knowledge and Application) and Step 2 (Clinical Knowledge) of the United States Medical Licensing Examination

(USMLE) was unrelated to variations in course hours (effect sizes 2.1 and 1.9 on score scales with SDs of 20 and 22 respectively) but correlated to their previous Medical College Admission Test (MCAT) scores. More interestingly, they reported that a small improvement (1/16 of a standard deviation) in Step 2 performance was observed in students who experienced both prosection[6] and dissection in their laboratory experience, as opposed to having either prosection or dissection alone.

From educational research, Hattie and Yates (2014) warn that total instructional time as a process factor should not be assumed to equal total on-task time which leads to learning. Indeed, anatomy laboratory research using students' self-reported survey data has revealed that medical students in the dissection laboratory are engaged in a variety of different learning and social activities (Winkelmann et al., 2007). In addition, researchers also found that medical students undertaking station-based and strictly-guided laboratory sessions recalled more anatomical facts than their loosely-guided and self-directed counterparts (Kooloos, de Waal Malefijt, Ruiter, & Vorstenbosch, 2012). These findings indicate that the "macroscopic" approach of curriculum studies and their conclusions must be interpreted with caution, because it cannot be assumed that all formal contact hours translate into on-task and productive learning time.

Altogether, the results from these 11 anatomy curriculum studies reviewed suggest the need for more finely-tuned investigations into how time is actually used in laboratory teaching and learning. They also indicate that the process-product relationships in anatomy laboratory teaching and learning are mediated by other process factors besides time and the dissection experience. Perhaps insight into which factors and variables influence anatomy teaching and learning can be gained

[6] Prosection is human cadaver specimens previously dissected by someone else, but there are many different forms of incorporating prosections into the anatomy laboratory.

from the study of more granular categories of variables (e.g. teacher/student behavioural approaches, cognitive processes, emotional processes, and sociological processes) that are currently outside the scope of existing macroscopic curriculum studies (Bergman et al., 2008; Cuddy et al., 2013; Drake et al., 2009; Prince et al., 2003). More interestingly, the findings from Cuddy et al. (2013) raise a question of interest to this thesis: perhaps there is something qualitatively different about the prosection-dissection mixed teaching-learning approach that produces significant learning outcomes. However, as this thesis argues, in order to understand *what is going on,* the use of observational and interview research approaches are required to investigate laboratory teaching-learning processes.

2.4.2 Anatomy Laboratory Instructional Methods and Resources Research

A rising concern about the depth of medical students' anatomical knowledge has motivated the development of anatomy laboratory teaching methods research (Beahrs, Chase, & Ger, 1986; Cottam, 1999; Cuddy et al., 2013; De Horne, Tiller, Eizenberg, Tashevska, & Biddle, 1990; Eiseman, Spencer, Menguy, Rush, & Bryant, 1965; Eizenberg, 1988; McMurray, 1949; Pabst, 1993; Vorstenbosch et al., 2011). This reflects an implicit assumption that the knowledge of anatomy directly correlates with students' dissection experience. However, much heated debate remains with regards to the relationship between the effectiveness and quality of students' learning and the laboratory instructional tools (e.g. dissection, prosection, and other technological alternative) and strategies (e.g. PBL, team-based learning, case-based learning, etc.). This debate persists and has attracted attention from a wide variety of stakeholders, including the general public (Cresswell, 2006; Cresswell & Franklin, 2010), practitioners (J. E. F. Fitzgerald et al., 2008; Waterston

& Stewart, 2005), educators (Bergman et al., 2011; McLachlan & Patten, 2006), and even the students themselves (Dyer & Thorndike, 2000; Joslin, 2008; Linacre, 2005).

Driven by concerns to develop and deliver effective and efficient laboratory curricula in evolving educational contexts, anatomy education research has emphasized measuring the effectiveness of education interventions (Bergman et al., 2011; Bergman, Verheijen, Scherpbier, Van Der Vleuten, & De Bruin, 2014; Brooks, Woodley, Jackson, & Hoesley, 2015; Kotzé, Mole, & Greyling, 2012; ten Brinke et al., 2014; Winkelmann, 2007). The published literature around cadaver-related teaching tools is primarily concerned with a comparison between the uses of dissection to prosection or other instructional tools/methods (Aversi-Ferreira et al., 2010; L. S. Jones, Paulman, Thadani, & Terracio, 2009; McWhorter & Forester, 2004; Nnodim, 1990; Waters et al., 2011; Winkelmann, 2007; Yeager, 1996).

According to Winkelmann's review (2007), the evidence slightly favours dissection as a more effective instructional tool, because eight out of the 14 studies reviewed, who Winkelmann presumes have originally set out with the intention to prove that the alternatives are just as effective as dissection, have needed to report contrary findings that dissection was statistically more effective. Winkelmann (2007) goes on to add that statistical significance does not equal education significance. It should be noted that both Winkelmann (2007) and Bergman et al. (2011) note that the conclusions in the literature should be taken with a degree of caution because in all the comparisons, dissection is not the only instructional variable that changed. In addition, Winkelmann et al. (2007) argue that it is problematic to assume practices, like dissection, provide a uniform learning experience for all. Their study clearly showed students self-reportedly taking up different activities in the dissection course besides active dissection (percentage of total time μ=33%, σ=19), such as studying

using prosection (percentage of total time μ =27%, σ=16), not cadaver related (percentage of total time μ =31%, σ=17), and breaks (percentage of total time μ =7%, σ=4) (Winkelmann et al., 2007). Thus, observations about processes are critical to obtain more objective data of actual laboratory activities.

2.4.2.1 Problems of definitions and their impact on research into the efficacy of instruction in the laboratory setting

However, there is a bigger problem with anatomy laboratory instructional research. In the literature, researchers use a variety of terms when describing the resources or instructional interventions such as *strategies* (Casado, Castano, & Arraez-Aybar, 2012; Martínez & Tuesca, 2014), *methodologies* (Aversi-Ferreira, Nascimento, Vera, & Lucchese, 2010; Schleich, Dillenseger, Houyel, Almange, & Anderson, 2009), *methods* (Keedy et al., 2011; Kerby, Shukur, & Shalhoub, 2011; Losco, Meyer, Armson, Walker, & Grant, 2013; Patel & Moxham, 2008; Peter J Ward & Walker, 2008), and *techniques* (Nottingham & Verscheure, 2010; Oh, Won, Kim, & Jang, 2011; Torres et al., 2014).

This lack of clarity and consensus of definition of terminologies cause fundamental problems in research designs that often result in unfair comparisons, such as matching an instructional tool (prosection) to a method (dissection) (Cuddy et al., 2013; Dinsmore, Daugherty, & Zeitz, 1999; Nnodim, 1990; Winkelmann et al., 2007). For example, unlike dissection, the term ‘prosection’ (defined on Page 19 in Chapter 1) communicates how the human cadaver specimen is prepared, and does not specify how the prosection is used in instruction for learning. Having said this, after some extent of dissection, the results of the process may be treated and used as a prosection by students and demonstrators to examine the anatomy (Winkelmann et al., 2007). Yet, without direct observational data to support researchers’ use of

terminologies, there is no way of knowing and confirming what is the nature of dissection and prosection, or more importantly, what activities and learning processes they are associated with.

A recent literature review by Bergman et al. (2011) provides some clarity and standardization of anatomy educational terminologies. They used the term *teaching tools* to generally describe the following types of resources that are available (Bergman et al., 2011):

(1) cadaver-related,

(2) clinically-related,

(3) computer/internet/multimedia-related,

(4) other-material-related (e.g. models or book),

(5) and other (e.g. lectures, practical classes, tutorial learning; PBL tutorials)

Unlike other terms, 'teaching tools' is a more appropriate terminology and analogy, because instructional resources and methods are like any working tool; each one serves a particular purpose yet can be versatile and used in different situations. Their purpose and utility only become clear and meaningful in the hands of the instructor or learner. Similarly, dissection, an instructional method, or prosection – which can be an instructional method or resource – are only tools to teach and learn. The learning and instructional purpose they may achieve depends on the ways that students and teachers use them; therefore, studies of laboratory instructional methods and resources need to recognise that the teaching tools should be studied in the naturally-occurring teaching-learning activities of the laboratory. Observational studies, such as the one reported by Hopkins et al. (2011) which is reviewed later, help to elucidate the commonalities and differences in the ways in which

instructional resources, activities and methods are used by teachers and students (Hopkins et al., 2011). In time, a more functional and clearly-demarcated set of definitions may be created to better define and differentiate between terms such as *instructional strategies*, *tool*s, or *methods*. For now, making clear what is meant by each of these terms in the communication of research will have to suffice and serve as the minimum standard.

2.4.2.2 The dominant quantitative approach in anatomy laboratory process-product research

In anatomy education, many comparative studies have sought to demonstrate the effectiveness of instructional interventions via experimental or quasi-experimental designs. For example, in a randomised controlled study comparing medical students assigned to three different educational interventions (Group 1: 60 minute lecture only; Group 2: 60 minute laparoscopic dissection only; and Group 3: 120 minute lecture and laparoscopic dissection), ten Brinke et al. (2014) found that, immediately after the interventions, Group 2 students performed best on a 21-item identification test followed by Group 3 and Group 1. The performance differences between the groups were found to be statistically significant, but the improved performance between Group 2 and Group 3 disappeared in a 2-week post treatment follow-up test (ten Brinke et al., 2014). These findings not only demonstrate that three-dimensional hands-on approaches are superior, but provide evidence that more is not always better in education, as demonstrated by the initially lower performance of Group 3 (who attended a 60-minute lecture and a 60-minute laparoscopic dissection). The emerging evidence from comparative studies of learning outcomes and perceptions of students and educators alike suggest that there is not just a single instructional tool that fits all the learning needs to achieve different learning outcomes (Biasutto,

Caussa, & Criado del Rio, 2006; Erkonen, Albanese, Smith, & Pantazis, 1992; Kerby et al., 2011; Stanford et al., 1994; Waters et al., 2011). Instead, students tend to benefit from having a mixture of different resources instead of simply having one resource or another, and that the choice of instructional modality should be aligned with the course objectives (Terrell, 2006; Waters et al., 2011). The findings of Waters et al. (2011) appear to accord with earlier reviews of curriculum studies that also indicated medical students with laboratory experiences using multiple resources perform better on medical licensing exams than those able to use only one resource (Cuddy et al., 2013). Such comparative studies have been made possible by the availability of technological alternative (e.g. computer/internet/multimedia related tools).

Anatomy education research have also focused on exploring the technological alternatives that could be either an adjunct to existing tools or be capable of replacing traditional anatomy instructional tools (e.g. lectures, cadaver dissections and prosections, and potted specimens). This has led to a diverse literature with publications on procedures, demonstration of effectiveness, and usability of the instructional tool. For example, the US *Visible Human Project*, the *Visible Korean Human*, and the *Chinese Visible Human*, which all took cadavers and serially sectioned them into cross-sectional slices and then scanned the slices into a digital data base, led to the development of virtual human models for browsing and manipulating the image data set to study anatomical structures (Ackerman, 1999; Donnelly, Patten, White, & Finn, 2009; Park, Chung, Hwang, Shin, & Park, 2006; Senger, 1996; Shin, Chung, Park, Park, & Hwang, 2011; Stephens, Temkin, Krummel, & Heinrichs, 2000; Zhang, Heng, & Liu, 2006).

Similarly, research into clinically-related instructional tools have come a long way from the early use of diagnostic medical imaging such as x-rays, computed tomography (CT), and magnetic resonance imaging (MRI) starting in the 1970s (Kirchner & Kaye, 1979; McNiesh, Madewell, & Allman, 1983; Whitley, 1977). Recently, with the widespread availability of diagnostic imaging machines, and the improved ease with which the digital image data sets can be saved and transferred, anatomy educators have begun to consider the benefits from scanning cadavers to conduct virtual dissection (Bohl, Francois, & Gest, 2011; Jacobson et al., 2009; Kotzé et al., 2012; May et al., 2013). Such investigations argue for the added value of being able to digitally dissect the cadaver, or the learning opportunities afforded by having multiple clinical tools available to the students to understand their first patient, the cadaver. Other clinically-related instructional tools under investigation include the use of:

- body painting to teach topographical anatomy (Finn & McLachlan, 2010; Finn, White, & Abdelbagi, 2011)
- ultrasound to visualise living anatomy (B. Brown, Adhikari, Marx, Lander, & Todd, 2012; Dreher et al., 2014; Fakoya, 2013; Griksaitis, Sawdon, & Finn, 2012; Hammoudi et al., 2013)
- laparoscopic tools and surgical techniques within the dissecting room (Are, Stoddard, Thompson, & Todd, 2010; Nutt, Mehdian, Parkin, Dent, & Kellett, 2012; ten Brinke et al., 2014).

Technological advancements have also enabled the development of basic science research into the learning of three-dimensional images and spatial anatomy representations (Chatterjee, 2011; Fernandez, Dror, & Smith, 2011; Garg, Norman, & Sperotable, 2001; Garg, Norman, Eva, Spero, & Sharan, 2002; Garg, Norman,

Spero, & Maheshwari, 1999; Höffler, 2010; Metzler et al., 2012; Nguyen, Mulla, Nelson, & Wilson, 2013; Nguyen, Nelson, & Wilson, 2012; Shin et al., 2013; Vorstenbosch, Klaassen, Donders, et al., 2013). In the future, computer science and artificial intelligence research may enable anatomy educators to gain further insights into other learners' skills and abilities, which affect how they learn anatomy and the ease with which they are able to learn anatomy.

2.4.2.2.1 The investigation of the social dimension of anatomy laboratory learning

With the wide availability of such technologies moving into the clinical and anatomy laboratory instructional settings, students and demonstrators will have a lot more instructional tools and objects at their disposal. The incorporation of technology into classrooms has been found to alter the way students and teachers interact with one another through observational video analysis (Grossman, 2014). Similarly, in spite of the small sample limitation (See Section 2.4.2.2.3), preliminary anatomy laboratory observations by Hopkins et al. (2011) also suggest that technology alters the social interactions, and negatively impacts the development of student social relationships. These findings are important to learning anatomy because they contribute to the affective engagement of students in the anatomy laboratory, which may impact upon the laboratory learning experiences, as well as the quality and extent to which learners can benefit from peer-learning.

Evidence of anatomy educators starting to pay more attention to the social dimensions of the anatomy laboratory is apparent in the recent preliminary study of social networks in of the medical histology-anatomy laboratory learning environment (Hafferty, Castellani, Hafferty, & Pawlina, 2013). Using social network analysis, Hafferty et al. (2013) revealed the complex evolving nature and relationship between

the formally-assigned student group networks and the informal student social networks, which in turn impact how and with whom students offer and seek help. They also found that medical students' self-formed cliques affect social diversity and cohesion but, through active pedagogical interventions to encourage better socioeconomic and cultural diversity, the cliques may be effectively disrupted.

These studies indicate laboratory learning is impacted by the formation of social networks and networking behaviours and that these behaviours in turn impact how and with whom students offer and seek help (Hafferty et al., 2013; Hopkins et al., 2011). However, anatomy education research has only started to explore these different dimensions of university education. As shown by the literature reviewed, the research agenda of anatomy education research can greatly benefit from and be enriched by interdisciplinary collaborations such as forming partnership with sociologists in the case of Hafferty et al. (2013), or by broadening research methodological perspectives and tools, as in the case of Hopkins et al. (2011).

2.4.2.2.2 The investigation of the linguistic aspects of anatomy learning

Instructional methods investigations have not all been driven by technology. Investigators have also explored and developed instructional methods based on helping students to understand the Greek and Latin word etymologies (Pampush & Petto, 2011; S. B. Smith, Carmichael, Pawlina, & Spinner, 2007). This linguistic approach helped to inspire the present investigation to consider anatomy learning from a language acquisition and utilisation perspective using CA. Furthermore, this may become more important as novice anatomy learners are generally no longer equipped with basic facility and familiarity with the Latin and Greek language.

Unfortunately, this type of investigation has not been taken up because of the weak positive correlation found between successful anatomy learning and students'

performance on a quiz of Latin and Greek medical terms (Pampush & Petto, 2011). Despite the negative results, it should be recognised that the research design by Pampush and Petto (2011) only examined one single and isolated aspect of language acquisition–word structure and vocabulary. As CA researchers of language acquisition (Filipi, 2009, 2015; Hellermann, 2012) and second language acquisition (Hellermann, 2008; Seedhouse, 2005; Sert & Seedhouse, 2011) have demonstrated, language learning is a highly social and communicative process involving learners' communication and negotiation of meanings. It is far too restrictive to conceptualise language learning and acquisition from the cognitive-linguistic paradigm that focuses on isolated aspects of language learning like grammar and vocabulary, as was the case in Pampush and Petto (2011) and S. B. Smith et al. (2007).

2.4.2.2.3 The only mixed-methods approach using qualitative observation in anatomy laboratory process-product research

Despite the clear need for laboratory observational research, currently, the anatomy education literature has only one reported observational research conducted by Hopkins et al. (2011) under controlled experimental conditions. This mixed-methods study (n=74) investigated medical students' learning of muscles of mastication and related osteology using researcher observation field notes of randomised controlled trials consisting of three experimental conditions (prosection, 3D computer models, or hybrid). 74 medical students were randomly assigned into 17 smaller experimental groups that constituted between three to six students. The researchers found:

- consistent with the general literature, virtual instructional resources did not offer any student learning advantages or disadvantages over traditional instructional resources like models or prosection

- students were adopting strategic learning behaviours towards the end of the sessions in response to upcoming post-test, which may explain the indeterminate advantages of one instructional over another generally found in the literature
- the experimental groups reconstituted themselves into smaller social interaction groups (2–3) or even independent work when learning; and
- that students often rotated the virtual computer anatomy models to mimic the images contained in the anatomy atlas; thereby negating the learning afforded to view the structures from all perspectives

These findings inform this thesis because of the high degree of similarity in the resources available[7], and the instructional laboratory format. However, the study's reliance upon observational field notes over such a limited sampling and short time exposure (i.e. each group learning session is only 45 minutes) casts some concerns and doubts regarding the reliability and rigour of the research design. The use of field notes also limits the opportunity to study actual social interaction and processes operating in the laboratory sessions, because it cannot capture all details of the utterances and interaction. In addition, one cannot revisit these particular moments in which the phenomenon of interest occurred to conduct further analysis, as is possible with video records.

There are also concerns regarding their analysis and discussion. According to Hopkins et al. (2011), students have reconfigured themselves to adopt small-group learning strategies, as opposed to team-based learning (TBL) strategies, as a consequence of using three different instructional tools (i.e. prosection, 3D computer

[7] Laboratory participants observed in this investigation predominantly used the readily available laboratory resources. Nearly all participants did not use any computer or technological resources except on a limited number of occasions when students and demonstrators were observed using the iPad to reference anatomy atlas for body painting.

models, or hybrid). However, according to the student *learning approaches* theory (Biggs, 1979, 1985; Entwistle & Ramsden, 1982; Marton & Säljö 1976; Newble & Entwistle, 1986; Ramsden, 2003), students' formation of smaller groups and their adoption of strategic behaviour in response to the upcoming post-test may be because the instructional activity designs or research protocols do not stipulate or encourage team-learning strategies. The concern here is that the researchers overlook their role in creating the conditions that lead to the observed behaviours, and mis-attribute this responsibility to the students and the tools. Yet, research has shown that the same instructional tools have been used in team-learning conditions (Burgess, Ramsey-Stewart, May, & Mellis, 2012; Chuang, 2007; Martínez & Tuesca, 2014; Vasan et al., 2011; Vasan et al., 2008), rather than small group learning.

More fundamentally, their study reflects the previously-identified confusion in the terminologies and conceptualisations of instructional resources, methods and strategies. They mistakenly consider the different instructional tools as 'methods', which leads them to believe that the tools are responsible for students adopting different strategies. But, in fact, it is the educators (i.e. the researchers) who are responsible for conceptualising instructional methods and strategies and creating the conditions in the first place. As for students, they are social agents who are subsequently placed in these man-made and restricted conditions and then asked to perform tasks such as learn anatomy. Thus, a different explanation can be derived from the social interaction principles of *turn-taking organisation*. It is known that the mechanisms guiding how people take turns to talk become more strained with increasing number of participants (See Chapter 3); thus, conversation naturally defaults to lower numbers of interactants (2–3) with *schisming* of conversations occurring more frequently with increasing numbers (Egbert, 1997; Ford, 2012; Sacks

et al., 1974). This predicts the forming of smaller groups observed by Hopkins et al. (2011), who have created the group interaction conditions (3–6 students per group).

Concerns for their methodological limitations and analysis aside, Hopkins et al.'s study (2011) is a landmark in anatomy education research. It recognises that the current outcome-focused research approaches are likely to be too narrow. Their study argues for the importance of studying and understanding how the instructional models and resources may impact the social and interactional dimensions of anatomy laboratory teaching and learning.

2.4.2.3 Concluding Remarks

The instructional methods literature thus far reviewed utilises an outcome-focused design to target the issue of evaluating effectiveness based on measureable learning outcomes. Other quasi-experimental studies do exist and collect data on student perceptions and beliefs using surveys or other alternative measures of outcome and effectiveness of intervention (Fitzpatrick, Kolesari, & Brasel, 2001; Thomas, Denham, & Dinolfo, 2011; Tutarel et al., 2000; S. J. Wright, 2012). While these alternative outcome measures might seem reasonable, when they are reported in isolation the paucity of data provides limited assurance by calling into question the rigours of the research designs. Perhaps CAL research carried out on proof-of-concepts and usability of new technological tools is the notable exception to the exclusive use of surveys soliciting user perceptions and beliefs towards such technologies, which clearly command respect for their emphasis on the learners' perspectives about the process of using the technology. These include perceptions about usability, usefulness and ease-of-use, and attitudes towards the innovation (Dawson, Bruce, Heys, & Stewart, 2009; Lazarus, Chinchilli, Leong, & Kauffman, 2012; Lombardi et al., 2014; R. Mitchell & Batty, 2009).

Care should be taken to base educational decisions solely upon a consumer-experience-based model which relies mainly on students' perspectives and preferences (Chuang, 2007; M. Murphy & Brown, 2012; Waters et al., 2011). For example, Waters et al. (2011) found that undergraduate allied health sciences students[8] (n=222) in their study tended to favour the methods that they used in their own studies regardless of their statistical effectiveness. Furthermore, in Chuang's (2007) unpublished thesis, he found that modified-TBL laboratory students' performance on timed laboratory flag test[9] only improved when forced to share one facilitator amongst three teams, but not in the students' preferred configuration where they had a dedicated facilitator for their TBL sessions. The results indicate that, sometimes, what students prefer may not be what is actually beneficial to their learning. Hence, the ideal research design not only investigates outcomes from multiple perspectives, as is the case in more recent literature (DeHoff et al., 2011; Guy et al., 2015; Hopkins et al., 2011; Lombardi et al., 2014; Phillips, Smith, Ross, & Straus, 2012; Serrat et al., 2014); but wherever and whenever possible the research design should investigate and observe the intricate social interactions that give rise to their results.

2.4.3 Research of Anatomy Laboratory Demonstrator and Teaching Factors

In this section, research into anatomy laboratory teaching and the anatomy laboratory demonstrators is reviewed. The decision to review teaching separately from learning reflects current research approaches which have yet to examine teaching and learning jointly as a socially collaborative phenomenon.

[8] In their study these included nursing, kinesiology and other allied health fields.
[9] Timed laboratory flag race test in anatomy is a test where students are asked to identify tagged anatomy structures in a series of specimens where they are only allowed a limited amount of time to identify each tagged structure.

Anatomy education in Australian universities employs sessional laboratory demonstrators (Craig et al., 2010). These sessional demonstrators play an important role in the implementation of the curriculum. They do all of the teaching besides lectures, and therefore have more actual contact hours with the students than the lecturers. Consequently, they potentially have the opportunity to develop a different level of personal relationship with the students. Yet, despite their pivotal role in providing instruction, sessional demonstrators receive few resources and little support to develop their pedagogical approach. Thus far, no scholarly research could be found that has investigated the laboratory demonstrators' teacher characteristics, their needs and their instructional behaviours (Gossage, Horner, & Ellis, 2003; Lockwood & Roberts, 2007; Raftery, 2007).

With demonstrators playing a significant educational role in anatomy laboratory teaching and learning, it is important to understand the variables that account for their effects on student achievement, such as pre-instructional (as in 'presage' in Figure 2.2) factors like educator characteristics (e.g. IQ, verbal aptitude, personality, social class origins, and preparedness) and process factors (refer to Figure 2.2) like teachers' actions (e.g. ways of explaining and asking questions) (Gage, 2009, p. 6).

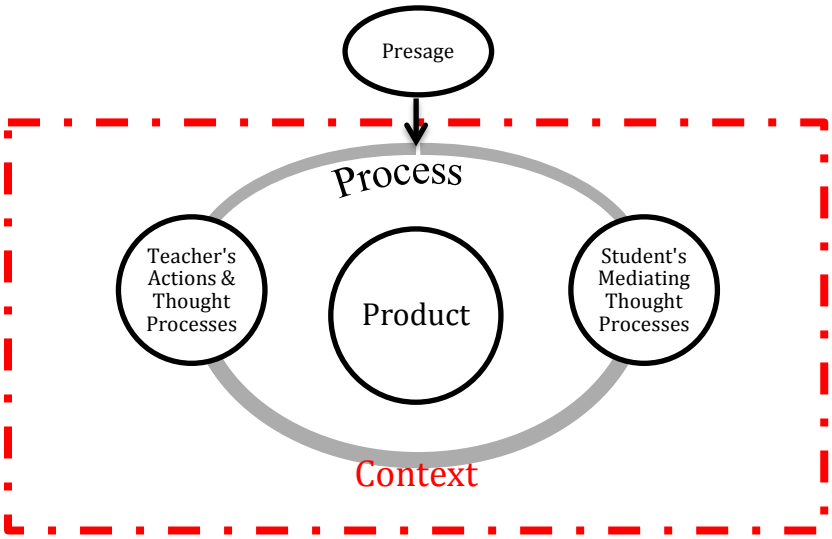


Figure 2.2 A six variable model of process-product research (Gage & Needels, 1989).

Understanding teaching is important, considering that Hattie's meta-analysis (2003, 2009) found that teacher variables account for 30% of the variance in student achievements, which is only second to the student factors that account for 50% of the variance. Given the high impact of teaching and teaching variables on student achievements, anatomy education research needs to prioritise teaching and teacher research. For example, anatomy education might start investigating the teacher and teaching effects in the top half of Hattie's graph (See Figure 2.3).

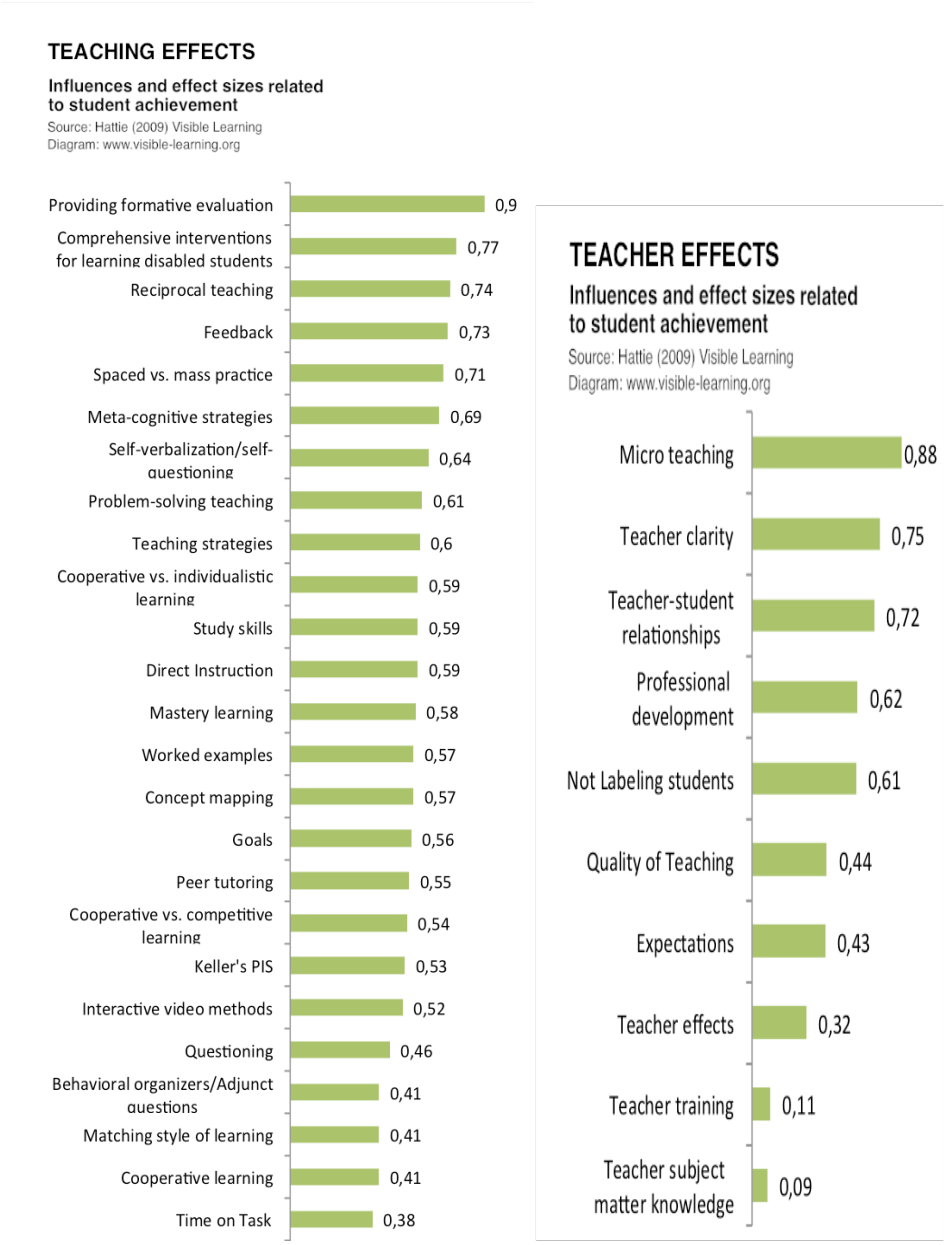


Figure 2.3 Teacher and teaching effects on student achievement as found in the meta-analysis by Hattie (2009).

Although the majority of studies in Hattie's meta-analysis (2003, 2009) are drawn from research in primary and secondary teaching contexts, the teaching and teacher effects with effect sizes greater than 0.4 are worth consideration and investigating in university anatomy laboratory contexts. It can also be clearly seen that teacher-student relationships are at the top of the 'Teacher Effects' chart with an effect size of 0.72 along with micro-teaching and teacher clarity, all of which are prime candidates for studying using the CA methodology. Similarly, in the 'Teaching

Effects' chart, many of the effective teaching behaviours identified may also be carefully studied using CA methodology to better understand how these behaviours are displayed by laboratory demonstrators in their pedagogical interaction with students.

In the literature, there remains a debate regarding anatomy teacher qualification, which has risen in response to universities increasingly employing non-medically-qualified scientists and part-time or sessional educators to teach anatomy (Bergman et al., 2011; Craig et al., 2010; M. J. T. Fitzgerald, 1992; D. G. Jones & Harris, 1998; Kramer et al., 2008). Proponents for medically-qualified anatomy educators are concerned that non-clinically qualified teachers are first concerned about research rather than teaching, and that non-clinical anatomists "…have no notion of why the subject is taught or why it is relevant from a clinical perspective…" (Bergman et al., 2014, p. 299). To date it is unclear how laboratory staff qualification affects students' anatomical knowledge (Bergman et al., 2011). However, Hattie's meta-analysis of pre-tertiary educational research (Hattie 2009; Hattie & Yates 2014) which aims to determine the factors that impact student achievements, provides some insight. According to Hattie (2009) and Hattie and Yates (2014), while teachers' competency weakly but positively correlates to student achievement, previous educational studies have shown that the effects are not mediated through students' learning, as might be conventionally assumed. Rather, they are mediated through student perceptions which affect learners' motivation and relationships with the teacher. That is, "students value the interaction and feedback received from teachers they recognise as clever and knowledgeable adults" (Hattie & Yates, 2014, p. 13). Hence, it is critical that anatomy education research investigates the actual teaching-learning

interactional processes that create the necessary contexts leading to the participants' formation and augmentation of such perceptions.

Turning now to the literature on anatomy educators' pedagogical approaches, there is currently a paucity of studies examining their teaching style or how they facilitate learning. To date, only one specific investigation on 'laboratory instructor approaches' to teaching has been identified. Chan and Wiseman (2011) investigated the use of the one-minute preceptor (OMP) in preparing clinicians for teaching. OMP is said to align with a learner-centred approach that includes "creating appropriate motivation, fostering learners' responsibility in their own learning, actively involving the learners, and emphasizing reflection and feedback in learning." (Chan & Wiseman, 2011, p. 236). OMP, which is also known as the one-minute teacher in the UK (Wall, 2008 in Chan & Wiseman, 2011), is an active learning and learner-centred approach that consists of five micro-skills:

1. Get a commitment from the student
2. Probe for supporting evidence
3. Reinforce what was done right
4. Correct errors and fill in omissions
5. Teach a general rule

The researchers provided examples of clinical and anatomy laboratory dialogue and theoretically argued that using OMP transforms the traditional close-ended questioning into an active learning opportunity for students.

The effectiveness of delivering OMP training to experienced anatomy laboratory teachers (20 years or more) was recently studied by Chan and Sharma (2014). The researchers found no improved medical students' perception of learning using survey questionnaires. Their semi-structured interviews with the teachers revealed that the

experienced teachers had already developed their own approaches that resembled OMP elements (Chan & Sharma, 2014). Furthermore, although the teachers' approaches did not have the explicit structure associated with OMP, because their approaches were already flexible and adaptive, it was argued that confining their behaviours to the OMP structure could limit the effectiveness of their performance (Chan & Sharma, 2014). Nevertheless, Chan and Sharma (2014) concluded that the explicit OMP structure might be useful for novice teachers, but further research was required to determine its usefulness. Unfortunately, their study did not report any empirical evidence of pedagogical interaction that examined how OMP had been implemented in practice and the effect of this process on the progression and trajectory of laboratory teaching-learning processes.

2.4.4 Anatomy Education Investigation into Student Factors and Its Adoption of Student 'Approaches to Learning'

Anatomy laboratory interaction is a collaborative process involving both demonstrators and students. Therefore, it is important to also consider what anatomy learners bring to the teaching-learning interaction, and what is currently known about anatomy learners. To this end, the following studies are useful in understanding student learning needs, the attitudinal and the psychosocial factors that impact on their learning, and the prerequisites that correlate with student success and achievements: Bergman, de Bruin, et al., 2013; Eizenberg, 1988; Hattie & Yates, 2014; Ramsden, 2003.

Whilst the study of student factors in anatomy education research has focussed on student learning outcomes, the impact of *learning approaches* has received serious attention. In particular, quantitative studies have investigated the relationship between learning approaches and achievement of student learning (Eizenberg, 1988;

Pandey & Zimitat, 2007; C. F. Smith & Mathias, 2007, 2010; P. J. Ward, 2011; Wilhelmsson et al., 2010), as well as learning approaches and students' perceptions of anatomy and the usefulness of its teaching methods/resources (Azer & Eizenberg, 2007; Bergman, de Bruin, et al., 2013; C. R. Davis, Bates, Ellis, & Roberts, 2014; Lazarus et al., 2012; R. Mitchell & Batty, 2009). There is also growing recognition and adoption of qualitative approaches to study how medical students approach and conceptualise learning anatomy (Bergman, de Bruin, et al., 2013; Eizenberg, 1988; Wilhelmsson et al., 2010).

The studies of anatomy learners forms four major streams of investigation:

1. influences of personality on learning styles (presage factor)
2. effects of spatial ability on anatomy learning (presage factor,)
3. learning approaches (process factor)
4. learner preferences for using different instructional and CAL resources (process factor)

This review will first examine the quantitative studies of the presage factors before attending to the studies on student approaches to and conceptions of anatomy learning, which have been studied using qualitative approaches. The studies on learner preferences for using CAL instructional resources have not been included in this review because no CAL resources were used in their laboratory sessions.

Like the study of presage factors of teachers, there is a limited body of quantitative work studying student presage factors (i.e. learning approaches, learning styles, personality, culture) that influence anatomy learning. In one study comparing British and Chinese medical students' approaches to anatomy learning, the researchers suggested that culture may be the variable that explained differences in their survey data (B. S. Mitchell, Xu, Jin, Patten, & Gouldsborough, 2009). However,

there is an important concern regarding the researchers' use of culture as an independent variable. Their argument was entirely hinged upon their unwarranted presumptions of what defined 'British' or 'Chinese' university student as their 'cultural' independent variable. Furthermore, the research questionnaire had not included any questions regarding participants' family history, ethnic background, or origins. Thus, the researchers only assumed by virtue of the participants' location (Two universities in Britain and in China respectively) that the participants belonged to a particular ethnic cultural group. Modern day Britain is a multi-cultural and multi-ethnic society, which renders the researchers' presumptions obsolete and inaccurate. Nevertheless, the researchers were surprised to find that medical students at the two British universities were more likely to learn anatomy by reciting definitions, given that Chinese students have a reputation for rote learning. But their study clearly show that memorisation was unequivocally used by students, regardless of their cultural origins (B. S. Mitchell et al., 2009).

Their findings illustrates a paradox at the heart of the university enterprise: learning is shaped by assessment, which rewards rote learning, whilst at the institutional level, universities proclaim as their mission the development of independent and self-guided life-long learners. While many studies have now confirmed that assessment format at the least affects, if not drives, student learning (Parpala, Lindblom-Ylanne, Komulainen, Litmanen, & Hirsto, 2010; C. F. Smith, Martinez-Alvarez, & McHanwell, 2014; Vorstenbosch et al., 2014; Wormald, Schoeman, Somasunderam, & Penn, 2009), the previous research suggested that institutional and ethnic cultural elements influence and surface in laboratory student-teacher interactions. For example, cultural beliefs about who has rights and responsibilities to know define the teacher-student hierarchical relationships; desire

to clinically contextualise anatomy might prompt students to ask more questions that lead to clinical narratives or story-telling; or cultural beliefs and preferences to work collaboratively with other students and not to raise questions in class might lead to more limited in-class student-teacher interaction. Thus, culture may be an important factor or variable influencing students' anatomy learning approaches, but more rigorous and carefully-designed studies are required to understand the true relationships.

The availability of multimedia technology has also spurred the study of another learner presage characteristic, spatial ability. As early as 1985, Rochford noted the relationship between medical students' spatial ability established using a pencil and paper test and their performance on anatomy spatial MCQ assessments (Rochford, 1985). The advancement in computing and multimedia information technology has allowed researchers to examine the particular spatial ability and skills that are related to learning spatial relationships in anatomy (Garg et al., 2001; Garg et al., 2002; Garg et al., 1999; Guillot, Champely, Batier, Thiriet, & Collet, 2007; R. Miller, 2000). The research confirmed that learners with poor spatial ability negatively impacted their ability to learn anatomy, but studies have also shown spatial ability improved with learning anatomy and clinical tasks and experiences (Chatterjee, 2011; Fernandez et al., 2011; Nguyen et al., 2013; Rochford, 1985; Vorstenbosch, Klaassen, Donders, et al., 2013). The research has led to more fundamental investigations into understanding how three-dimensional models might be cognitively represented in the brain (Crossingham et al., 2009; Dev, Friedman, Dafoe, & Felciano, 1992; Friedman, Dev, Dafoe, Murphy, & Felciano, 1993; Zarahn, Rakitin, Abela, Flynn, & Stern, 2006).

Understanding the influence of this innate ability is important, because anatomy learners and health practitioners alike are routinely involved in and are required to process spatial anatomy information, and with the increased use of medical imaging they are increasingly required to use their mental spatial skills in image interpretation. In some cases, health practitioners are learning to conduct and interpret ultrasound scans without dedicated sonographers (Moscova, Bryce, Sindhusake, & Young, 2015). Understanding the impact of spatial ability is particularly important for radiography students, because they will need to learn ultrasound, which requires both anatomy knowledge as well as spatial abilities. Fortunately, as previously mentioned, there is evidence that spatial ability improves with anatomy learning (Chatterjee, 2011; Fernandez et al., 2011; Vorstenbosch, Klaassen, Donders, et al., 2013). However, given the impact of spatial skills on anatomy learning, it might be wise to take this factor into account when designing the curriculum to provide differential instructions for students with spatial ability learning needs. In addition, it is important to take spatial ability into account when designing anatomy assessment questions so that there is a spread of different questions, since assessment item difficulty and discrimination may be influenced by the presence of images, particular perspectives of the image, whether the images are moving, and if moving whether users have control over the images (Lufler, Zumwalt, Romney, & Hoagland, 2012; Nguyen et al., 2013; Nguyen et al., 2012; Vorstenbosch, Klaassen, Kooloos, Bolhuis, & Laan, 2013). Understanding these student presage factors relates to observing student-teacher interaction by providing a conceptual framework to understanding interaction where anatomy spatial and positional terms of reference become used or misused.

However, the literature is not clear on how students' behaviour during anatomy laboratory classes affects their learning outcomes. It is argued that only by systematically observing and studying laboratory teaching-learning behaviours can laboratory demonstrators be informed by this data to improve the effectiveness of their instruction and student learning outcomes. Similarly, studies of student learning outcomes in anatomy education research have done little to make visible how students behaviourally demonstrate their learning approach and the nature of the pedagogical interaction and conditions that reinforce or modulate learning approaches.

Anatomy education research has also adopted the *learning approaches* framework originating from the phenomenography research conducted from the 1970s–80s defining one aspect of the relationship between the student and his/her learning (Biggs, 1979; Marton & Säljö 1976; Ramsden, 2003). Conceptually, the terms to describe the referential *what* and the structural *how* are intentional dichotomisations that help to simplify and describe the ways learners approach learning (see Figure 2.4 p. 54). Nevertheless, the concept consolidates and defines the important relationships among the subject being studied, the students' perception of the situation and the perceived learning that is required, and the learning s/he is doing (Eizenberg, 1988; Entwistle & Ramsden, 1982; Newble & Entwistle, 1986; Ramsden, 2003; Trigwell, Prosser, & Waterhouse, 1999). Therefore, most importantly, it needs to be recognised that student approaches are not inherent characteristics of students, and from early childhood everyone is capable of learning using both surface and deep approaches to learning (Ramsden, 2003).

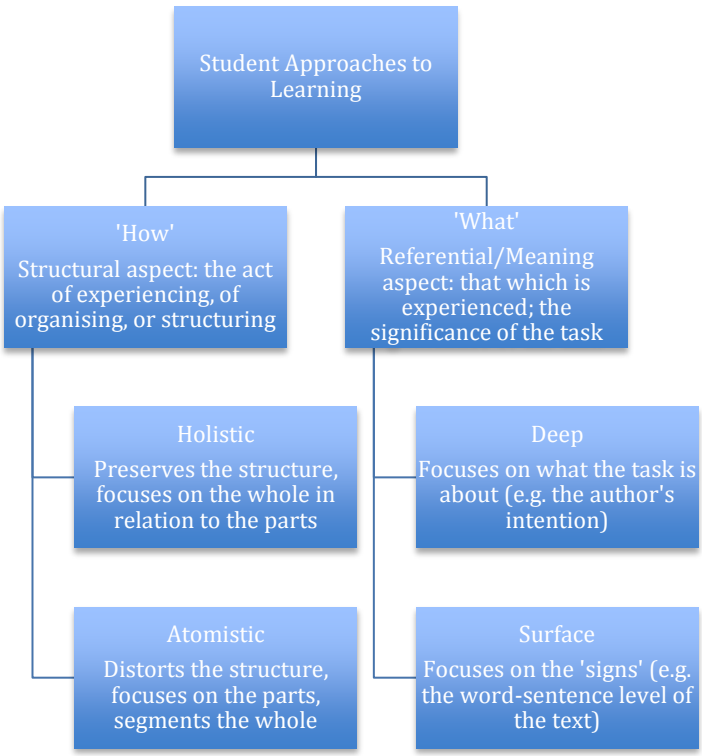


Figure 2.4 Hierarchical chart representing the dichotomies of student approaches to learning[10].

Studies of students' learning approaches have found that science students are more likely to adopt a surface-atomistic approach when compared to students in the arts and humanities (e.g. Parpala et al., 2010). In the case of a subject such as anatomy, with its seeming abundance of facts needing to be memorised, there is great concern that the overwhelming amount of information fosters surface learning approaches in students. Indeed, C. F. Smith and Mathias (2010) found evidence from studies of medical students (n=256, 23.8%) that indicated their adoption of surface learning approaches was associated with perceiving the learning of anatomy to be daunting or irrelevant. In contrast, deep-holistic learning approaches were correlated with students' self-reported practice of frequently using anatomical language and anatomy-radiology knowledge at clinical opportunities or in clinical situations, but also by learning anatomy using hands-on approaches to touch and feel for structures

[10] This is based on Figure 1 in Marton (1988, p. 66) referenced in Figure 4.1 in Ramsden (2003, p. 44) and Figure 1 in Eizenberg (1988, p. 181).

in the dissecting room (C. F. Smith & Mathias, 2010). The research indicated that anatomy learners indeed can and do adopt deep approaches, but it is not clear whether that is the case for all anatomy programs.

At this stage, it is important to point out that the concept does not simply attribute learning behaviours/strategies such as memorisation to either deep or surface. The concept is more sophisticated in the sense that it is concerned with what the learner intends to do with the memorised information and how they go about structuring their memorised information. In other words, does the learner memorise with a focus on the purpose or intention of the task (deep) and is the information context and structure organised and maintained (holistic). Unfortunately, in application of the *learning approaches* concept, the information structural aspect of learning gets lost, leaving behind only the referential terms of *deep* and *surface approaches*. More correctly, approaches to learning should be thus described: *deep-holistic*, *deep-atomistic*, *surface-holistic*, and *surface-atomistic*.

More critically, although student *learning approaches* as a concept provides an indication of the learning process, it generates a rather isolated and individualistic conception of learning. The quantitative research methods used in these studies provide no insight into the observable student behaviours that represent each of the three learning approaches. Without knowing the type of interaction and learning behaviours that represent surface, deep, or strategic approaches, it is difficult for teachers to observe and create instructional environments or interventions that encourage the desirable learning approaches.

Student approaches to learning anatomy have also been qualitatively investigated. Eizenberg (1988) documented first- and second-year medical students' anatomy learning journey using questionnaires, interviews, teaching observations,

and informal discussion with students to identify the impact of an existing anatomy curriculum and instructional methods. The researcher used the information to redevelop an anatomy curriculum with the patterns he observed from student learning approaches in combination with accepted teaching principles known to improve learning (Eizenberg, 1988). Using a questionnaire delivered to second-year medical students in 1987 at the beginning and end of the semester, the researcher found 94% of the students intended to study the subject of anatomy with an aim to understand, but by the end of the semester with realisation of the actual total workload required by other subjects besides anatomy, 62% of the students shifted their intention away from understanding to an approach aimed to avoid failure in examinations. These findings resonate with the broader studies of university student learning approaches reviewed by Ramsden (2003) that demonstrated students are more likely to adopt a surface or strategic approach when they perceive they have excessive workloads, which renders the preferred deep approach impractical. However, besides student perceptions of workload, Eizenberg (1988) notes the potential to motivate medical students to adopt deep approaches to learning by delivering anatomy content in a medically relevant context. The researcher's phenomenographic and action-based research approach led him to conclude that all students come to class equipped with a unique set of motivations, skills, abilities and conception of learning from their previous life experiences, and that these student characteristics augment and form part of the students' self-perceptions. Students' intentions, approaches, and outcomes are contingent upon their self-perceptions, but are also modified by students' perceptions of the context, which includes curriculum, teaching and assessment (Eizenberg, 1988). Social interactions in the education

settings provide opportunities to make visible and negotiate students' perceptions of self and the broader educational context.

In another study, Wilhelmsson et al. (2010) found second-year medical students in Sweden held intentions to understand anatomy by balancing the dual notions of the wholes and the details, and by searching for meaning and connectedness in learning the subject. The group also identified that individual students approached the task of learning anatomy through different ways of contextualisation, such as contextualising the parts with respect to the whole structure that is meant to be understood; contextualising through drawing relationships to other related disciplines like physiology; and contextualising by understanding anatomy in relation to professional practice (Wilhelmsson et al., 2010). The internal contextualisation of learning anatomy as a dichotomy of balancing the whole and the details and the various methods used, such as experiencing anatomy, visualising the anatomy, and being confronted by the real anatomy of a corpse all resonate with previous findings of Eizenberg (1988). However, the external contextualisation of anatomy to other disciplines and to clinical practice adds a new element to how students strive to understand anatomy. These findings resonate with the phenomenographic analytical findings of Bergman, de Bruin, et al. (2013), where students reported that learning anatomy required more than just having an educational approach like PBL underpinning the curriculum. Students found that repeated exposure to anatomy was more effective than stricter assessment and that contextualising anatomy in relation to clinical practice or other disciplines enhanced understanding, motivation, and the transfer of the learned knowledge to other contexts (Bergman, de Bruin, et al., 2013).

Understanding students' motivation and *learning approaches* to anatomy provides educators with insights into how to develop more impactful and effective

instructional interventions. However, currently no studies have yet attempted to examine how such behaviours might be exhibited in actual anatomy laboratory interactions. While beyond the scope of this investigation, given that the approaches students select are determined by how and what students perceive to be required of them in their immediate learning environment (Ramsden, 2003), the empirical study of the laboratory interaction and environment is important to shedding light on how particular approaches to learning might be demonstrated or augmented in the laboratory teaching-learning process.

2.4.5 The Social Conception of Learning as a Tool for Anatomy Laboratory Research

Besides exploring these more granular processes, it is important to consider how learning is conceptualised. Researchers' conceptualisation of learning affects how it can be observed and measured. Learning can be conceptualised as an outcome or change in conception (Dahlgren, 1984); as changes in persons' conception of aspects of reality (Ramsden, 1988); or even as "…a means to that end, i.e. how a change between qualitatively different conceptions takes place. Describing how a change in conception takes place characterizes an approach to learning." (Eizenberg, 1988, p. 180). These varied concepts of learning demonstrate how measuring student performance on examinations is but one perspective to determine what is learnt. However, these perspectives focus mostly on the individual learner, except for the last perspective offered by Eizenberg.

An alternative view to learning for the anatomy laboratory is a socially collaborative perspective of learning. The laboratory provides more than just opportunities to generate visual and tactile experiences that align with individual cognitive, constructivist learning (Dalton-Puffer, 2007) or with contextualised

learning through clinical case studies that relate to schema theory (Regehr & Norman, 1996). Like the classroom, teacher-student and student-student interactions provide the binding glue for the social fabric of the anatomy-learning laboratory, where laboratory participants co-construct the social and cultural reality and knowledge of anatomy. These verbal encounters and the discourse created are pivotal to understanding learning (Dalton-Puffer, 2007) as being more than just "making conceptual connections but also, and crucially, making interactional connections, knowing how to coordinate action, and how to collaboratively construct learning activities" (Ford, 1999, p. 401).

Vygotsky's theorising about learning as a socially-mediated act resonates here because understanding is not only a product of interaction with the physical world but also the means through which interactions between people in relation to the world become relevant (Edwards & Mercer, 1987). This understanding of learning is fundamentally different from the general cognitive perspective that is assumed in most anatomy laboratory instructional research. Applying Vygotsky's notion of learning as a social act, anatomical knowledge expressed through language is achieved, replicated, and reshaped meaningfully within the culture of the health professional community. In addition, Vygotsky's (1978) concept of the Zone of Proximal Development (ZPD) becomes useful because of the amount of potential learning in a given time as being dependent on the interplay between what the learners bring in terms of prior knowledge and experiences, and the degree to which the full potential of the ZPD is tapped by the available social interactions (Dalton-Puffer, 2007; Hein, 1991). The concept implies that the range of skills that can be developed in a socially-collaborative environment far exceeds that which can be achieved alone (Dalton-Puffer, 2007).

Bringing these concepts together provides a basic formulation for a framework of social learning. The framework accounts for how learners individually ascribe meaning to the experiences and knowledge (constructivism) (Dalton-Puffer, 2007), but also how these experiences and knowledge are socially fabricated and situated within the interactions they have with other members and objects in that context (socio-constructivism) (Vygotskiĭ, 1978). In addition, these experiences and knowledge become shared, and negotiated inter-subjectively (Gardner, 2008; Koschmann, 2012; Potter & te Molder, 2005). In light of this brief and arguably simplistic overview, the student 'self-directed learning' process in laboratories is perhaps much more socially interactive than previously understood, and involves interactions with peers and educators as well as tools/resources within the environment. Learning thus defined may be more difficult to quantitatively measure, but may be observable over time, as in the changes in patterns of interaction and practice.

2.4.6 Summary

Current research indicates that laboratory teaching and learning is part of a complex system of practice and intervention, the success of which requires attention to be paid to:

- environmental factors (types of instructional tools available, physical setup, layout, etc.)
- pedagogical factors (types of instructional activities, instructional strategy etc.)
- student/teacher factors (approaches to learning, student/teacher beliefs and attitudes, personality etc.)

- social factors (identity of self, community memberships and identities, teacher/student interaction behaviours, etc.)

Building on the broad base of existing anatomy education research that has individually examined different parts of a complex system of laboratory teaching-learning, this thesis attempts to fill the gaps identified in the social and interactional aspects of the system. In order to achieve this, the thesis examines and analyses at a more micro-level the laboratory participants' interaction, which is at the root of the social networks and laboratory behaviours observed by Hafferty et al. (2013) and Hopkins et al. (2011) respectively.

Given that anatomy education is particularly interested in understanding how instructional processes like dissection affect student learning outcomes, perhaps it would be worthwhile to consider developing research around a six-variable process-product model, as shown in Figure 2.2 (p. 44). As the model indicates, teacher characteristics do not directly correlate with student achievements. After all, teaching and learning do not follow a simple knowledge transmission process (Hattie & Yates, 2014; Terrell, 2006). Furthermore, the fact that only weak positive correlations, if any at all, exist between teachers' presage factors like knowledge and student achievement suggests the existence of interacting intermediary process factors, such as student's and teacher's thought processes enacted through action. As further understanding is developed, a more complex process-product relationship model may be constructed.

2.5 Conclusion: Unpacking the Anatomy Laboratory '*Black Box*'

This chapter has sought to provide a cultural-historical perspective of the discipline of anatomy and its instructional and research practices. A number of gaps and issues in existing anatomy laboratory research literature have been identified. Most

importantly, there appears to be a lack of research into the actual social processes that operate in the anatomy laboratory, whether that be of the traditional approach by dissection or the blended approach that no longer situates dissection at the centre of the laboratory experience. By focusing on the social interaction of laboratory pedagogy, as will be seen in the analysis of Chapter 5 and 6, it would be possible to better understand how instructional tools and objects contribute to observable interactional differences. This will lay the necessary foundation better understand the differences or the lack thereof between traditional and novel blended instructional approaches.

Teaching and learning interactions in anatomy laboratory settings call out to be studied and understood. Laboratory demonstrators play a significant role in teaching and learning, and they also have power and influence over students and colleagues as part of a complex social system (Hafferty et al., 2013). Yet demonstrators are often medical practitioners lacking the time and, in some cases, may lack the motivation to learn about teaching because they have other reasons for taking on the role. Nonetheless, given the university commitment to quality teaching, the anatomy laboratory demonstrators must be equipped with the skills and knowledge to understand and practice the sociological art and science of anatomy laboratory pedagogy. Moving forward, this thesis begins to address the gaps in understanding the social and cultural dimensions of the anatomy laboratory teaching-learning process identified by this literature review. It starts to unpack the anatomy laboratory pedagogical interaction ‘black box’.

Chapter 3 Conversation Analysis – A Tool for Understanding Anatomy Laboratory Teaching

3.1 Introduction

Conversation analysis (CA) is a set of methods that have generated a body of research findings that analysts repeatedly draw upon. Whilst it is not the only method for analysing the teaching and learning of anatomy, but it is a rigourous methodology for dissecting social interaction. The rationale for choosing CA will be discussed in Chapter 4. One of the many methodological strengths and rigours of CA is that analysts ground their research findings firmly within the original observational data which undergo many iterative cycles of transcription and analyses. Therefore, it is difficult to arbitrarily discuss the CA methods separately from the findings. Nevertheless, this chapter aims to provide an overview of the CA findings that have relevance to the current study before explicating the rationale for adopting CA methods. The chapter first focuses on presenting the key concepts of CA (e.g. turn-taking organisation, sequential/sequence organisation, repair, epistemics and membership categorisation). Furthermore, it will review and present the relevant literature where CA methods have been applied to study pedagogical interaction in formal educational contexts ranging from university seminar/tutorial sessions and the research laboratory, to secondary school (grades 7–12) science class/laboratory sessions and language classrooms. This chapter establishes a basic CA knowledge framework and CA findings which facilitate the methodological justifications provided in the methods chapter.

3.2 A General Introduction to Conversation Analysis

Put simply, "CA aims to describe, analyse, and understand talk as a basic and constitutive feature of human social life" (Sidnell, 2010, p. 1). The goal is to examine

how participants achieve inter-subjective understanding, how speakers make their understanding visible to each other, and to describe the interaction mechanisms and machinery that make this co-construction and inter-subjective understanding possible (Sacks, 1995). The CA researcher's central aim is to understand the functions of different interactional features, and the *where*, *when*, and *why* they occur have allowed investigators to grasp human action as understood by the participants and as situated within the full complexities of the social situations (Filipi, 2009; Sahlström, 2009). This aim and the methods of achieving it have been succinctly summarised in the transcribed lectures of Harvey Sacks (1984), who founded CA.

> The gross aim of the work I am doing is to see how finely the details of actual, naturally occurring conversation can be subjected to analysis that will yield the technology of conversation.
>
> The idea is to take singular sequences of conversation and tear them apart in such a way as to find rules, techniques, procedures, methods, maxims (a collection of terms that more or less relate to each other and that I use somewhat interchangeably) that be used to generate the orderly features we find in the conversations we examine. The point is, then, to come back to the singular things we observe in a singular sequence, with some rules that handle those singular features, and also, necessarily, handle lots of other events. (p. 411)

Studies in CA have demonstrated that talk-in-interaction possesses structures and regularities can be subjected to analysis using highly detailed transcription methods (Drew, 2012b; C. Goodwin, 2013; Heritage, 2012b; Koschmann, LeBaron, Goodwin, & Feltovich, 2011; Lindwall & Lymer, 2014; Mondada, 2013b; Rendle-Short, 2006; Schegloff, 2007a; Zhao & van Leeuwen, 2014). As a result, CA has established itself

as the social science that studies the organisation of human interaction by demonstrating that interactions can be systematically and empirically studied using carefully transcribed, micro-analytic studies of naturally-occurring interactions in both ‘ordinary’ or ‘mundane’ conversations and talk in institutional settings (Maynard, 2006; Sahlström, 2009; Schegloff, 2007a; Sert & Seedhouse, 2011).

Traditionally, CA researchers have focused heavily on the organisational structures of social encounters such as:

- *turn-taking organisation*: how people take turns to speak and the rules governing the selection of speaker (Sacks et al., 1974)
- *sequential/sequence organisation*: how participants collaboratively construct conversational structures as the conversation unfolds or how there are regular organised patterns of utterances that frequently appear together (Schegloff, 2006, 2007a; Schegloff & Sacks, 1973); and
- *repair*: how people correct and hold each other or themselves accountable when the conversation does not proceed according to expectations or social regularities (Bolden, 2011; Hepburn, Wilkinson, & Shaw, 2012; Lerner & Kitzinger, 2015; Robinson, 2006; Schegloff, Jefferson, & Sacks, 1977; S. Wilkinson & Weatherall, 2011).

In addition, CA analysts’ interest in studying naturally-occurring interaction means the field is well positioned to contribute to the study of socio-linguistic and sociological issues that are the concerns of applied linguistics or discursive psychology. Examples of such research topics within CA are:

- *epistemics*, which has recently re-emerged in the field as a third major organisation structure in addition to turn-taking and sequential organisation, that describes how people signal and display their states of

knowledge and their assumptions about the knowledge states of others (Heritage, 2012b, 2012c; Koole, 2010; Kushida, 2015; Mondada, 2013a; Sert, 2013); and

- *membership categorisation*, which describes how members show their affiliation with respect to each other and to an existing community, and how they display and develop their identities in interaction, which influence claims on knowledge and communication of information (Boblett, 2012; Buchanan & Middleton, 1995; Maheux-Pelletier & Golato, 2008; Stevanovic & Peräkylä, 2012; Stokoe, 2010; Stokoe, Benwell, & Attenborough, 2013).

These applied research investigations have influenced the development of an applied CA framework. For example, the use of CA in applied linguistics to study the organisation of teaching-learning in education contexts such as second-language acquisition (SLA) has led to the emergence of CA-SLA (Sert & Seedhouse, 2011). The CA-SLA research has enriched our understanding of the instructional and interaction behaviours of language teachers and learners and the teaching-learning processes in the language classroom. In addition, more general studies of the organisation of interaction in other pre-tertiary classroom contexts have identified instructional sequences between students and teachers like *Initiation-Response-Evaluation/Feedback* (IRE/IRF) that characterise pedagogical talk (Hellermann, 2003; Mehan, 1979a; Waring, 2009; Zemel & Koschmann, 2011). Similarly, this thesis argues that university education contexts such as the anatomy laboratory can benefit from an improved understanding of the teaching-learning processes and pedagogical interaction in order to improve the quality, efficiency and impact of its

practice. Briefly we will turn to the methodological characteristics of CA that made these achievements possible.

3.2.1 The Ethnomethodological Roots of CA

CA was inspired by Garfinkel's ethnomethodology and Goffman's *interactional order*, which assert that the micro face-to-face interactions are local and orderly structured social phenomenon that also need to be studied with progression to macro discourse before joining the two concepts later (Heritage, 1984b, 2012a; Sert & Seedhouse, 2011; Sidnell, 2010; ten Have, 2007). CA's ethnomethodological characteristics are demonstrated in its treatment of social action as being practical and having ongoing practical purposes (Psathas, 1995). This grew out of Garfinkel's ethnomethodology that studies, "the common sense resources, practices and procedures through which members of a society produce and recognize mutually intelligible objects, events and courses of action" (Liddicoat, 2007, p. 2) (Sert & Seedhouse, 2011). These theoretical concepts have helped CA to become a "naturalistic observational discipline that could deal with the details of social actions rigorously, empirically and formally" (Schegloff & Sacks, 1973, p. 289).

Drawing from ethnomethodology and armed with recording technology (ten Have, 2007), CA researchers have shown empirically that people's talk and social encounters encompass methodical, ordered and purposeful social actions, which are produced to be understood by their intended recipients (Goffman, 1983; Schegloff, 1988). Altogether, the sociological ethnomethodology and the conceptions of *interaction order* form the epistemological foundations through which CA analysts may treat social interaction as an autonomous object that can be studied in its own right. By applying this framework, CA analysts assume that particular features and

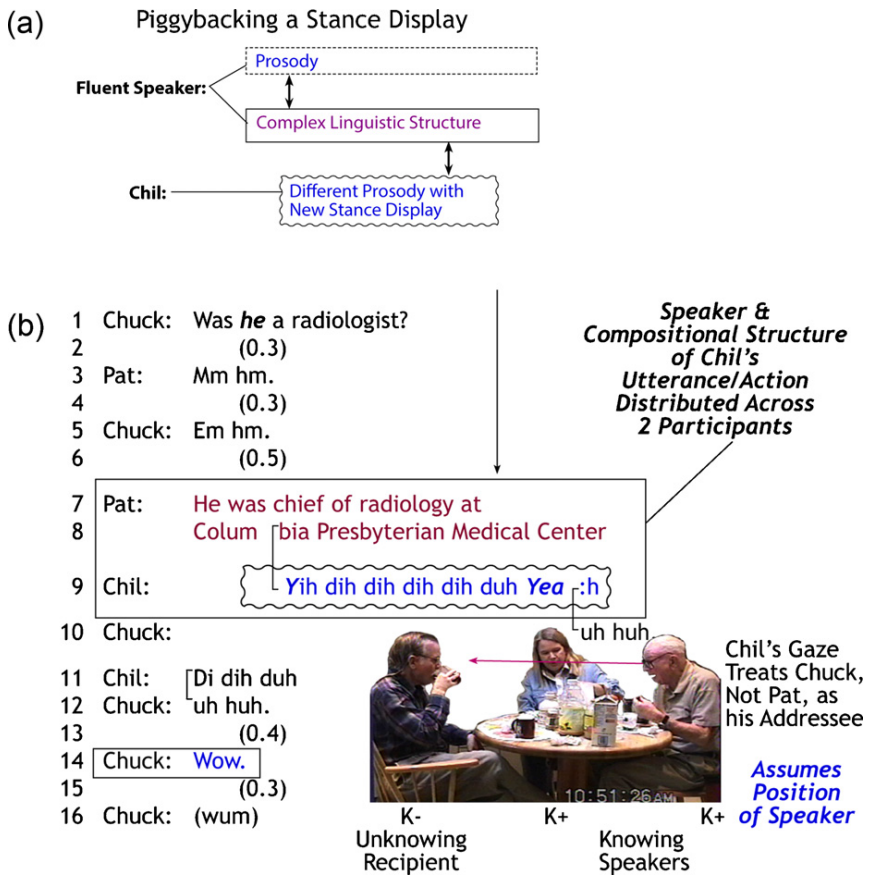
patterns of interaction may be extracted and isolated from their immediate local contexts within which they take place (Sert & Seedhouse, 2011).

CA has shown that participants orient to implicit interactional order and features to shape their ongoing talk, and to solve emerging organisational problems using their own knowledge of those organisational features (Filipi, 2009). The co-produced talk displays the inter-subjective understandings achieved, and determines how speakers design their next utterance for their listener. This is referred to as recipient design (Schegloff, 1972). It implies that each participant monitors and interprets the utterances in an ongoing manner in order to select an appropriate next action from a variety of potential responses, which may be to take the floor, maintain silence or display listenership (Filipi, 2009; Gardner, 2001). Because of this view of talk as a social action, the non-presence of a feature may also be treated as an action (Schegloff, 1968).

Next, an example of Goodwin's multimodal analysis is presented to illustrate the analytical approach adopted for this thesis, which will be discussed in detail in the methods chapter. Example 3-A on page 69 from C. Goodwin (2013) exemplifies the multimodal resources that participants draw upon for organising turn-taking. Furthermore, the example demonstrates the salient multi-layered construction of sequential turns and social actions that reveal and renew the emerging understandings of interactants. The extract is from a conversation between a stroke patient (Chil), his daughter (Pat) and his son (Chuck) (C. Goodwin, 2013). Chil's stroke left him with only three words in his vocabulary: *yes*, *no*, and *and*. However, Chil continues to function as a powerful speaker by combining different interaction resources produced by others and using the rich fluent prosody that he retains (C. Goodwin, 2013). In this extract, they are "discussing a friend of Chil's, who Chuck

recognizes, but Pat knew well." (C. Goodwin, 2013, p. 12). In terms of the epistemic[11] ecology[12] of this conversation, Chuck is an *unknowing recipient* of Chil's friend, while Chil and Pat are *knowing recipients*.

Example 3-A A sample extract from the work of C. Goodwin (2013) to illustrate the multimodal resources that participants draw upon and orient to facilitate turn-taking organisation and to demonstrate the co-construction of emerging sequential organisation that demonstrate salient understanding of the ongoing conversation.



The extract shows how the participants augment traditional turn-taking organisation of one speaker at a time, so that Chil can overlay his prosodic emphasis to the information provided by Pat (lines 7–9). Chil ends the overlay with an emphatic "Yea:h". In addition, Chil uses his gaze in constructing his overlay to clearly indicate

[11] Epistemics refers to people's territory of knowledge, and will be covered in more detail later in the chapter..
[12] Epistemic ecology simply refers here to the general state of how people's territory of knowledge relates with respect to one another

that he is directing his utterance to Chuck. Thus, Chil creates a laminated[13] and multimodal social action that shows that he is telling Chuck about the status of his friend as news. Furthermore, the sample extract shows how the previous and emerging local sequential context is an important resource for participants in constructing and making sense of their co-operative interaction. Using this extreme example, along with many other interactions from archaeological excavation sites, C. Goodwin (2013) constructs his argument for human action being *laminated*, or composed of multiple layers of social actions, and drawing upon various resources available from previous utterances to embodied gestures and physical objects.

The ethnomethodological and sociological principles of the existence of an interactional order that underpins CA can be summarised in the following ways:

- there is order at all points within talk and the social encounter
- contexts are created, renewed and mutually influenced by the participants' preceding and subsequent talk or other social actions
- analysis gives primacy to original source data of the social encounters and therefore, "No order of detail can be dismissed *a priori* as disorderly, accidental, or irrelevant" (Heritage, 1984a, p. 241)
- CA is bottom-up and data-driven. This means that analysts do not approach the data with prior theoretical assumptions such as background contextual factors like power, gender or race unless there is evidence in the source data to suggest that they are relevant to the participants and the social encounter being investigated. Seedhouse (2005, pp. 166–167)

[13] Participants bring together multiple laminated layers of interactional resources (e.g. language structure, embodied displays, prosody, tools/objects, categories such as institutional membership, epistemics, sequential organisation, and turn-taking organisations) in order to understand how participants construct, display, and negotiate identities, relationships, and shared social practices

This means that, epistemologically, conversation analysts do not lay claim to the "neutral discovery of an objective truth" (Castelló & Botella, 2007, p. 263). Rather, analysts argue from a constructivist perspective that having access to the step-wise process of an interaction allows them to gain first-hand the inter-subjective knowledge being collaboratively constructed and compiled by the social actions of participants (Raskin, 2002), with the exception that the analysts are not privileged to take part or contribute to that process. This forms the analytical basis underpinning Chapter 5 and 6, but the CA data analysis process will be further discussed in detail in Chapter 4.

3.3 Basic Features of CA Relevant for the Study of Social Interaction in Education Institutional Contexts

This section briefly describes applied-CA studies and introduces the important concepts and principles of CA substantiated by investigations. It begins by generally surveying applied-CA studies in education institutional contexts,.and identifies examples of methodological frameworks useful for conducting applied-CA investigations. As we will see in the analysis chapters, anatomy laboratory pedaogigcal interaction possess qualities that resemble educational institutional talk. Next, it explicates important fundamental CA findings from traditional- and applied-CA research. The discussion will introduce *turn-taking organisation*, *sequential organisation*, *repair*, *epistemics*, and *membership categorisation*. Explicating the principles of turn-taking organisation in early ground-breaking CA investigations by Sacks et al. (1974) laid the cornerstone of CA, providing a basic framework for understanding how people take turns to talk and that change in speakership takes place. Concurrently, further pioneering CA work in sequential organisation, such as Schegloff (1968), provided the background for subsequent work in this area to

examine how people's turns at talk possess an emerging natural order, pattern, and structure. Examples of different sequential structures and patterns that will be described are *adjacency pairs*, *expansion sequences*, and *response tokens*. Next, the mechanism of *repair* is generally described to reveal the options available to participants, when they experience trouble in speaking, hearing, understanding the talk, or turn-taking. Following this the discussion returns to the re-emerging third conversational organisational structure, *epistemics*. Epistemics was re-introduced and popularised by Heritage (2012b) in CA and represents a confluence of psychological, sociological, and linguistics concepts, and has played a significant role in helping CA analysts understand how meaning and knowledge drives interaction, which is particularly useful for applied-CA investigations of educational interaction. Finally, *membership categorisation* (MCA), a lesser known strand of CA developed by Sacks (1995), is briefly addressed. MCA demonstrates how CA methodology and analyses can be applied to study more abstract social constructs (e.g. *identity categories* and *membership roles* and *identities*).

3.3.1 Analysing Interaction in Education and Other Fields Using Applied-CA and Important Analytical Considerations

This is an applied-CA study which, unlike *purist* approaches, imports the use of exogenous theories such as community of practice (Lave & Wenger, 1991; Hellermann, 2008). The aim is to use existing knowledge and principles of CA as the basis for understanding the organisation of talk in different contexts and scenarios, in this case the anatomy teaching-learning laboratory sessions. As stated, CA has been successfully applied to study talk in a variety of institutional settings, for example: classrooms (Ford, 1999; Hellermann, 2003; Lerner, 1995; Lindwall & Lymer, 2011, 2014; Macbeth, 2004; McHoul, 1978, 1990; Seedhouse, 1997; Sert, 2013; Stokoe,

2000; Tobin, Ritchie, Oakley, Mergard, & Hudson, 2013; Zhao & van Leeuwen, 2014), medical/healthcare settings (Jenkins & Reuber, 2014; Koole & Mak, 2014; Koschmann et al., 2011; Robinson & Heritage, 2014; R. Wilkinson, 2014), research laboratories/field work (Bernhard, 2011; C. Goodwin, 1994, 1995, 2013; Hsu & Roth, 2009; Hsu, Roth, & Mazumder, 2009; Wooffitt, Holt, & Allistone, 2010), business/professional/political institutional talk (Mondada, 2007; Mondada, 2013b) and seminars (Rendle-Short, 2006; Walsh & O'Keeffe, 2010; Waring, 2002). Notably, the vast majority of CA studies of pedagogical talk have been in more teacher-fronted or teacher-centric classroom settings rather than university settings (Emanuelsson & Sahlström, 2008; Lerner, 1995; Macbeth, 2004; McHoul, 1978, 1990; Parmeggiani, 2011; Seedhouse, 2012). Increasingly, researchers have focussed on the interaction between learners/students (Ford, 1999; Hellermann, 2007, 2008, 2012; Kelly & Brown, 2002; Koole, 2012b; Kumpulainen & Mutanen, 1999; Kupetz, 2011; Lindwall & Lymer, 2011; Markee, 2005; Mehan, 1980; Melander, 2012; Stokoe, 2000; Stokoe et al., 2013).

In university instructional settings, PBL has been studied using CA or CA-like discourse analyses (Glenn, Koschmann, & Conlee, 1999; Koschmann & LeBaron, 2002; Remedios, Clarke, & Hawthorne, 2008a; Woodward-Kron & Remedios, 2007; Zemel & Koschmann, 2011). In addition, CA investigations have been used to study tutorials (Benwell, 1999; Benwell & Stokoe, 2002, 2005; K. M. Davis, Hayward, Hunter, & Wallace, 2010; Horton-Salway, Montague, Wiggins, & Seymour-Smith, 2008; Lindwall & Lymer, 2014; Stokoe et al., 2013; Stokoe & Smithson, 2001) and lectures/academic presentations (Christodoulidou, 2011; Rendle-Short, 2006; Walsh & O'Keeffe, 2010). However, studies of interaction using CA in the university context remain under-investigated (Stokoe et al., 2013). This is especially true for

science learning laboratories. Nevertheless, the variety of investigations examining different instructional contexts demonstrates how participants organise and construct their interaction. In doing so, participants introduce, make relevant and transform interactional components and resources from an array of sociological layers that include physical space, body positioning, embodied gestures, gaze, facial expressions, previous utterances, words, grammatical structures and prosody (C. Goodwin, 2000, 2013; Koschmann & LeBaron, 2002; Kupetz, 2011; Mondada, 2007, 2011).

The success of CA as a field is self-evident in the recent emergence of CA-guided interventions and CA-interventional studies. Amongst which there are many examples of CA being applied to improves healthcare practices (Jenkins & Reuber, 2014; Lindholm, 2015; Robinson & Heritage, 2014), help patients with speech-related pathologies to communicate (Beeke et al., 2014; Koole & Mak, 2014; R. Wilkinson, 2014), improve telephone helpline services (Hepburn, Wilkinson, & Butler, 2014) and improve the cost effectiveness and delivery of government social services (Drew, Toerien, Irvine, & Sainsbury, 2014). Therefore, CA studies are not just ‘nice in theory’, they can result in pragmatic benefits and have real-world applications.

While the discussion and consideration of the CA method will be more extensively considered in the methods chapter, a description of some general features of the CA methodology will help to develop a general understanding of the methodology before discussing the key concepts in the field. It begins by considering the differentiation and relationship between everyday conversational talk and institutional talk.

CA analysts do not automatically assume that institutional contexts have a direct and immediate bearing on the talk; the onus is on the analyst to demonstrate how institutional settings, cultures and particular types of roles and professional identities are implicated and consequential for the talk produced (Drew & Heritage, 1993; Filipi, 2009; Mortensen & Wagner, 2012; Sert & Seedhouse, 2011). In other words, just because the talk happens in an institutional context does not automatically make it institutional or relevant to conducting the business of the institution (Filipi, 2009; Mortensen & Wagner, 2012). In fact, it is up to the participants to talk the context into being by altering the specific features of talk that make them institutionally affiliated and distinguishable (Drew & Heritage, 1993; Sert & Seedhouse, 2011).

In achieving this, Sacks et al. (1974) argue that the different types of talk or speech-exchange systems are derivatives of everyday talk created by augmenting turn-taking organisation, which will be discussed later in Section 3.3.2 (p. 78). They also note that the arrays of *speech exchange systems* may be arranged on a continuum from least formal, where allocation of turns are locally managed, to the most formal of exchanges, where all turns are pre-allocated (e.g. parliament proceedings, formal debates) (Sacks et al., 1974). In fact, unlike other linguistic disciplines, in CA the normal conversation turn-taking system is considered to be the foundation upon which all other arrays of systems are based, and therefore may be studied by comparison with the modification of the different aspects and features of talk, like turn-taking, sequential/sequence organisations (Sacks et al., 1974). This foundational status in everyday conversation gives rise to applied-CA studies for studying and comparing talk that occurs in other social institutional contexts like the classroom (Koole, 2010, 2012b; Lerner, 1995; Macbeth, 2004; McHoul, 1978; Mehan, 1979a, 1979b, 1998; Sahlström, 2009; Seedhouse, 2012; Sert, 2013; Walsh, 2002; Waring,

2009). Unsurprisingly, given the relevance of CA to linguistics and language, much of the research has been in language learning classrooms, previously mentioned and referred to as the CA-SLA literature based on the pioneering work of Firth and Wagner (1997, 2007).

Furthermore, CA research has shown that the dynamic nature of the context is created, renewed and transformed by participants' talk and interactions (C. Goodwin & Heritage, 1990; Heritage, 1984b), which Seedhouse (2011) has more recently also demonstrated through his work in the second language classroom. Furthermore, this notion means that institutional or non-institutional characteristics and the micro-contexts are talked into and out of existence by the participants (Drew & Heritage, 1993). However, there is an issue of *procedural consequentiality* (Schegloff, 1991), where the context may be relevant to participants' talk, but the context may not necessarily directly contribute to the production of that talk. To address this, the analyst must demonstrate the relevance of the contexts by showing how ordinary features of conversation are modified by participants with orientation to institutional social structural features, whereby the institutional context leads to distinctive institutional conduct (Filipi, 2001; Mortensen & Wagner, 2012).

In addition to institutional micro-contexts being created by the participants' talk, participants' roles, identities, relations, cognition and emotional states are also emergent through social encounters (Clift, 2014; Garcia, 2013; Maheux-Pelletier & Golato, 2008; Potter & te Molder, 2005; Voutilainen et al., 2014). This starting point for CA is Goffman's proposition that there is a dramaturgical element to human social life, where participants are actors depicting and acting to construct an onstage identity of themselves reciprocally shaped by their contexts (Goffman, 1990). Therefore, in anatomy laboratory interactions, participants act in a way to

characterise their identity as visible and readily available to each other, and hence also available to the analysts of interaction. Indeed, Mehan's (1998) review of interaction studies in classroom settings argues that identities and cultures are social constructs, and they are formed and acted upon through student-teacher interactions. While multiple frames and perspectives may be adopted by analysts to interpret the various aspects, the challenge for the analysts is to determine the identities being made relevant to and by the participants, which is best characterized by MCA research (Buchanan & Middleton, 1995; Schegloff, 2007b; Stokoe, 2010).

In closing, the notion of *embodied interaction* in CA will be briefly introduced. Since CA's early work on recorded telephone conversations, with the advances in video-recording technology, CA has been able to expand its study of interaction to include non-verbal behaviours such as gaze, gestures and embodied orientations (Filipi, 2009; C. Goodwin, 1986, 2000, 2007, 2013; Mondada, 2011, 2013b; Mortensen & Wagner, 2012; Nevile, 2015; Rendle-Short, 2006; Stivers, 2008; Streeck, 2009). This is particularly relevant to the multimodal environment of anatomy laboratories, because as Rendle-Short (2006) reminds us, "Scientists, in particular, surround themselves with tools, artefacts, or visual aids, in order to better explicate their ideas" (p. 14). The importance and the simultaneous production of these non-verbal forms of interaction have been studied in a variety of informal and formal institutional settings such as science class laboratories, archaeological excavation sites, and courtrooms (Ford, 1999; C. Goodwin, 1986, 1994, 2007). For example, in the high school science learning laboratory, embodied gestures and interaction have a variety of important interactional roles, such as assisting participants in task-orientation, determining participants' role-orientation, maintaining group 'jointness', demonstrating understanding, and organising the task

activity (Ford, 1999). For this thesis, the studies examining how participants produce and orient to embodied displays that contribute to turn-taking and sequential organisation in education institutional contexts are of particular interest (Belhiah, 2009; Cekaite, 2015; Koole, 2010; Koschmann & LeBaron, 2002; Melander, 2012; Sert & Walsh, 2012).

The following sections will review the relevant CA research related to turn-taking organisation, sequential organisation, epistemics, and MCA. In each of the sections, the emphasis will be on the applied-CA findings within university instructional contexts that best resemble the anatomy laboratory, and where the literature is scant, research of high school science instructional contexts will be considered.

3.3.2 Turn-Taking Organisation

The turn-taking organisation system allows participants in interaction to change over in speakership from one person to the next so that speakers may display their understandings of the previous talk and actions (Ford, 2012; Sacks et al., 1974; Schegloff, 2000a). Asymmetry in turn-taking has been identified as a feature of institutional talk, and is a critical first layer of analysis to understand how laboratory participants managed their interaction in Chapter 5 and 6. Research across languages shows the tendencies for interactants to minimise overlap in talk and the gaps between transitions (Ford, 2012; Stivers et al., 2009); in CA terms, the gaps that appear are referred to as *pauses*. In addition, participants' close monitoring and managing of the timings of turn-taking indicate that when such pauses and overlaps occur, they are not random acts but are intentionally created and thus meaningful to the interaction (Ford, 2012). Recent quantification of CA data found that the average gap between turns across 10 languages remain within a range of 250 ms from the

cross-language mean, which suggest that turn-taking infrastructure is likely a robust human language universal (Stivers et al., 2009). However, the general guidelines of the turn-taking organisation system are not prescriptive with regards to how turns are taken. In fact the system is locally managed and allows for the participants to work out the system on a turn-by-turn and moment-to-moment basis as the talk unfolds (Auer, 2005; Ford, 2012; C. Goodwin, 1979; Mondada, 2007; Sacks et al., 1974). Consequently, the modifications of the turn-taking organisation in different institutional settings help participants achieve the purposes and business of their encounter while, to different degrees, allowing for deviation and participants' own local management.

The general features of turn-taking (more recently summarised by Ford, 2012) show the consistency and robustness of a system that was initially observed and developed by Sacks et al. (1974). The features are summarized in Table 3-1 on the following page.

Table 3-1 Summary of the general features and rules of turn-taking organisation adopted from Sacks et al. (1974) and more recently summarised by Ford, 2012.

<table>
<tr><th colspan="2">General Features of Turn-Taking Organization</th></tr>
<tr><td colspan="2">• absolutely, one party talks at a time
• talk can be continuous or discontinuous
• each speaker is given one Turn-Construction Unit (TCU) per turn
• transition of turns may occur at Transition Relevant Places (TRPs) within turns or at either ends of a turn construction unit
• minimal gap and overlap occur when turns transition from one speaker to the next
• turn allocation techniques are used but are not pre-specified. That is, the current speaker may select or designate a next speaker in the course of his/her own turn-construction unit, or people may self-select. If no one self-selects then the original speaker may continue
• repair mechanisms are employed and deployed when turn-taking organisation fails (e.g. extended overlaps between speakers, extended gaps, etc.)</td></tr>
<tr><th>Component 1: Turn Allocation</th><th>Component 2: Turn Construction</th></tr>
<tr><td>• each speaker is allotted one Turn-Construction Unit (TCU) per turn
• minimal gap and overlap when turns transitions from one speaker to the next
• current speaker may select or designate a next speaker in the course of his/her own TCU
• recognised courses of action across turns also contribute to speaker selection
• largely locally managed and dependent on participants' formulation and perceived constitution of action trajectories that unfold as the sequential context gradually becomes revealed</td><td>• turns are constructed in units that vary in length
• there is variability in the size, length, content, order of distribution of turns, and the number of participants present
• talk spanning multiple turns are locally managed but may occur by default of no next-speaker, or driven by content and sequential relevance of the talk based on the trajectories of action being displayed and monitored</td></tr>
</table>

It is important to recognise that the features of this system are driven by participants' actions, which may also include doing nothing. In addition, it is worthy of noting that Stivers et al. (2009) found the mean turn transfer time for 10 different languages

range from 7–468 ms, which is insignificant given that the latency in planning a single word is around 600 ms (Levelt, Roelofs, & Meyer, 1999). The results suggest that people's turns most likely project possible next turns, which limit the cognitive planning and processing times.

Mechanistically, Sacks et al. (1974) divided the turn-taking organisation system into two components: *turn allocation* and *turn construction*. Turn allocation is "a set of rules for when speaker change occurs and how next speakers are selected" (Ford, 2012, p. 1). See "Component 1: Turn Allocation" in Table 3-1 for the rules as summarized by Ford (2012). Turn allocations may also have a number of different practices for selection, such as sharing turns and choral performances, and there are various context-sensitive, obvious, and subtle methods for addressing the next speaker (Lerner, 2003; Mondada, 2007). Furthermore, these practices undergo specialisation and diversification in different interaction contexts and, increasingly, studies have investigated wider ranges of resources that participants use to accomplish the task (Mondada, 2007). For example, Mondada (2007) notes in telephone conversations the use of verbal and vocal resources, in face-to-face interactions the use of multimodal resources, in multi-party interaction like work meetings the central use of names (Lerner, 2003), and in mediated communication the use of objects and technology.

On the other hand, turn allocation works intimately with turn construction to allow participants to recognise when subsequent action has become or is becoming relevant to their interaction (See "Component 2: Turn Construction" in Table 3-1). The turns are made up of TCUs (Sacks et al., 1974), which are the basic units of interaction that participants recognise and orient to. TCUs are social constructs collaboratively achieved by the participants, and "interactively negotiated, emerging

within the temporal moment-by-moment unfolding of talk as it is jointly, 'situatedly' (emphasis added), contingently produced by the participants." (Mondada, 2007, p. 195). A central feature of the TCU is its *projectability*, which is responsible for participants capably predicting the unfolding of the construction of TCUs (Mondada, 2007; Sacks et al., 1974). Therefore, participants can predict the trajectory and possible points of completion throughout the course of a TCU's development, before the unit comes to an end (Drew, 2012a; C. Goodwin, 2013; Lerner, 1995; Levinson, 2012; Stivers & Rossano, 2010). This allows participants to forward plan to minimise gaps and overlap so that they are able to take over at the precise point where the previous turn ends (Drew, 2012a; Ford, 2012; C. Goodwin, 2013; Levinson, 2012; Mondada, 2007; Nevile, 2015; Stivers & Rossano, 2010). Consequently, in preparation for the transitions there may be opportunities for overlapping talk-in-interaction.

CA analysts and linguists have diligently identified the resources that participants draw upon to construct and determine the projectability of a turn (Drew, 2012a; Lerner, 1995; Levinson, 2012; Mondada, 2007; Stivers & Rossano, 2010). In English, the resources that TCU utilises to allow for projections of possible points of turn completion are: grammatical sentence structures (e.g. subject-verb-object word order), and clausal, phrasal, and lexical (individual word) constructions (Ford, 2012; Mondada, 2007). However, beside these lexico-grammatical resources, the sound and vocal productions (i.e. intonation, phonology, etc.) are another set of resources that are important in helping participants discriminate when a single word like 'what' is the beginning of a sentential or phrasal construction (Ford & Thompson, 1996; Sacks et al., 1974; Schegloff, 1996); as does pragmatics, that is, the interaction contexts in

which utterance and action are produced (Ford & Thompson, 1996; C. Goodwin, 2013).

Regardless of the variety of resources central to creating the projectability of a turn, it is important to recognise that TCUs are not cohesive un-altering entities that employ minimal sizes. Rather, right from the start, a TCU is interactively determined because it can allow participants to use its *transition relevant places* (TRPs) to start talk, pass up talk, affect the direction of talk, *etc.* (Sacks et al., 1974). Therefore, TCUs, whilst providing for expansions within the unit, are stoppable. However, these breaks are not at just any point; they have built-in discrete recurring TRPs (*transition relevant places*) that can be expanded or contracted (Sacks et al., 1974).

Thus, it can be seen that the turn-taking system is in large part dependent on participants' ability to determine the immediately forthcoming future social action (Ford, 2012). Evidence for this is found in research such as Lerner (1991) that shows collaborative completion of talk, and studies that show positioning of utterances right at the points of TRP (C. Goodwin & Goodwin, 1987; Sacks et al., 1974; Schegloff, 1996, 2000a). Participants create and are able to jointly understand the relevance of TRPs or, as Mondada (2007) demonstrates, a conceptually less confined notion of *transition space*, where transition and allocation of turns becomes relevant and possible. It follows then, that almost all multi-action/TCU turns contain multiple TRPs (Robinson, 2014). This can be quite an expansive space, as Robinson (2014) notes in previous observations on some orderliness, with the space starting prior to possible turn completion and ending past the turn completions and into the pre-beginnings and beginnings of the current speaker's next TCU (Mondada, 2007; Schegloff, 1996; Stivers et al., 2009). At TRPs, participants may also conduct self-/other-initiated repairs (Robinson, 2014). However, if no action is taken at TRPs and

the next TCU begins then participants tacitly accept what has been said to have been understood (Robinson, 2014).

Understanding the organised appearances of TRP is essential to understanding the demonstrators' formal laboratory introduction talk, which will be explained in Chapter 5, where turn-taking organisation is augmented by membership categories within the institutional context to allow for extended talk by demonstrators. Furthermore, the turn-taking organisation system may be flexibly augmented by participants to demonstrate affiliation/disaffiliation (C. Goodwin & Goodwin, 1987; Sacks et al., 1974), or to achieve particular institutional business and purposes like court-room proceedings, political debates, and formal education talk (e.g. classroom introduction/overview). In addition, in multi-party interaction, where there are two speakers or more, the more people involved the greater are the increases in the potential competition of speakership, and the increasing minimisation of gaps between turns (Ford, 2012). Hence, in PBL situations many students remain silent, however, students and facilitators alike often fail to recognise that besides speaking there are other ways of showing participation (e.g. maintaining gaze/attention, head nodding), one of which is to remain silent (Koschmann & LeBaron, 2002; Remedios et al., 2008a; Remedios, Clarke, & Hawthorne, 2008b; Woodward-Kron & Remedios, 2007). More relevant to turn-taking organisation, Egbert (1997) has shown the orderly ways that *schisming* [14]of interaction sequences occurs when the interaction involves four or more participants. These CA analyses provide valuable insights into understanding the sociology and organisation of interaction, and help to understand that the dynamic of interaction amongst students and teachers is strongly

[14] As noted in the CA literature review in Chapter 3 schisming refers to the way that interactions involving more than 3 people have tendencies to split ('schism') into multiple separate interactions. In other words, with increasing number of people involved in an interaction, the more likely that the interaction will 'schism' and break into multiple pockets of conversation with different interactants.

influenced by the number of individuals involved. This can be used to inform pedagogical decisions about optimal learning group configurations, and it pre-empts the type and quality of interaction that may be had depending on social configurations.

Multimodal resources used for turn-taking practices have long been recognised (C. Goodwin, 2013; Mondada, 2007; Nevile, 2015). As previously mentioned, Mondada (2007) provides convincing evidence that supports the notion of expanding beyond the TRPs. Instead Mondada (2007) focuses on a conceptually more extensive 'transition space', as opposed to the TRPs, where multimodal resources (e.g. head nods, in breaths) and 'Uh(m)' tokens (Schegloff, 1996), which are not recognised as a turn, act strongly to project a forthcoming speaker turn in the pre-beginnings temporal window of a turn prior to the TRPs. For example, Mondada (2007) demonstrates that in her data, pointing gestures serve as: organisation of turn-taking; displays of orientation to turns; and participation in the interaction. Mondada (2007) argues that these pointing gestures not only can function as the traditional deictical references, which

> are a pervasive resource for identifying and making recognizable an object (even if it is not visible for the participants, Haviland, 1996), within a referential practice which may or may not occur with other spoken resources, for example, deixis[15]. (Mondada, 2007, p. 199),

Interactants also exploit them to signal speaker selection. This exploitation relies on the specificity of the context, since the participants being observed were more focused on the artefacts in their workspace instead of one another; thereby,

[15] Deixis in English are terms like *me* or *here* which cannot be fully understood without additional contextual information. In the case of *me* refers to the identity of the speaker and *here* refers to the speaker's location.

participants were able to use the pointing gesture in the commonly oriented space for self-selection (Mondada, 2007). Additionally, the research shows how material and spatial environments are methodically mobilised in achieving speakers' self-selection to speak (Mondada, 2007).

From the multimodal perspective of turn construction, participants recognise non-verbal actions and resources that serve to project TRPs and the moment-to-moment trajectory of the TCU being constructed. However, previous actions not only provide the immediate interactional context, they may also serve as resources in the construction of the immediate next turn or subsequent following turns, which establishes a micro-culture of sustained practices (C. Goodwin, 2013). Consequently, a cohesive series of actions and sequences emerge with an accumulation of semiotic resources that are gradually transformed into complexes using precise and local operations, which was presented earlier in this Chapter using the case study of Chil (C. Goodwin, 2013). Despite Chil's extremely limited lexical resource of three words (i.e. *yes*, *no*, and *and*), C. Goodwin's analysis shows that Chil utilises the information made available by other interactants (the substrate) and transforms the substrates that become and are made available to him by overlaying his prosodic resources (laminating), thereby transforming and laminating the substrates to generate new and meaningful social actions.

3.3.2.1 Summary

The review has revealed that a variety of interactional resources are available to interactants, from semiotic resources, which are not just limited to intonation and prosody, to more multimodal resources including physical embodiment, to objects (e.g. laboratory manual, laboratory instructional tools), and even the nature of the activities and physical configurations of the interactional space. These resources are,

and may become, constituents of the micro-cultural resources for organising how participants interact in the laboratory. Each of the resources is locally activated and made relevant by the participants, and they each provide the scaffold for the organisation and production of relevant subsequent turns and actions. More importantly, participants demonstrate understanding of others' turns by selectively acquiring and reusing relevant semiotic parts and recasting them in the next new interaction context of their next relevant action (C. Goodwin, 2013). Tools and objects, particularly those that are epistemically loaded to particular communities and activities, provide another layer upon and around which to structure and organise interaction (Goodwin, 2013).

The implications of turn-taking organisation and the perspective of analysing interaction as multimodal, multi-substrate, and multi-layered laminated actions (C. Goodwin, 2013), provides a power analytical lens with which to deconstruct the organisations of anatomy laboratory social encounters into identifiable layers assembled by the participants to achieve their intended purposes. Furthermore, the notion of a micro-culture with longitudinal continuation and accumulation of interactional substrates advanced in C. Goodwin (2013) supports an analytical framework to consider the sustained ethnographic investigation of laboratory participant interactions in this thesis. However, to achieve this, attention needs to be paid to the sequential/sequence context within which turn-taking organisation takes place.

3.3.3 Sequential and Sequence Organisations

Discovering the 'turn' as a basic unit of analysis and how they are exchanged in alternating pair sequences called adjacency pairs (Schegloff & Sacks, 1973) has been instrumental in identifying the sequential organisational features of interaction

(Psathas, 1995). Sequential organisation is the more general of the two terms that refers to the "relative positioning of utterances and actions" (Schegloff, 2007a, p. 2), which can be used to examine the organisation of different aspects of the encounter such as turn-taking, topic organisation, and sequence organisation (Schegloff, 2007a). For example, Benwell (1999) examines the topical organisation of physics and English literature tutorials at a British university. She argues that the disciplinary identities are apparent in the topical organisation and differential discipline tendencies to structure the relationships between macro-issues and micro-issues (Benwell, 1999). Furthermore, Benwell (1999) shows that the macro-issues are constructed by students and tutors employing particular logic and reasoning strategies in their discussions of the micro-issues.

In contrast, sequence organisation is a type of sequential organisation that is concerned with the specific ordering of sequences and actions, where "sequences are the vehicle for getting some activity accomplished" (Schegloff, 2007a, p. 2). This more closely refers to the discourse strategies that tutors and students employ when discussing the micro-issues in their tutorial lessons (Benwell, 1999). Therefore, in terms of classroom interaction, sequential organisation may be used to refer to the global structures (e.g. teacher-led greeting/class introduction, followed by class activities, and ending with teacher-led summary and homework assignment), and at a more micro-level, analysts may focus on the sequence organisation on a turn-by-turn basis. A number of different sequence organisations have been described, such as the two-turn *adjacency pair* sequence, *pre-sequences*, and *post-expansion sequences* (Schegloff, 2007a). These, together with features such as *response tokens*, will be

useful in understanding instructional interactions and their functions in the anatomy laboratory context[16].

3.3.3.1 Adjacency pairs

Amongst the different types of sequence organisation, adjacency pairs are one of the most common and prominent organisational features in most conversation. Their frequent presence informs the analysis used in Chapter 5 and 6 to examine the turn-to-turn logical sequentiality that unfold in interaction. According to Roberts, Torreira, and Levinson (2015), adjacency pairs occur "When an initiating action, calling for a specific type of response in next turn, is followed by a relevant responding action, the turns form an adjacency pair." (p. 4). In other words, participants tend to construct adjacency pairs when their utterances and actions are sequentially organised in recognisable pairs that are adjacently placed (Schegloff & Sacks, 1973). Thus, adjacency pairs are composed of two turns—a recognisable *first-* and *second-pair-part*, which are separately produced by two different participants (Schegloff & Sacks, 1973). The first-pair-part of the adjacency pair is said to develop *sequential implicativeness*, which refers to the tendency for a second corresponding pair-part to be produced by the listener that follows and develops a linear progression and context of meaning based on the initiating first-pair-part (Schegloff & Sacks, 1973). This implies that in producing the corresponding second-pair-part the listener demonstrates attention, understanding, and response to the previous utterance; thereby, the speaker of the first utterance is able to monitor how his/her first utterance is being understood and responded to (Schegloff & Sacks, 1973). Therefore, sequential implicativeness is a property of language that encourages

[16] These include: summons-answer, greeting-return greeting, question-answer, closings, invitation-accept/decline, offer-accept/decline, complaint-apology/justification, etc. (Schegloff in Psathas, 1995; Schegloff, 2006)

utterances to occur in pairs, and it allows for joint understanding to be developed so that speakers can shape their next turns accordingly (Schegloff & Sacks, 1973).

CA studies show that there are many regularly occurring adjacency pairs that follow the preferred sequence organisational structure (See Table 3-2, p. 91 for examples identified by CA researchers). Researchers suggest that adjacency pairs frequently used in conversations, such as the *Greeting-Return Greeting*, may decrease the response time needed due to their frequent occurrences and confinement of possible responses (Roberts et al., 2015). However, depending on the complexity and design of the initiating sequence, listeners' responses may be delayed as additional time are required to plan and process a 'fitting' second-pair-part (Roberts et al., 2015). Alternatively, response time and gap may also increase preceding a forthcoming dis-preferred response in the second-pair-parts, which creates a shift in interactional dynamics and, momentarily, disrupts the adjacency pair sequences (Benwell & Stokoe, 2002; Roberts et al., 2015; Stivers et al., 2009). For example, in a question-answer context, the extended gap may signal resistance to the question (Benwell & Stokoe, 2002; Roberts et al., 2015; Stivers et al., 2009). However, an alternative argument suggests that the powerful questioning move creates constraint on the recipients' available discourse options, which leads to delays in the response (Hutchby, 1996). Nevertheless, when there is hesitation or dis-preference being exhibited by the respondent, the initiator of the first-pair-part often responds to the potentially forthcoming dis-preferred response by inserting a sequence that either upgrades the offer or reformulates the offer (Clayman, 2002; Levinson, 2012). Consequently, in such sequences, the delays between turns may actually be shortened instead of observing lengthened gaps (Clayman, 2002; Kendrick & Torreira, 2015; Levinson, 2012; Roberts et al., 2015).

Table 3-2 Examples of common adjacency pair types that have been identified by CA researchers (Roberts et al., 2015; Schegloff, 1968, 2006, 2007a). Refer to Appendix A CA Transcription Conventions (p. 455) for transcription symbols and explanations.

Adjacency Pair Sequence Types	**Initiation Sequence Types**	**Possible Expected Next Turn (Response) Sequence Types**	**Examples with Adjacency Pairs Labelled**	
Question-Answer	Question (**Q**)	Answer/Statement -non-opinion **(A)**	**Q** **A**	A: Was it a Pell grant? B: I'm sorry, what did you say? **A: What kind of grant was it?** **B: Well, it was called a B E O G, a Basic Equal Opportunity Grant** (Roberts et al., 2015, p. 12)
Summons-Answers	Summons **(S)**	Yes/No/Answer **(A)**	**S** **A**	**Police (A) makes call—receiver is lifted and there is a one-second pause.** A: Hello. **B: American Red Cross** (Schegloff, 1968, p. 1087)
Offer/Invitation-Acceptance/Reject	Offer **(O)**	Yes/No/Affirm/ Negative-Non-No-Answers / Statement-non-opinion **(A)**	**O** **A**	A: Whatcha doin'. B: Not much. **A: Y'wanna drink?** **B: Yeah.** (Schegloff, 2007a, p. 30)
Request-Acceptance	Request **(R)**	Acceptance /Rejection **(A)**	**R** **A**	A: Are you coming tonight? **B: Can I bring a guest?** A: Male or female? B: What difference does that make? A: An issue of balance. B: Female. **A: Sure.** B: I'll be there. (Schegloff, 1972, p. 79)
Greeting-Return greeting	Greeting **(G)**	Greeting/Answer **(A)**	 **G** **A**	Ring A: Hello:? B: Hi: Marsha? A: Ye:ah. **A: How are you.** **B: Fi::ne.** (Schegloff, 2007a, p. 22)

CA research notes that the recognition of the first-pair-part may be enhanced by improving the internal design of the turn itself so that a forthcoming second-pair-part may be produced more readily (Drew, 2012a; Levinson, 2012). This can be lexical, grammatical, or using/transforming any potentially relevant interactional resources available to the participants, as previously discussed in turn-designs. As an example, speakers can setup the context using *expansion sequences*, such as a pre-offer 'Are you doing anything tonight?', that enhance the sequential implicativeness for subsequent turns. As the discussion turns to expansion sequences, it is worth noting that turns need not always form adjacency pairs (Torreira, Bögels, & Levinson, 2015).

3.3.3.2 Expansion sequences

Expansion sequences in educational institutional talk forms the basis to understand the frequently occurring IRE-sequences initiated by teachers (McHoul, 1978; Mehan, 1979a), which is also a feature of the anatomy laboratory pedagogical talk identified in Chapters 5 and 6. Expansion sequences are additional single utterances or clusters of sequences that may precede the adjacency pair (pre-amble/pre-sequences), be inserted into a base adjacency pair (insertion sequences), or follow the adjacency pair (post-expansion sequences). Their position as well as their interactional features and functions within the emerging contexts of the unfolding conversation determine these sequences. Pre-sequences may also make use of adjacency pair structures such as the generic summon-answer sequences. Unlike other sequence organisations, pre-sequences serve to prepare participants for the ensuing interaction, but depending on their outcomes they may also alter the trajectory of the conversation. For example, as discussed in the previous section, an initiator of an invitation may include a pre-sequence to help avoid or minimise dis-preferred responses from the invitee

(Schegloff, 2006, 2007a). Depending on the response of the pre-invitation, the initiator may then decide whether or not to proceed with an invitation; thus, the initiator may save face or avoid having to deal with having his/her invitation turned down. Besides the pre-invitation, there are many different types of pre-sequences, insertion-sequences, and post-expansion sequences, which are highly variable and context specific. Thus, for the present thesis, the typologies are not as significant as recognising the sequential positioning of these events.

Consider the third-turn position in a post-expansion sequence which serves specific functions in classroom instructions like the evaluation/feedback in IRE sequences which was briefly mentioned at the beginning of the chapter. The IRE-sequences, which is a three turn sequence organisation, are a dominant characteristic of teacher-fronted and teacher-centric classroom instructional talk (McHoul, 1978; Mehan, 1979a). The teacher predominantly initiates IRE-sequences by asking known information questions (Mehan, 1979b), with the response provided by student(s) and a teacher evaluation or feedback in the third-turn position. The frequent and regular occurrences of IRE-sequences in the most ubiquitous form of teaching, direct instruction (Gage, 2009), also make IREs a salient organisation feature of education institutional talk. Consequently, any deviations or augmentations of the IRE structure signal to teachers or students potential problems that require their attention. For example, Macbeth (2004) and McHoul (1978) found that if a teacher withholds the expected evaluation in the third-turn position, students might identify that there is a problem with the response in the second-turn position. Despite the seemingly well-established role of IRE-sequences, more recent CA research has started to re-examine the different functions and constructions of the IRE-sequences, with specific attention devoted to who initiates the sequence, how participants modify and locally

manage the sequence, and why the modifications are done (Jacknick, 2011; Lee, 2007, 2008; Sert & Seedhouse, 2011; Waring, 2009; Zemel & Koschmann, 2011). More importantly, researchers are starting to examine how the third-turn position might be modified to create continuous learning cycles and scaffolding of learning (Jacknick, 2011; Hsu et al., 2009; Lee, 2008; Waring, 2009; Zemel & Koschmann, 2011). Thus, the study of turns at a sequential and sequence organisation level provides a powerful analytical perspective and model for examining a basic functional unit of interactional exchange.

3.3.3.3 Response tokens

Before moving on to discuss other social features and resources relevant to the organisational mechanics of interaction, it is important to point out a category of response sequences known as *response tokens* (Gardner, 2001; Heritage, 1984a; Levinson, Holler, Kendrick, & Casillas, 2015; Local, 1996). Response tokens are frequently used by listeners in response to speakers to show understanding or acknowledgement of explanations or instructions (Gardner, 2008). Table 3-3 below is a summary of different response tokens and lists some decontextualized examples of response tokens. Like deixis, the functions of different response tokens are derived from additional information within the interactional contexts.

Table 3-3 Examples of response tokens frequently used in conversation (Gardner, 2001; Heritage, 1984a; Levinson et al., 2015; Local, 1996)

Response Tokens	Examples
Continuers	mm hm / uh huh
Acknowledgements	yeah / mm
Change-of-State Tokens (Newsmarkers)	oh / right
Change-of-State Tokens (Change-of-Activity)	okay / alright
Assessments	that’s terrible/ how awful
Non-Verbal Responses	head nodding / shaking head

These response tokens may be produced in a clear space, but they may also appear in overlap without competing for the turn. For example, continuers are often overlapped by the prior speaker (Levinson et al., 2015; Local, 1996). The interactional functions of response token are determined by analyses of the interactional context as well as how they are produced prosodically. Nevertheless, looking at the examples, one can appreciate the functional role of response tokens in displaying understanding, which makes them an important feature of conversation in the study of teaching-learning encounters, such as the anatomy laboratory in this thesis. While response tokens are not the primary interactional features being analysed in this thesis, appreciating the different types of response tokens helps to describe when they appear in laboratory interaction, what interaction function they serve, and their functional significance in the unfolding interaction between participants.

3.3.3.4 Summary

The review of sequential organisation draws attention to some of the regular features and sequence organisations that CA has identified in everyday and classroom interaction. It illustrates the patterns and regularities with which people conduct their interaction, and the methodical ways of communicating and establishing inter-subjective understanding. These regularities establish turns as the fundamental units of analysis in their immediate sequential interactional context. Additionally, research supports that sequential organisation emerges from participants' co-constructed interaction, and it harnesses and is constrained by lexico-grammatical and local interaction contextual resources. That is participants create interaction contexts that make certain responses more relevant than others, and, at every turn, participants display their understanding of the ongoing context by providing responses or

context-altering actions. The review now turns to briefly introduce the repair mechanisms available to speakers when problems arise.

3.3.4 Repair

The way repair is initiated and who initiates the repair has also been found to be an identifiable feature of education institutional talk. As will be seen in Chapters 5 and 6, who initiates and completes the repair is an important feature of characterising anatomy laboratory interaction. Discovery of the mechanisms of repair is grounded in the seminal work of Schegloff et al. (1977). Repair is the action where participants suspend their ongoing talk in order "to attend to possible trouble in speaking, hearing or understanding the talk." (Kitzinger, 2012, p. 229) (Schegloff et al., 1977). A number of potential sources of trouble exist in interaction, such as lexis (incorrect word selection, unavailability of a word, mis-articulation), semantics (recipient showing troubles in understanding or misunderstanding), and failing to hear or being heard (Kitzinger, 2012; Schegloff et al., 1977). The repair initiation may lead to either a solution or abandonment (Filipi, 2009). The goal of repair is to ensure that the interaction endures and that inter-subjectivity may continue to be maintained or re-established (Schegloff, 2007a) so that the action, sequence, or turn can proceed to possible completion (Kitzinger, 2012; Schegloff, 2007a). However, repairs affect progressivity, either at the unit of the turn (e.g. *self-initiated repairs*) or interrupt progressivity of the sequence (e.g. *other-initiated repair*) (Kitzinger, 2012; Schegloff, 2007a).

3.3.4.1 Types of repair

There are a number of different types of repair that can be categorised according to who initiates the repair, who formulates the repair, and finally in what position the repair occurs (Refer to Table 3-4 p. 97) (Kitzinger, 2012; Schegloff, 2007a). Of

relevance to this thesis is consideration of a typology based on self-/other-initiated repair (who initiates) and by whom the actual work of the repair is accomplished.

Table 3-4 Summary of repair types and the potential spaces where repairs may take place.

Who initiates repair?	Who does the repair?	Possible Combinations	Potential Spaces where repairs may occur
Self-initiated	Self	Self-initiated-Self-repair	Same turn (within TCU)
		Self-initiated-Other-repair	Transition Space
Other-initiated	Other	Other-initiated-Other-repair	Next/Third turn
		Other-initiated-Self-repair	Other subsequent later turns

Self-initiated repair on the trouble-source or repairable is most common in conversation (Kitzinger, 2012; Schegloff et al., 1977). This is because as turn-taking rules apply it is not yet relevant for another to speak, but also partly because only the speaker may know that there has been trouble that needs fixing (Kitzinger, 2012; Schegloff et al., 1977). In other words, self-initiated repair improves and 'fine-tunes' the turn with reference to the action that the speaker intends to produce for the recipient of that action (Schegloff, 2007a). Generally speaking, in self-initiated repairs, the work itself is performed by the speaker via providing a solution (Kitzinger, 2012; Schegloff et al., 1977). To carry out self-initiated repair on the trouble-source within the same TCU, Schegloff (2013) has identified 10 different operations available to the speaker, and they are: replacing, inserting, deleting, searching, parenthesising, aborting, sequence jumping, recycling, reformatting, and reordering. As a result of these varied ways of completing repairs, CA researchers

have found that repairs may be used to perform different interactional functions. For example, analysts have shown how repairs may be used to proffer an identity of self and situation, as in substituting the word ‘cop’ for ‘officer’ in court proceedings (Jefferson, 1974), or the relationship between repair and instruction- related correction practices (Macbeth, 2004). However, for this thesis, a general understanding of the forms and functions of repair will suffice for the analysis to identify and examine their roles and functions in the pragmatics of the anatomy laboratory interaction.

Other-initiated repairs describe an interaction situation where someone other than the speaker of the trouble-source initiates repair. This is often treated as an invitation for the speaker of the trouble-source to then effect a repair (Schegloff, 2000b). Note that Self-repair is preferred in ordinary conversation, thus, in normal conversation, it is rare for the recipient of the talk to ‘correct’ the speaker (Schegloff et al., 1977). However, in instructional situations and settings, other-initiated repairs are quite ubiquitous and usually initiated by the teacher; consequently, researchers consider them as an important and distinguishing feature of instructional talk from everyday conversations (Macbeth, 2004; McHoul, 1978, 1990).

3.3.4.2 Summary

The general types and characteristics of repairs discussed above are summarised in Table 3-4. It is important to recognise that the different repairs may occur sequentially. When this occurs, analysts may examine the sequential and contextual organisation of the repairs to reveal the powerful ways in which repairs exhibit participants’ shared understanding and inter-subjectivity (Schegloff, 2000b, 2007a; Schegloff et al., 1977). For example, when a self-initiated repair occurs in the process of providing a solution to an other-initiated repair, the speaker demonstrates

her understanding of the recipient's potential trouble-source (Kitzinger, 2012). Thus, repair serves important pragmatic functions, and as such is of obvious importance to the present study.

3.3.5 Epistemics—An Engine that Drives and Organises Interaction

Epistemics has recently been reintroduced to the field of CA as a third organisational structure for interaction in addition to *turn-taking* and *sequential organisation* (Heritage, 2012b, 2012c, 2013; Raymond & Heritage, 2006; Stivers & Rossano, 2010). Although sociologists and linguists have long researched epistemics, the recent work by CA researchers has revived research interests on this topic and placed epistemics as a central organisational structure and resource for interaction (Drew, 2012b; Heritage, 2012b, 2012c, 2013; Raymond & Heritage, 2006; Stivers & Rossano, 2010). The study of epistemics examines how participants' relative domains of knowledge contribute to understanding the motivations and meanings behind their social action and interaction (Drew, 2012b; Heritage, 2012b). Heritage (2012c) reviews previous data and reframes it in the light of epistemic-driven principles to show how 'on-the-record' and 'off-the-record' epistemic displays serve to initiate topic discussion, manage topic shifts, and explain sequence atrophy in terms of the lack of additional new information contributions from the interacting parties.

Epistemics in the sequential organisation context refers to sequences being driven by the maintenance of an *epistemic gradient* that is generated by "what is known, how it is known, and persons' rights and responsibilities to know it (Drew, 1991; Maynard, 2003; Pomerantz, 1980; Sacks, 1992; Terasaki, 2004)" (Heritage, 2012c, pp. 5–6). It refers to the social enactments of these knowledge elements in people's interactions with one another, which are partially represented in the displays

of and orientations to *epistemic status* and *epistemic stance*. Using K+ and K-, analysts depict, respectively, the more knowledgeable and less knowledgeable *epistemic* (knowledge) *status* and *stance* of participants in relation to one another, thereby illustrating the existence of an epistemic gradient that mobilises participants' interaction (Heritage, 2012c). Heritage (2012c) defines epistemic status as an "inherently and relational concept concerning the relative access to some domain of two (or more) persons at some point in time" (p. 4). The domain refers to the territories of knowledge of the respective individuals, in other words, 'what they know', "how it is known and the persons' rights and responsibilities to know it" (Heritage, 2012c, pp. 5–6). The relative nature of epistemic status between individuals means that epistemic statuses are points on a continuum represented by K+/-. For the most part, in social encounters epistemic status can be considered as an enduring feature of social relationship, despite it being able to change over time via interactions and between different domains (Heritage, 2012c).

Unlike epistemic status, epistemic stance "concerns the moment-by-moment expression" (Heritage, 2012c, p. 6) of epistemic domains, which is established in participants' epistemic status and their social relationships. As an example, Heritage (2012c) suggests that, in English, epistemic stance can define the relative sharpness of the epistemic gradient between parties by using "different grammatical realizations of propositional content" (p. 6). Heritage (2012c, pp. 6–7) uses the following set of propositions in decreasing magnitude of the epistemic gradient as an example:

1. 'are you married?'
2. 'you're married, aren't you?' and
3. 'you're married.'

Each of the three grammatical formulations encodes a different epistemic stance, and when they are placed in conversational contexts then they represent different level of steepness in the K+/- gradient between speaker and recipient. Consider the grammatical structure of (1) ‘are you married?’ spoken between an unknowing (K-) questioner with no definite knowledge of the recipient’s marital knowledge and the knowing (K+) recipient (Heritage, 2012c). As Heritage (2012c) explains, the grammatical structure of the question indexes a steep epistemic gradient slope between the unknowing (K-) questioner and the knowing (K+) recipient. In comparison, the grammatical structure of (2) and (3) indexes an increasingly milder and flattening epistemic gradient slope with the (K-) question “expressing increasing commitment to the likelihood that the recipient is married,” (Heritage, 2012c, p. 6). The latter two formats have been found to be more commonly used when the speaker already has access to the information and seeks to confirm or reconfirm the information, or to convey inferences, assumptions, or other kinds of ‘fishing’ and ‘best guesses’ (Raymond, 2010; Stivers, 2010). Furthermore, in conversation, the ‘unknowing’ epistemic stance depicted in (1) invites additional elaboration and projects possible sequence expansion, whereas the ‘knowing’ stances, as in (2) and (3), tend to invite confirmation and sequence closure (Heritage, 2010; Raymond, 2010).

Researchers have demonstrated that an epistemic engine, which is made up of epistemic status and epistemic stance, drives the organisation of conversation from initiation, topic shift, and to closings (Clift, 2012; Drew, 2012b; Heritage, 2012b; Koole, 2010; Mondada, 2013a; Roseano, González, Borràs-Comes, & Prieto, 2014; Sert, 2013). This is achieved via the displays and altering of epistemic status and stance through individual sequences or a series of social actions sequentially created

and organised by the participants (Heritage, 2012c; Koole, 2010; Mondada, 2013a; Roseano et al., 2014; Sert, 2013). Focusing on the epistemics that drive conversation, the analyses zoom out from the linguistic analysis of sentence structures and better explain interaction as a display of knowledge status (epistemic stance), and a display of and orientation to the different knowledge states (K+/K- epistemic status) (Heritage, 2012b, 2012c). Thus, large segments of ongoing utterances might be interpreted as having a strong knowing epistemic stance and trying to address the recipient's K- epistemic status (Heritage, 2012b, 2012c). This notion is particularly relevant and critical in the social interaction of educational settings.

For example, Koole (2010) observes in mathematics classroom interaction that students and teachers demonstrate interaction practices that differentiate between epistemic access modalities which 'claim' understanding and those that 'display' understanding (Sacks, 2010). The differentiation is based on the sequential position environment such as 'do you understand…' which prefers a 'claim' of understanding as compared to 'do you know…' which prefers additional demonstration of knowing (Koole, 2010). Such displays and demonstrations of epistemic access are critically important in education institutional settings, where they have a strong influence on teachers' and students' subsequent actions (e.g. provide additional explanations, seek further clarifications, or to close the interaction) (Koole, 2010; Sert, 2013); therefore, they contribute to the observation of teacher responsiveness in instructional phenomenon like scaffolding (Koole & Elbers, 2014). Similarly, the frequently observed Epistemic Status Check, henceforth ESC, (e.g. 'no idea?', or 'you don't know?') in language instructional settings has been found to be initiated following student non-verbal cues (e.g. gaze withdrawals, long silences, and head shakes) of insufficient knowledge. The use of ESC allows the instructor to pursue certain

interactional/pedagogical goals by interpreting the state of knowledge of another interactant when a second-pair-part of an adjacency pair is delayed (Sert, 2013). From these examples, it can be seen that the displays of epistemic stance and status contribute to establishing particular speaking rights and social interaction dynamics. More importantly, since teachers' subsequent actions respond to the different epistemic access displayed or demonstrated, it is plausible to imagine interaction scenarios where the students may intentionally create misalignments between their epistemic status and stance (i.e. disguising their K+ epistemic status using a K- epistemic stance) in an attempt to engage teachers in didactic interaction. This scenario which has been derived primarily from personal experiences in anatomy laboratory teaching whereby withholding a direct answer and with additional probing I was able to discover that the students knew more than they were willing to display epistemically. This observation reinforces the applicability of the epistemics framework to understanding social action, especially in educational contexts.

The application of epistemics to video data is, however, not entirely clear. Traditionally, researchers have adopted a more *morphocentric focus* on epistemics concentrating on grammatical expressions of epistemic categories in various languages, but researchers of naturally-occurring talk have also noted the epistemic rights attached to membership, social status, and relationships (Heritage, 2012c, 2013; Raymond & Heritage, 2006; Roseano et al., 2014; Stivers et al., 2011). Furthermore, epistemic stance may be conveyed by intonation (Heritage, 2013; Stivers & Rossano, 2010). For example, in English, a final rising intonation is used to mobilise response by increasing its urgency; however, Heritage (2013) asserts that when there is consensus about who has rights to epistemic status then morphosyntax and prosodic resources become secondary to the epistemic status for determining

whether information is being requested or conveyed. Yet, recent linguistic studies of prosodic and gestural features indicate that these features override lexical conveyance for degree of certainty (epistemic stance positioning); more importantly, gesture seems to trump prosody when the two are in conflict (Roseano et al., 2014). More research is required to understand how multimodal resources are employed and oriented to by people for epistemic displays.

3.3.6 Introducing Membership Categorisation CA (MCA) Research and its Relationship to Sequential Organisation

MCA research is a less well known strand of ethnomethodological inquiry than the more prominent CA research based primarily on studies of sequences (Stokoe & Smithson, 2001), which has been previously discussed. MCA examines the membership categories that are locally organised and which participants locally use and invoke (Hester & Eglin, 1997), and "claims to be the study of *culture-in-action*." (Stokoe & Smithson, 2001, p. 253). As will be seen in Chapter 5 and 6, the MCA analytical approach is used to study how laboratory participants establish and orient to implicit institutional membership categories. MCA research was developed in Sacks' (1995) earlier writings, but was later dropped by Sacks because of the potential for the analysts' interpretations to prevail over the available evidence in the talk (Lepper, 2000). Nevertheless, this potential for 'wild' analysis made via implicit importation of the analyst's common-sense knowledge or assumptions may be offset to some degree by extending the notion of 'member' to the researcher analyst and acknowledging the inevitability of analysts having to draw upon their comprehension as members of the culture that produces the talk (Antaki & Widdicombe, 1998; Hutchby & Wooffitt, 1998; ten Have, 1999). That is, for CA researchers to explicate what people do in interaction the analyst must have some access to the interpretative

and inferential resources that people themselves also rely upon (Hutchby & Wooffitt, 1998). Thus in conducting MCA, analysts draw upon their culture and background knowledge, but the process is not completely interpretive.

MCA is organised around concepts of categories and *membership categorisation devices* (MCD), and according to Sacks (1974) MCD explains how native speakers of a culture interpretively and inferentially link categories together (Lepper, 2000). For example, consider what words one might use to replace X and Y in the following utterance, 'The **X** cried. **Y** picked it up' (Lepper, 2000). Notice there is a tendency to complete it as, 'The baby cried. The mother picked it up' or some variations of wording representing this now classic example from Sacks (1974). This example illustrates how, on an ongoing basis, the relevant context for utterances can be meaningfully found in the pragmatic use of words (Lepper, 2000). In this case the activity category of 'cried' and 'picked up', which are activities often bound to mothers and babies, were used to infer the subjects identity category of X and Y. In more technical terms, Sacks referred to the action words that link subjects and objects as *category bound activities* (Lepper, 2000).

Besides inferring the link between subjects and objects, Sacks (1974) argues that when we hear the original utterance, 'The baby cried. The mommy picked it up' we also by default 'hear' links between mommy and baby and infer that mommy is in fact the mother of the baby. The MCD in this case is 'family' (Sacks, 1974). Furthermore, Sacks (1974) argues that the inferred categories and how they are interlinked represent people's common-sense expectations and cultural knowledge "about what constitutes a 'mommy's' or 'baby's' normative behaviour." (Stokoe & Smithson, 2001, p. 253). While the above MCA analysis seems logical and readily apparent, the trouble with such MCA analyses is that the culture and background

knowledge that the participants themselves have access to are inferred by analysts based upon their own background knowledge (Stokoe & Smithson, 2001). In other words, it is the analysts who draw attention to the links made by the speaker between categories and category-bound activities based upon the analyst's own position, which is not analytically neutral (Hester & Eglin, 1997; Stokoe & Smithson, 2001). More importantly, as Hester and Eglin (1997, p. 4) note, "some membership categories can be used and heard commonsensically as 'going together', while others cannot be so used and heard", and it is the analyst who makes the decisions (Stokoe & Smithson, 2001). The analytical decisions may not be neutral, and as (Stokoe and Smithson) writes, "analysts cannot attend to *everything* that participants make relevant in conversation – analytic choices are made continually" (p. 265).

The fact that there are potentials and opportunities for analysts to impose their assumptions on data does not completely undermine the CA approach or MCA because CA analysts can, and indeed do, base their claims of participants' perspectives upon the detailed micro-level of interactional data. Without becoming too bogged down by existing debates on the neutrality of the CA analyst (as opposed to the motivated analyst that draws upon their worldviews and cultural knowledge), CA provides a useful and powerful tool for explicating the participants' perspectives and understandings that they orient to in their interaction. More importantly, from the CA perspective categories such as

> …social identities are claimed, resisted and otherwise put to use in social interaction (e.g., Antaki, Condor, & Levin, 1996; Antaki & Widdicombe, 1998). Rather than starting with sets of identity categories, claims of identity relevance are demonstrably linked to particular actions in talk. (Stokoe, 2010, p. 428)

Therefore, analysts attend to categories that are demonstrably relevant to participants, and instead of assuming that the categories that surface in interactional behaviour are "stable, essential identity, conversation analysts chart the identity work of shifting selves, contingent on the unfolding demands of talks' sequential environment" (Stokoe, 2010, p. 428). The methodological rigour of CA method to examine identity and categories from the participants' perspective are exemplified in the work on culture, gender, and identity (Antaki & Widdicombe, 1998; Housley & Fitzgerald, 2009; Lepper, 2000; Stokoe, 2010; Stokoe & Smithson, 2001). More relevantly, MCA has been used in the education institutional context (Benwell & Stokoe, 2002, 2005; Stokoe et al., 2013) to examine how membership categories like 'student', 'teacher', or 'demonstrator' in institutional discourse demonstrate the rights, obligations, activities, and predicates that are tied to them (Sacks, 1995; Stokoe et al., 2013).

Combining MCA and sequential organisation to analyse institutional interaction, interactants may draw upon, as resources, institutional goals, purposes, and their associated membership categories and identities which can subsequently influence the sequence organisation of talk. For example, this is illustrated by the frequent use of the IRE sequences by teachers observed in secondary education settings and the asymmetry for instructional sequences such as the IRE to be initiated by teachers (Hellermann, 2003; Koole, 2012a; McHoul, 1978; Mehan, 1979a; Seedhouse, 2012). This asymmetry in the interaction dynamics continues to persist in the tutorials of the three UK universities observed by Benwell and Stokoe (2002). However, to a degree, their work on UK university tutorials and student interaction also challenges the traditional robust studies that portray a rigid hierarchical student-teacher relationship asymmetry that becomes apparent in the sequence organisation of their exchange

(Benwell, 1999; Benwell & Stokoe, 2002, 2005; Stokoe, 2000; Stokoe et al., 2013). For example, Benwell and Stokoe (2002) note that the tutorials afforded a certain degree of flexibility in terms of the students' scope and contributions to the basic exchange sequences, which include the increased potential to take responsibility in initiating and evaluating that are usually actions performed by the tutor. It was also observed that the traditionally teacher-dominant actions (such as asking questions, setting the agenda, and evaluating contributions) can, and do in fact, become negotiable (Benwell & Stokoe, 2005; Stokoe et al., 2013). In addition, their investigations suggest that students challenge traditional identities and hierarchies through non-aligning sequences, such as the withholding of response by students in the second-turn positions (to a tutor's adjacent prior turn), and are actions of resisting their academic identities and therefore their institutional obligations to participate (Benwell & Stokoe, 2005; Stokoe et al., 2013). Their work is a powerful reminder to researchers to avoid assuming and applying identity categories, and instead work to demonstrate and track when and how participants make relevant, orient to, and embody a particular identity category, because any given individual has infinite possible identities (Stokoe, 2010).

CA informed research in education institutional settings convincingly demonstrates how institutional roles and identities cannot be assumed. Instead, participants continuously make relevant and construct their identity categories through their social encounters with one another. Furthermore, participants' identities and membership categories may be exhibited in the specific ways in which sequential organisation show asymmetry, such as the frequent use of IRE sequences with the teachers as initiator. Understanding membership categorisation devices and practices in the educational social context provides a strong theoretical and empirically

supported analytical framework to examine the background knowledge and cultural understandings participants draw upon to construct and make sense of anatomy laboratory interaction practices.

3.3.7 Summary

Thus far, the chapter has provided a broad overview and general introduction to CA. The previous section introduced three main conversation organisational structures identified and extensively described by CA researchers through their examination of social interaction, which are *turn-taking organisation*, *sequential organisation*, and *epistemics*. The mechanics and basic guiding principles of each organisational structure were examined in detail to varying degrees, and the general mechanisms for repairing and dealing with problems in interaction was also briefly introduced. The discussion of these general CA organisational structures and some of their related topics prepared the foundation for the discussion on epistemics and membership categorisation analysis (MCA). With the CA foundation laid, the review now turns to applied-CA studies in the university and laboratory contexts.

3.4 Applied-CA Studies in the University and Laboratory Contexts

There is limited CA research that has investigated social encounters in the university context with no investigations conducted in the undergraduate science laboratory context. Examples of available research have focused on literature lectures in Greek (Christodoulidou, 2011), science academic seminars (Rendle-Short, 2006), and small group tutorial/PBL sessions from various disciplines (e.g. physics, psychology, literature, medicine, and dentistry) (Benwell & Stokoe, 2002, 2005; Glenn et al., 1999; Koschmann & LeBaron, 2002; Lindwall & Lymer, 2014; Stokoe, 2000; Walsh & O'Keeffe, 2010; Zemel & Koschmann, 2011). CA studies have also investigated

student interaction in high school physics laboratory (Ford, 1999), university research science laboratory (Hsu & Roth, 2009; Hsu et al., 2009; Roth, van Eijck, Hsu, Marshall, & Mazumder, 2009), and dental clinical laboratory (Hindmarsh, Reynolds, & Dunne, 2011). It is worth noting that in these applied-CA works there is evidence for the strong influence of the CA methodology, where most of the CA research avoids imposing the analyst's own theoretical constructs and categories upon the interaction, but is instead concerned with the categories that participants themselves orient to in the course of their interaction with one another (Stokoe, 2000). This thesis builds upon these works by exploring the undergraduate radiography anatomy laboratory in the university context.

Of particular relevance to this thesis has been the discourse study by Benwell (1999) in the UK university context, which is informed by CA and argues for the importance of examining pedagogical discourse structure from a disciplinary perspective. According to her comparative analyses of university physics and English Literature tutorials, the discourse structure and sequential organisation of physics tutorials demonstrate a very logical top-down organisation of the knowledge structure which, according to Benwell, reflects the scientific method (Benwell, 1999). In her data, Benwell (1999) notes that the science discipline tends to use information providing strategies, rather than, for instance, the strategies that elicit information in more open-ended and exploratory approaches found in English Literature tutorials. Based on her findings, Benwell (1999) argues that subject identity is "indisputably reflected in the discourse strategies and structure of knowledge" (Benwell, 1999, p. 557). As agents, teachers and students co-construct these socio-cultural constructs (i.e. subject identity, discourse strategies, and

structure of knowledge); as such, these constructs can be changed and, indeed, is always changing depending on the micro- and macro-contexts.

More recent investigations have revealed the university teaching-learning culture that emerges from the formal tutorial interaction and the informal private conversations between students living in residence (Benwell & Stokoe, 2002, 2005; Stokoe et al., 2013). The authors claim that recent UK government policy changes leading to tuition fee charges for university students is responsible for the cultural shift in UK towards a instrumental view of learning in university education where work is only valuable and worthwhile if it is assessed (Benwell & Stokoe, 2002, 2005; Stokoe et al., 2013). Benwell and Stokoe (2002, 2005) contend that the cultural shift is exhibited by students trivialising the non-completion of their academic duties (doing the teacher assigned work) or by downgrading their academic achievements attached to their student identity. Indeed, their data show tutor-student negotiation of incomplete academic tasks and student-student interaction downplaying academic achievements and rejecting assigned tasks. While their analyses reveal how students construct their academic and individual identity through social interaction within the university teaching-learning culture, their extrapolation of these social identity constructs as a reflection of government policy and the larger societal changes seems to extend beyond the capabilities of their data. Nonetheless, their data supports that students go about the business of learning in universities by balancing their academic identity as a student and their social identities as individuals (Benwell & Stokoe, 2002, 2005; Stokoe et al., 2013). This results in a tension where students demonstrate resistance to their academic identity by rejecting or questioning assigned tasks in order to create desirable social cohesion with their peers (Benwell & Stokoe, 2005). More importantly, their research reveals noteworthy and valiant tutor interaction

strategies that maintain social cohesion by face-saving while demonstrating tutor control (Benwell & Stokoe, 2002). For example, in negotiating the tutorial agenda during tutorial openings, which will be discussed in details in the next section, the tutor creates a more 'democratic' forum for agenda setting by extending the second part ('work-at-hand') of a three-part sequence formulation[17] with his/her justification of the task, while providing additional contexts that 'ease' the students into the tutorial session by deferring student contributions. By deploying such strategies, Benwell and Stokoe (2002, 2005) demonstrate that tutors implicitly orient to the teaching-learning activity as potentially face-threatening.

Another study in the university context that has relevance to this thesis is Stokoe (2000), who studied students' organisation of topicality and activities in tutorial settings. Stokoe (2000) argues that whilst previous rigorous qualitative work has been conducted to examine pedagogical talk in the past, these analyses have tended to impose researchers' thinking and perspectives, which "leads to a new kind of analytic 'black box' in which the minutiae of talk and participants' concerns are sidelined." (p. 200). In contrast, CA embraces the perspectives of those participating in the social encounter by "focusing on aspects of talk that are demonstrably relevant to speakers' concerns" (Stokoe, 2000, p. 200). Thus, using CA, Stokoe (2000) shows how students organise their interaction 'to get down to the business of learning' and how shifts in topics is a collaborative event that requires acts of topicalisation and recognition by fellow student participants (Stokoe, 2000). Furthermore, the data identifies how students point out and mark 'topic drifts' based on their contributions to the original task, which can lead students to re-orient their attention back to the intended task (Stokoe, 2000). Interestingly, Stokoe (2000) points out how students

[17] three-part task-formulation sequence that resemble Heyman's (1986) classroom teacher formulation 'work-thus-far', 'work-at-hand', and 'work-to-come'.

may use pre-sequences to setup an imminent topic shift, for example, ‘I know this is not relevant, but…’. Through this earlier work she shows that understanding of educational talk may be achieved that is grounded in the participants’ own terms.

The other CA research in medical PBL tutorials (Koschmann & LeBaron, 2002; Zemel & Koschmann, 2011), dental clinical training (Hindmarsh et al., 2011), and dental procedure video tutorials (Lindwall & Lymer, 2014) were focused more on exposing pedagogical processes. For example, Koschmann and LeBaron (2002) conducted a fine-grained analysis of how gestures are an important part of the PBL knowledge construction process that help participants structure and communicate abstract concepts and knowledge relationships while mobilising resources such as gestures as well as the physical environment. Koschmann and LeBaron (2002) argue for the centrality of embodied gesture that is part of the sense-making machinery which at the same time enables cognition to be made visible.

In a slightly different vein, Hindmarsh et al. (2011) examined the inseparably intertwined and orchestrated embodied displays and claims of understanding between dental procedure demonstrators and their students in clinical dental training. While performing the required dental procedures, dental demonstrators not only have to have professional vision of their patient’s mouth but they also exhibit a vision for monitoring their dental understudies (i.e. dental students) by constantly checking their ‘claimed’ understanding with their embodied understanding being ‘exhibited’ (Hindmarsh et al., 2011; Sacks, 2010). Thus, the study by Hindmarsh et al. (2011) demonstrated that in teaching-learning interaction the body plays an important role in aligning or undermining the claimed understandings. This study is important for the present thesis, because anatomy learning laboratory interactions, like dental clinical trainings, routinely involves examining and discussing understandings that revolve

around knowledge-laden and culturally rich objects. Therefore, it provides a multimodal perspective to examine how demonstrators and students claim and display understanding in their interaction.

Lastly, Lindwall and Lymer (2014) demonstrate how differential knowledge states and status contribute to the construction of questions and answers between novice dental students and their expert tutors, in video observation tutorials of dental procedures. Through their work they illustrate the taken-for-granted knowledge of dental procedures available to tutors, which is made apparent by novice students' queries of the interpretation of procedures and objects that the expert tutors overlook in their narration of the ongoing/video recorded endodontic procedure shown (Lindwall & Lymer, 2014). The emergent key theme through these different contexts and studies is the pedagogical interaction processes that foster and make relevant different identities, their respective knowledge domains, and relationships. Through these social processes a communal shared knowledge amongst the participants emerges that taken altogether provides empirical support and sheds light on the complex, multimodal, and laminated perspective of social encounters advanced by C. Goodwin (2013).

Most importantly, these studies frame interaction as the site where teaching, learning, and understanding occur and not merely as the means to achieve those ends. The studies emphasise how knowledge, identities, and relationships are inseparably intertwined in teaching-learning interaction within various instructional contexts. They also demonstrate the benefits of adopting a more comprehensive view of examining and understanding laboratory teaching-learning interaction as a series of social encounters. Building on their methodological approach, this thesis attends to anatomy laboratory pedagogical interaction by examining its sequential organisation,

how participants' identities and the associated knowledge domains are constructed and made relevant in interaction, and how embodied interaction contributes to understanding and inter-subjectivity.

3.4.1 Studying Openings-the Negotiation Site of Agenda, Identities, and Relationships

This section examines research on interaction openings that are directly relevant to the current investigation. Notably, Benwell and Stokoe are discussed because their work on student and tutor identities and relationships has been conducted in a university setting. The work of C. Goodwin (2013) is emphasized as it provides an evidence-based conception of social actions that is analytically suitable for the data. A version of the concept of community of practice from Hellermann (2008) will also be discussed because it provides the community of practice framework suitable for analysing the longitudinal observation data in the present investigation.

Unlike traditional discourse studies that focus on discussions where the 'learning' takes place, Benwell and Stokoe (2002) and Hellermann (2007) argue that *openings*, like the beginning of tutorials or subsequent participant interactions, are important organisational spots of educational activities that need to be studied and examined. Benwell and Stokoe (2002) note that openings are where sequences are devoted to the negotiation of agenda and identities. Furthermore, openings are the primordial sites where the business and purposes of the ensuing interaction are made explicit and pursued (Benwell & Stokoe, 2002; Schegloff, 1968; Schegloff & Sacks, 1973; Stokoe, 2000). As such, openings are an ideal site to examine relationship dynamics between teachers and students.

Researchers such as Schegloff (1968) pioneered the CA work on openings, whose investigation reveals the regular sequencing patterns of openings through

rigorous analysis of everyday telephone conversational interaction. Through the analyses of summons-answer sequences, Schegloff's (1968) work on openings explored the notion of *conditional relevance* of sequences and their adjacent parts, which have been discussed previously, and laid the foundations for the exploration of sequential organisation. Examination of the sequencing of openings has led to the study of how turn-beginnings are constructed by speakers to establish recipiency with a co-participant (C. Goodwin, 1980; Chris Heath, 1984). In more recent research, investigators identified actions (e.g. in breaths and body movement) in the pre-beginning position that function to orient participants to ensuing interaction before the turn is properly initiated (Mortensen, 2009). Mortensen (2009) contributes to an established body of research that demonstrates participants' mutual orientation is necessary for talk to emerge between co-present participants (e.g. C. Goodwin, 1980, 1986, 2007; C. Goodwin & Goodwin, 1987; Chris Heath, 1984; Mondada, 2007; Rae, 2001). Such work provides an analytical perspective that can be applied to understanding how anatomy laboratory participants physically and verbally establish co-presence, mutual orientation, and recipiency for joint talk.

In terms of sequential organisation of tutorial openings, earlier research shows that tutors' task-setting generally follows a three part formulation (Benwell & Stokoe, 2002)

1. Future projection of the task
2. Use of contextual details to express and justify the limits of the task to be done, and often but not always with reference to the past
3. Focus on the immediately upcoming task or next action that often makes relevant students' participation

This three-part formulation echoes classroom teacher pedagogical talk functioning to provide an agenda with ‘work-thus-far’, ‘work-at-hand’, and ‘work-to-come’ (Heyman, 1986). This communicates and sets an agenda for the tutorial while asserting the tutor’s role as being in charge (Benwell & Stokoe, 2002).

Such a formulation impacts upon the interactional dynamics. As Benwell and Stokoe (2002) argue, the tutor’s justification of task in the second part of the formulation demonstrates intent to justify and explain the task choice, which could be altered to reflect a more democratic process. Furthermore, they note that because the second part of the task formulation is often extended with contextual details, it may serve to ease students into the task by delaying/deferring their contributions (Benwell & Stokoe, 2002). Therefore, Benwell and Stokoe (2002) suggest that the second part of the task formulation may be partly oriented to the ‘demands of student face’ by delaying student contributions, which the researchers argue is deemed by tutors as face-threatening. In support of this argument, Benwell and Stokoe (2002) observed tutor’s frequent use of politeness (P. Brown & Levinson, 1987) in their task-formulating sequences, such as the conditional tense and pausing to construct a less authoritative identity. Furthermore, tutors employ *negative politeness* devices that create hedging (e.g. ‘sort of’, ‘in a sense’, ‘perhaps’, ‘could be said’), hesitation, pauses, and fillers (e.g. ‘y’know’, ‘I mean’), and strategic use or avoidance of pronouns that distance the interlocutor from face-threatening acts (e.g. ‘could someone fill us in here’). In addition, tutors also use *positive politeness* devices that may also function to lessen the threat to face by suggesting solidarity and alignment between speaker and hearer (Benwell & Stokoe, 2002). Common strategies include the use of the third-person plural (‘we’) to suggest solidarity, the use of informal in-group markers (e.g. ‘mate’) to suggest closeness and equality as opposed to distance

and hierarchy, and use of joking and humour (P. Brown & Levinson, 1987). Benwell and Stokoe (2002) argue that although face-work[18] is a normal part of everyday interaction, as this is frequently employed by tutors (who are in positions of institutional authority and power), this suggests that tutors consider tutorial activities as face-threatening to students.

Finally, in analysing and conceptualising interactional data from the opening phases this investigation draws upon the concept of social actions as *laminations* of various interactional resources (C. Goodwin 2013), as discussed earlier[19]. Using analyses of face-to-face interaction between a stroke patient and his family members and examples from archaeological excavation sites, C. Goodwin (2013) illustrated how participants' social actions and turns are co-constructed from the conglomeration of a myriad of interactional resources. These interactional resources may be introduced and made relevant through previous turns within an ongoing interaction, be shared cultural understandings, or be physical objects that are knowledge- and culture-laden. Regardless of the origins, the resources are locally managed and laminated into human actions that exhibit participants' inter-subjective understandings, where

> participants must know in detail what each other is doing, the kinds of knowledge each can accountably be expected to possess, and relevant features of the materials, whether language structure, artefacts or features of the setting, that contribute to the organization of the action in progress. (C. Goodwin, 2013, p. 21)

[18] Politeness and face-work has a long tradition in pragmatics starting with the work by P. Brown and Levinson (1987). It is a normal part of everyday interaction when people are interacting with others who they consider to be their equals.
[19] Goodwin's work was discussed earlier in the chapter in the section under turn-taking organisation and construction of turns on page 100-103.

This continuous sedimentation of culture and sequential interaction combined with the laminated perspective of actions provides an analytical framework to examine laboratory interaction longitudinally. Using this analytical perspective, the analysis aims to tease apart the multiple laminated layers of interactional resources (e.g. language structure, embodied displays, prosody, tools/objects, categories such as institutional membership, epistemics, sequential organisation, and turn-taking organisations) that participants bring together in constructing and understanding their interaction. The longitudinal analyses is further facilitated by the adoption of a version of a community of practice (Hellermann, 2008; Lave & Wenger, 1991), which provides a perspective of interactional competence developing over time as participants introduce, co-construct, and renew social and cultural practices in their.

Hellermann (2008) defines the community of practice for language classroom based on five elements "…mutual engagement, joint enterprise, shared repertoire, reification and participation and economies of meaning." (p. 9) (See Figure 3.1).

Figure 3.1 A diagrammatic representation of the five elements that defines a conception of a community of practice of language classroom for Hellermann (2008).

The figure representing these five elements is being adopted in this thesis as a way to conceptualise the radiography anatomy learning laboratory also as a community of practice. The definition of Hellermann's (2008) five elements is briefly summarised in Table 3-5 below.

Table 3-5 The five elements that define Hellermann's (2008) conception of a community of practice for language classrooms.

Elements of a Community of Practice	Definition
1. Mutual Engagement	participants in the community understand their mutual commitment to one another in taking part; therefore, members develop an understanding of their individual roles, competences, and any subsequent changes to the roles and competencies within the community.
2. Joint Enterprise	participants understand and share a common goal.
3. Shared Repertoire	the developed regularities and patterns of regularities in the practices, languages of communication, and routine. This is established and negotiated by the members of community.
4. (Curriculum) Reification and Participation	the 'making it happen' of taking an abstract curriculum and ideas then turning them into real, actual practices like the enactment of the curriculum. Participation refers to the continuous joint development, refinement and evolution of the abstract curriculum into actual practices. E.g. No commonality leads to struggle with reification, while long history of ritual practices may lead to a lack of participation.
5. Economies of Meaning	refers to the fact that practices and actions are meaningful to the participants of the community, and that meanings can have different degrees of shared ownership. The more shared a practice is the greater the participation, and where there is less *sharing of meaning* the greater the work required to be done by the participants in order to perform the same practice within a community of practice.

More importantly, Hellermann (2008) reminds researchers that:

> While students and teachers experienced with schooling bring an understanding of similar communities to a classroom, in order to interact with one another in a particular community of practice, members - students and teacher - must learn in what ways they can communicate and interact with one another through their particular and local mutual engagement in classroom practice. (p. 10).

The community of practice framework provides an overarching scaffold to consider how participants' interactional practices are changing over time and it serves as a theoretical model to consider and pay attention to change and evolution of co-construct practices in a community of practice like the undergraduate radiography anatomy laboratory.

3.5 Conclusion

This review has shown that there is a paucity of CA investigations on interaction in the university sector. The existing studies provide a foundation to understand the sequential organisation of university tutorial talk, which, as previous research has shown, is influenced by the disciplinary contexts of the pedagogical talk (Benwell, 1999; Benwell & Stokoe, 2002). Furthermore, as the institutional setting and physical environment changes participants alter and augment their interaction practices to suit their changing interactional requirements. The anatomy learning laboratory context, although a formal educational context, is altogether different from a tutorial setting. The laboratory's social structure, physical environment, and teaching-learning goals create different interactional needs, knowledge and culture, and novel identities that participants need to navigate. It therefore provides a different institutional context to

examine how people co-construct the social practices for teaching and learning, and needs to be studied in its own right.

Yet, as illustrated in Chapter 2, the current study of teaching in anatomy education research, like in education research (Gage, 2009), has not received sufficient attention. More critically, the interactional nature of teaching and learning (Koschmann, 2011b; Schegloff, 2006) has been largely ignored in the anatomy laboratory pedagogy literature. Thus pedagogy research that ignores the social and interactive dimensions of learning is at risk of misrepresenting the phenomenon. Presently the study of university and science pedagogy in the field of CA remains embryonic unlike the study of second-language acquisition, which has formed a coherent body of work. This thesis builds on and extends previous CA work within a university context by examining the pedagogical interactions in a first-year undergraduate anatomy teaching-learning laboratory setting. More importantly, this thesis considers education as sociology in action, and as asserted by Goffman, such action, namely talk, is not and should not be reduced to its linguistic forms, but be founded and understood within the social fabric in which they take place (Fine & Manning, 2007). Thus, unlike previous anatomy laboratory pedagogical research, this novel investigation adopts a multimodal approach to investigate the teaching and learning in the university anatomy laboratory context.

Chapter 4 Methods

4.1 Introduction

Previous chapters have examined existing investigations and research approaches in the study of anatomy in the university context. It was concluded that there is a need for additional approaches such as those afforded by conversation analysis (CA) if anatomy education is to be understood as a social practice. Having reviewed the features of CA, the aim of this chapter is to describe in detail the methods employed in this study including rationale, research design (i.e. participant selection and data collection), ethics, and data transcription and analysis. The research questions are presented after the description of the cyclical CA transcription and data analysis cycles. It concludes with a general discussion of the data collected and analysed.

4.2 A Rationale for Choosing CA

Researchers bring different worldviews from their individual life experiences and the research community to which they belong, as well as philosophical assumptions, to their research methods, and it is important that such beliefs and assumptions be made explicit and discussed (Creswell & Plano Clark, 2011, pp. 38–51). Thus, a discussion of the CA methodology is important because "No method is without theoretical assumptions…" (Jordan & Henderson, 1995, p. 40).

CA investigations are methodologically concerned with the observation of naturally occurring interaction and with analysing them to explicate the structures and mechanisms by which participants express and achieve mutual understanding. This section will specifically address the questions of what social interaction features characterise anatomy laboratory pedagogy and how CA methodological characteristics facilitate the study of social interaction in anatomy laboratory pedagogy.

4.2.1 How CA Meets the Needed Method Characteristics to Study the Organisation of Anatomy Laboratory Interaction

CA methodology embodies the appropriate characteristics and the necessary tools for understanding how laboratory interaction between students and demonstrators is a sequence of actions. Furthermore, CA investigations have an established record of success describing and analysing interaction in a variety of different contexts, which include education institutional settings (Benwell, 1999; Ford, 1999; Hellermann, 2005; Lerner, 1995; Macbeth, 2004; McHoul, 1978, 1990; Pea, 1993; Seedhouse, 1997; Stokoe, 2000). The success of CA lies in the way analysts treat talk and other social actions in the education institutional setting as the fundamental tools of teaching and learning. The interaction is seen as the essence of the teaching and learning experiences shared between educators and students, in defining their respective identities and relationships. Furthermore, these social actions are the vehicles by which parties negotiate a broad range of social constructs such as knowledge, participation and expectations.

As illustrated in Chapter 3, in different institutional settings (e.g. classrooms, courtrooms and political meetings), CA research has confirmed that people maintain and modify the basic forms of organisation of turn-taking and sequential organisation to serve specific functions and demands. These modifications in the education setting, particularly in teacher-fronted or teacher-centred structures, include the frequent appearance of IRE/IRF sequences, the use of ‘wh’ questions by teachers, and the specific turn-taking procedures like teacher delegation of speaking rights etc. (Emanuelsson & Sahlström, 2008; Hellermann, 2003; Huh, 2014; McHoul, 1978, 1990; Mehan, 1979a; Radford, Blatchford, & Webster, 2011; Seedhouse, 2012; Sert, 2013; Stokoe et al., 2013; Waring, 2009; Zemel & Koschmann, 2011; Zhao & van Leeuwen, 2014). It has been shown that university tutorial instructional settings use

similar classroom organisational structures (Benwell & Stokoe, 2002, 2005), but it remains to be determined whether the university anatomy laboratory instructional setting also shares this same characteristic organisational structure with university tutorials and classrooms.

CA is also able to simultaneously account for verbal and non-verbal features in the construction and sense making of participants, a task difficult to achieve without observational data and with quantitative methods alone. In this regard, the CA work by Streeck (2009) on gestures and C. Goodwin (1986, 2000, 2013) on embodied interaction has made a significant contribution in challenging the traditional linguistic assumption that verbal utterances take primacy in communicating meaning. In fact, CA studies have shown, verbal utterances are slowed down to synchronise with, and even become subservient to, the developing non-verbal gestures (Filipi, 2009; Rendle-Short, 2006; Streeck, 2009). Furthermore, increasingly, CA researchers are finding that the grammatical and even prosodic features (e.g. pitch, loudness, rhythm and tempo) of utterances do not necessarily align with the intended social interaction function (Auer, 2014; Walker, 2014a, 2014b). That is an utterance grammatically structured as a question does not necessarily have the rising pitch and intonation contour, and that the transcription of form should be separated from the analyses of their relationship to the practices and functions within actions (Auer, 2014). Thus, the anatomy laboratory data collected and analysed needs to allow for the close examination of the functions and design of verbal and non-verbal actions (referred to as talk-in-interaction) that are created and oriented to by the demonstrators and students. This is important in order to understand how the laboratory participants are able to negotiate and reach inter-subjective understanding and shared knowledge. The knowledge status and stance displayed and assumed by

participants are referred to as epistemics, which has been discussed in the previous chapter.

In light of emerging non-CA research that shows knowledge and cognition have a degree of contextual and situational sensitivity, it also becomes pertinent to adopt a CA approach to investigate anatomy laboratory pedagogical processes (J. S. Brown, Collins, & Duguid, 1989; Greeno, 2011; Hutchins, 1995; Mondada, 2011; Sherman, 2004). This epistemological property of knowledge and cognition synergises well with the findings from qualitative anatomy education research that show learners trying to impart meaning into and to derive significance out of their anatomical knowledge through contextualisation techniques. As noted in Chapter 2, Eizenberg (1988) and Wilhelmsson et al. (2010) both found that medical students who study with the intention to achieve *deep* and meaningful learning do so by relating anatomy to professional medical practice, working with materials that resemble real live bodies like cadavers, and visualising or working with resources that help them to visualise the particular and relevant anatomy. Thus, using CA, it should be possible to examine how anatomical knowledge is situated in the anatomy laboratory context through the activities, conduct and the learning culture created and maintained by the demonstrators and students.

CA appears to naturally fit the aim and the research problem of this thesis, but besides CA other quantitative and qualitative methodologies may be used to investigate anatomy laboratory pedagogical processes, albeit with different limitations (See Table 4-1 p. 127). The table tallies a score out of seven that indicates the number of matches between the various research methods that were considered and the required selection characteristics. Briefly, the quantitative and qualitative alternatives to CA for studying interaction will be discussed.

Table 4-1 Summary of different quantitative and qualitative research methods match up with the key research method criteria needed for conducting anatomy laboratory observation research required for this thesis.

Required Research Method Characteristics	Research Methods					
	CA	Discourse Analysis	Observation Field Notes	Quantitative Matrices	Interviews	Surveys
1. Observe teaching and learning actions in the laboratory setting	X	X	X	X	X	
2. Systematically analyse the teaching and learning actions as a systematic whole aiming to describe 'what' actions are displayed, 'how' the actions are understood, and 'why' these actions are being performed.	X	X	X			
3. Recognise the collaborative efforts of social interaction, which are central to anatomy laboratory teaching-learning processes.	X	X	X	X	X	
4. Account for and be sensitive to both verbal and non-verbal actions.	X		X	X		X
5. Adopt a bottom-up and data-driven approach to allow the organic anatomy laboratory teaching and learning to emerge. Avoid theoretical imperialism or pre-existing biased perspectives.	X			X		
6. Flexibly balance and integrate my insider perspective as an anatomy educator whilst maintaining objectivity in the analysis.	X	X	X			X
7. Ground the analyst's understandings of the actions produced by the student and teacher to be within the observation data. Shows that the analyst's interpretation and understanding of the social situation aligns with those of the participants being observed.	X				X	
Total	**7**	**4**	**5**	**4**	**3**	**2**

One such quantitative approach may be to use observation matrices that record and characterise classroom data (e.g. number and duration of activities, types of resources and their resources) or more linguistics measures (e.g. length and duration of student teacher utterances, numbers and types of student/teacher questions). The concern in pursuing such a quantitative research approach is that it forces the researcher to take a top-down theory-oriented approach, which would mean sacrificing the opportunity to allow the essential characteristics of laboratory teaching-learning to emerge as a socially collaborative event. Furthermore, using matrices is likely to impose unwarranted assumptions and beliefs about the teaching-learning processes, which would be inappropriate when there is so little known about such processes in the anatomy instructional laboratory setting. Such approaches might be useful to quantitatively characterise specific aspects of laboratory teaching and learning, (i.e. 'what' and 'how much'), but ultimately they will not be able to explain 'why' the actions in talk are produced in the interactional context. This is because quantitative analyses tend to de-contextualise interaction data by making it less 'messy'. Hence, many investigations adopting a positivist-inspired approach are unable to examine how each speaker mutually and reciprocally influences action through talk. Unlike quantitative investigation, which tries to clean up the 'messiness' of pedagogical interaction, CA researchers embrace and seek ways to most accurately represent the full 'messiness' of interaction (Jordan & Henderson, 1995).

Other qualitative methods exist besides CA that can be used to study the anatomy laboratory process. These include interviews/personal accounts (e.g. written or audio diaries), researcher observation field notes, and discourse analysis. With the

exception of discourse analysis, the other qualitative research methods are frequently employed in education to study various aspects of pedagogy.

However, as Markee (2005) rightly points out, in using ethnographic approaches such as interviews, focus groups and personal narratives to study interaction processes like pedagogy, the researchers end up examining and eliciting the 'formed categories' from their participants. This is not to mention that research relying solely on interviews/personal accounts increases its potential risk of committing *attitudinal fallacy* by inferring behaviour from beliefs and perceptions (Jerolmack & Khan, 2014). Therefore, the use of interviews and personal narratives is limited in the sense that they rely heavily upon participant reflections and recollection, which are prone to human error, and they do not have direct access to the events and interaction that the participants experienced, which led to the formation of the categories identified in interviews (Jerolmack & Khan, 2014; Markee, 2005). Hence, Markee (2005) suggests that the microanalysis of observations and actual interaction is the method that allows researchers to directly examine the formation of participants' categories as opposed to finding the formed 'categories'. With advances in digital recording technology, such multimodal interaction research is becoming more prevalent, as previously illustrated in Chapter 3.

Similarly, researcher observations, journals and written field notes are merely indirect representations of the phenomenon to be studied, and such data collection techniques are prone to human errors and biases (Guba & Lincoln, 1994). Many of these techniques were employed and recommended during a time when video or audio recordings were not available, or, in the present day, when the data to be recorded proves to be highly sensitive and/or requires specific ethical considerations

to protect participants or places and institutions that might be named or mentioned in the data (Creswell & Plano Clark, 2011; Guba & Lincoln, 1994). Neither of these considerations seems directly relevant to the current investigation except for the possible appearances, treatment and usage of cadaver material, which may be seen to require sensitive treatment[20].

While both *discourse analysis* (DA) and CA are qualitative methods that broadly focus on understanding how language functions and how people make sense of language, their similarities end at this broad level. CA focuses on the procedural analysis of people's talk and how talk is systematically organised to achieve a particular function or to solve a range of organisational problems (e.g. distributions of turns at talk or problems of understanding) (ten Have, 2006; Wooffitt, 2005). DA research tends to investigate more socially or politically relevant themes, and in the case of critical discourse analysis (CDA), practitioners tend to use current linguistic and critical social science concepts and conventions to serve a highly political agenda in order to expose ideologies of certain groups (ten Have, 2006; Wooffitt, 2005). Thus, the DA approach does not suit the present thesis' aim to explore and understand anatomy laboratory based on the naturally-occurring pedagogical interaction. Furthermore, CA systematically examines mutual collaboration of talk from moment-to-moment. It further pays attention to how participants of the talk simultaneously attend to the moment-to-moment context of the unfolding talk while maintaining orientation to a larger situational context (Wooffitt, 2005). For example, a student asking the teacher a question is able to monitor his/her immediate unfolding conversation while being aware of the social norms and necessary conducts that may be required of them as a student in the classroom where the teacher is in charge. By

[20] These ethical considerations will be covered in the Ethics section of this chapter.

contrast, DA investigation is generally not concerned about such mundane details and generally studies interaction and discourses to shed light on how larger sociological contexts and ideologies are imprinted or achieved (ten Have, 2006; Wooffitt, 2005). As well, in some forms of DA, researchers do not use interaction data but instead use written texts.

Underlying these separate approaches is the different ways CA and DA researchers treat their data. CA research is a data-driven method that emphasises the derivation of research questions based on careful consideration of the recorded data and transcripts instead of being based on pre-formed theoretical constructs and ideologies (ten Have, 2006). Thus, CA research is characterised as a 'bottom-up' analytical approach. In contrast, DA research in its various forms may be generally characterised to take a 'top-down' analytical approach, with researchers utilising current concepts from linguistics or critical social sciences to show how these concepts exist in particular forms of discourse (ten Have, 2006). DA investigation also tends to take a more interpretative and less objective approach towards the analysis of data (ten Have, 2006). As noted by ten Have (2006), the challenge of comparing CA and DA in this regard is that CA's analytical framework is much more orthodox despite its wide adoption into various fields. Unlike CA, DA research adopts a wider range of approaches and has a more varied set of core ideas (ten Have, 2006) that is more ready and flexible to adopting exogenous theories.

4.2.2 Summary

To summarise, students and educators make visible a part of their cognition to be manipulated and negotiated during their teaching and learning social encounters. These actions give rise to the teaching-learning experiences for educators and students alike, and the CA research approach makes it possible to subject the talk-in-

interaction to analysis. This analytical focus is achieved by analysts through ever more fine-grained transcriptions of the verbal utterances and the non-verbal actions of participants, but, more importantly, by analysts asking the questions of 'who did what' and 'why that action now' (Filipi, 2009; Hepburn & Bolden, 2012; Sacks, 1995; Schegloff & Sacks, 1973; Sidnell, 2012). Using the recorded data, CA analyses are not the mere subjective beliefs of the analyst. The CA analyst's interpretations of the data are made public in concert with the original data so that the readers may determine for themselves the accuracy and validity of the interpretations. In achieving this, the CA method allows and values the unique insider's perspective, and broadly acknowledges the respective individual ability to understand social actions by being competent members of society or the particular community of practice. Unlike other methodological approaches that rely on interview data of students and educators to construct their formed categorical experiences (i.e. by studying the actual talk-in interaction using CA), it becomes possible to comprehend emergent understandings that result from unfolding talk. In other words, CA analysts study the talk-in interaction that gives rise to the categorical experiences that are elicited by interviews and surveys (Markee, 2005). To understand anatomy laboratory teaching and learning, the research needs to give primacy to the organic processes and the naturally-occurring interaction that are already taking place.

4.3 Research Design

Having explicated the rationale for choosing the CA methodology for this thesis, this section of the chapter describes in detail the research design. This includes a description of the research site; a discussion of the participants recruited for the study; and an account of the larger curricular context that the anatomy laboratory session being investigated is a part of. The CA data collection principles will be

discussed in terms of the data collection method that was adopted for this investigation, and post-recording data processing and handling are discussed. Finally, the CA data transcription and analytical processes adopted for this study are explained, highlighting the roles and contributions of computer software analytical tools such as Transana and NVivo 10.

4.3.1 Context of the Study and the Participants Recruited

This section will describe and discuss the settings of the participating institution and program, and the participants recruited for this study before moving on to a discussion of the relevant curricular contexts and the physical laboratory setting in which the data was collected. The Australian university study site was selected by convenience sampling. The selected university's radiography department voluntarily agreed to permit research access to their Year 1 Bachelor of Radiography Program (BRad), a professional health science degree course offered by the participating Australian university.

The student participants were recruited on a voluntary basis from the Year 1 BRad student cohort who was undertaking the integrated biological science subject. The departmental administrative and teaching staff assisted with making the necessary arrangements for access to recruit student and laboratory demonstrator participants. The student participants were drawn from a potential pool of 64 students, out of which 34 students volunteered and gave full consent to participate in the laboratory sessions to be recorded. The majority of the students were recent high school leavers with few exceptions, and all of the students had been offered a place in the professional BRad Program based on their academic merit and having passed a face-to-face selection interview conducted by the radiography department. This is a naturalistic observational study thus no extra efforts were made to 'control' and

balance the gender ratios. Due to the requirement to use video recording, it was necessary to ensure that all participants in the laboratory session recordings gave their consent, and extra efforts were made to ensure that the researcher did not overly affect the normal administration of the course, which also required students to be subdivided into two. Thus, following participant recruitment, a department administrative officer helped allocate all 34 of the student participants into the same weekly laboratory time slots to facilitate the recording process. The assignment of students to laboratory session groups consisting of ~15 students is a normal part of the administrative procedures of the anatomy subject. However, it should be noted that the student groups often intermingled and it was observed that in a number of recording sessions students spontaneously formed new subgroups to complete the assigned laboratory activities with peers outside the assigned groups. This may

The laboratory demonstrator participants were recruited on a voluntary basis from the sessional staff involved in the teaching of the anatomy laboratory components of the subject. The anatomy demonstrator participants drew upon a potential pool of four demonstrators for each of Semester 1 and Semester 2, altogether eight demonstrators. All eight demonstrators volunteered and gave their full consent to participate in the laboratory sessions to be recorded. All of the anatomy laboratory demonstrators are medically qualified. In terms of teaching experience and training, the majority of the demonstrators either had little or no experience in formal teaching. Furthermore, most of the demonstrators had little to no formal pedagogical training except for the one-day induction program provided by the anatomy department where they were under contractual obligation. It is worth noting that the demonstrators were primarily employed to provide anatomy laboratory and tutorial instruction for medical students, and teaching into the BRad

anatomy laboratory and tutorial sessions is only a small part of their contractual obligations. The induction day was designed to familiarise the demonstrators to the curriculum and content structure of the courses they will be teaching, but the program also included a one-hour pedagogy workshop. Finally, consent was sought from the senior lecturer in charge of the first-year anatomy subject. The lecturer was not always directly involved in the anatomy laboratory teaching sessions, but she was occasionally present during the teaching sessions. In the final laboratory session, the lecturer acted as the substitute demonstrator on behalf of an absent demonstrator.

The Australian university curriculum in this study followed a 12-week semester structure, and the anatomy laboratory sessions recorded in both Semester 1 and 2 for this study are but one component of the integrated biological science subjects for first-year radiography students. It is important to understand that the anatomy laboratory sessions studied in this thesis were complemented by weekly anatomy lectures and tutorials, which were not part of the study. The weekly lectures provided the theoretical backbone for students to review and apply to the real anatomy on view during the anatomy laboratory sessions. Together, the laboratory sessions and lectures formed the anatomy component of the integrated multi-disciplinary human biological sciences subject. Besides this subject, students also undertook two other subjects. One subject covered radiologic physics and radiation protection, and the other subject addressed radiographic science and practice.

In terms of the anatomy laboratory sessions, at the beginning of each semester every student received an anatomy laboratory practical manual, which acted as a guide and workbook for each of the laboratory sessions. For each of the sessions, the laboratory manual clearly sets out the topic, the associated readings, the learning objectives, and the activities to be completed along with a series of questions

designed by the lecturer to prompt students' learning (please refer to Appendix B for example).

The anatomy laboratory sessions all took place in the largest learning area of the anatomy-learning laboratory (Please see Figure 4.1 below).

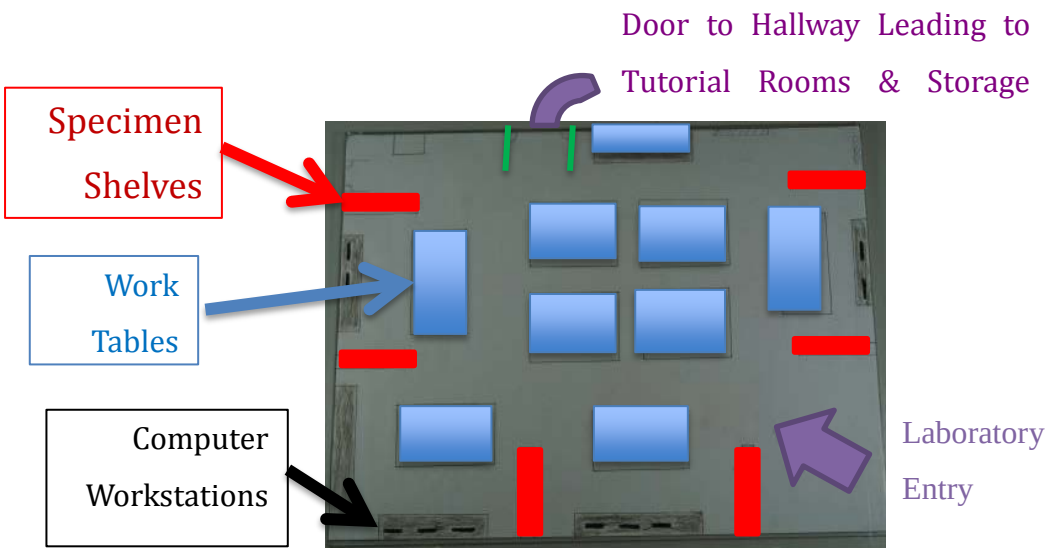


Figure 4.1 Picture and floor plan of anatomy laboratory space.

It is a large open space filled with tables, specimen shelves, and computer workstations. The room can be divided into two areas, a central uncarpeted area with four large waist-height tables and a peripheral carpeted ring area. The four large tables in the centre are high enough for students to work on without sitting down. Each of the four tables can accommodate approximately 15 students around it. Note that besides the demonstrator-led talk that typically occurs at the opening or closing of the laboratory sessions, the remainder of laboratory interaction took place at the various large tables spread around the laboratory; hence, these interactions conducted during the laboratory activities and at the tables will be referred to as *table-talk*.

The carpeted ring area is further sectioned into four smaller zones by shelves that house specimen jars on permanent display. Moving around the periphery, each zone contains specimens from specific regions of the human body. For example, the

shelves in one zone contained specimens of the lower limbs, while another the upper limbs, and yet another contained specimens of abdominal organs. Each of these zones is furnished with a central group working table where 15–20 students may sit comfortably. Against the wall a row of 2–4 computer workstations are also available for use.

How this learning space was utilised varied from session to session depending on the activities and content. However, generally speaking, in Semester 1 specimens and models for activities were placed on the four large tables at the centre of the room. Then the demonstrators and students generally used the periphery of the laboratory space, which will be referred to as the peripheral learning zones, for independent or smaller group learning. Students generally moved around freely or congregated at the tables with the learning materials they needed depending on the tasks they were attempting to accomplish. However, in Semester 2, limited learning materials meant that participants shared common resources such as potted specimens and cadaver materials, which were placed on the four tables in the centre of the laboratory. Consequently, three demonstrator-students participant groups were formed and congregated, respectively, at three of the large tables around the periphery of the room. In Semester 2, the participant group being recorded was located at the large table immediately to the left of the laboratory entry.

In Semester 1, seven two-hour long anatomy practical sessions were scheduled for the students, consisting of an hour of anatomy laboratory session and an hour of anatomy tutorial session. Four anatomy demonstrators were responsible for overseeing and running the concurrent laboratory and tutorial sessions. The hour-long anatomy laboratory sessions recorded for this study were just one part of this two-hour long practical session for the students. Logistically, the entire cohort (n=64)

was split into two groups, which were then further subdivided into smaller teams of 15±2 students. During each of the seven two-hour long tutorial/laboratory sessions, one group would attend the anatomy laboratory session while the other group attended the concurrent anatomy tutorial. At the end of the hour the groups swapped over, thus the students who were first in the tutorials went into the anatomy laboratory and vice versa. Although students swapped between the tutorial and laboratory sessions, the laboratory demonstrators did not swap with the tutorial demonstrators. This meant that the demonstrators were responsible for learning the content for just one area of the practical sessions, which helped to balance and minimize workload. Consequently, however, the students had no consistency and continuity in terms of the demonstrators assisting with their learning.

In Semester 2, there were only four anatomy practical sessions, and four new demonstrators took over the sessions. Logistically Semester 2 was similar to Semester 1, with the student cohort again split into two groups but students were subdivided into smaller teams of 10±2 students. However, instead of having concurrent laboratory and tutorial sessions, each of the four anatomy practical only had the hour-long laboratory session, and at the end of the hour student groups swapped out. Thus, in Semester 2 students only attended four hour-long anatomy laboratory sessions. It should be mentioned that for both semesters, the demonstrators determined for themselves who should cover the tutorial or the laboratory sessions (Semester 1), and who was responsible for supervising particular student teams.

Having introduced the general contexts of the study site, the participants, the curriculum, and the physical setting, the following section describes data collection decisions under the guidance of CA principles previously established.

4.3.2 Data Collection and Representing the Daily Activities of the Anatomy Learning Laboratory: The Use of Video-Recording

This investigation is a naturalistic study of the day-to-day activities and interactions in the anatomy learning laboratory setting within an Australian university BRad program over two semesters. During the two semesters, students and demonstrators would have gained more experiences and knowledge, but there was also a 'changing of the guard' after the first semester and a new set of anatomy demonstrators took over who would have already had a semester of teaching the medical anatomy laboratory curriculum. Besides the change of demonstrators between the two semesters, the students themselves had also undergone a significant education event by completing their first semester of university and experiencing their first professional clinical placement.

CA methodology emphasises the use of naturally-occurring data for analysis and, as discussed in the rationale, one of the conclusions reached in the previous chapter was the need for multimodal analysis of the anatomy laboratory face-to-face interaction. Consequently, it becomes necessary to use audio-video recorded data. Video-recorded data has long been used in educational research, and it allows researchers to repeatedly and more precisely view the actions and phenomenon of interest, which can be more accurate and less subjective (Gage, 2009; Parmeggiani, 2011).

Compared to the independent use of field notes for analysis, the preserve of social psychology and ethnography, the use of video records in CA research offers a number of advantages. Video records provide ample opportunity to revisit the recorded phenomenon with a more critical reflexive stance (Parmeggiani, 2011; Schegloff, 1988, 1997; Stivers, 2015; Stokoe & Smithson, 2001; ten Have, 2007). While it is recognised that some contexts are lost when recording the original

interaction, the recordings still provide instances of interaction that can be subjected to micro-analyses of fine interactional details that cannot possibly be achieved by field notes and observations alone. This micro level of interaction analysis has formed the basis for understanding how interaction and learning is co-constructed in the natural context of the anatomy learning laboratory. In comparison, other methods of data collection and analysis alone, without using video-recording, cannot simultaneously achieve this level of objectivity and detail. Using video-recorded data and analysis to drive the formulation of theories is the strength of CA, and revisiting the recordings allows the analyst to determine the theories' reliability and consistency based on the relevant identifiable patterns.

As previously discussed, video recording has become increasingly common in CA, and with any video recording there are concerns that the recording personnel and equipment might disrupt or augment the phenomena being observed. Before addressing this concern it is important to point out that participants' interaction and behaviour recorded in this investigation occur in a publicly accessible domain of the university readily observable by other students, demonstrators and their peers, and faculty members. Thus, the presence of outsiders such as the recording technician should not be perceived as being overly intrusive. The greater concern in this data collection context and setting is the presence of larger and obvious pieces of recording equipment such as cameras mounted on tripods, which may be perceived as intrusive by participants. However, previous research suggests that people acclimatise to the presence of such recording equipment over time (Brody, Stoneman, & Wheatley, 1984; Parmeggiani, 2011; Wiemann, 1981), where behaviour indices of relaxation/anxiety rise during the first minute but then stabilise (Wiemann, 1981). Reassuringly, early research on video observation of

conversational data, conducted in controlled laboratory conditions, indicates that video recording has little to no influence on the participants' 'out-of-consciousness' behaviours such as talk-in-interaction (Wiemann, 1981).

Within CA, C. Goodwin (1981) provides an interesting counter argument regarding recording equipment and claims that the participants in interaction produce their behaviour to be observed by others and "actually orient their behaviour to being observed" (Filipi, 2001, p. 129). Therefore, C. Goodwin (1981) concludes that the interaction and behaviour produced has little to do with whether the interaction is being recorded or the presence of the camera equipment. Further assurance is provided by Drew (1989), who argues that the presence of the recording equipment is more likely to affect the analyses of the frequency of an item but not analyses of how participants manage and accomplish social activities such as talk. Drew's comment provides reassurance for the video-recording approaches being adopted in this thesis given its aim to examine the organisation of anatomy laboratory social action. Nevertheless, to minimise the potential effects, minimally intrusive equipment such as clip-on microphones were selected. Furthermore, the video-recording procedures were introduced from day one so that they became a normal and accepted part of participants' laboratory experience (Filipi, 2001; Kendon, 1979; Reder, Harris, & Setzler, 2003). Additionally, the longitudinal data collection process over the course of the entire year is known to moderate the likelihood of observer influences, and it enhances the validity of the recordings to capturing and representing the normal everyday activities (Filipi, 2001; Kendon, 1979). The contextual factors and CA principles discussed above guided the development and implementation of the data collection, which will now be described in detail.

The data collection discussion now turns to the recording protocols and procedures. A video-recording technician was hired from the university's multimedia unit to conduct the recordings and post-recording processing. Table 4-2 summarises the anatomy laboratory video-recorded in Semester 1 and Semester 2. Each video recording was approximately 60 minutes.

Table 4-2 Summary of the Anatomy Laboratory Session Recordings and Sampling Strategy.

Semester 1 (Typically 10 Weeks)				
Semester Weeks	1	2	5	9
Anatomy Laboratory Session	Laboratory 1	Laboratory 2	Laboratory 4	Laboratory 7
Topic	Anatomical Terminology & Joints	Pectoral Girdle & Glenohumeral Joints	Muscles & Neurovascular Structures	Foot & Ankle
Observation Number	1	2	3	4
Observation Label	S1W1L1	S1W2L2	S1W5L4	S1W9L7
Data Length (minutes)	23	34	28	46
Semester Break (Student Hospital Work Placement)				
Semester 2 (Typically 10 Weeks)				
Semester Weeks	2		7	
Anatomy Laboratory Session	Laboratory 1		Laboratory 4	
Topic	Cervical & Thoracic Vertebrae		The Thoracic Cavity	
Observation Number	5		6	
Observation Label	S2W2L1		S2W7L4	
Data Length (minutes)	54		49	

In following the principle to capture naturally-occurring data the researcher and the video-recording technician avoided interfering and interacting with the laboratory participants. This meant that from week to week the demonstrators were free to sort

out for themselves, as they would normally, who was going to teach in which section and the group that they would supervise. In Semester 1, at the beginning of each video recording, the researcher approached the demonstrators to ask them to decide who was going to be filmed for the session, and then the technician attached the wireless clip-microphone to their clothing. In Semester 2, the changing laboratory configuration also altered the way demonstrator and students were grouped, and with additional wireless microphones available for better sound recording, it was decided to prioritise filming of student talk-in-interaction.

As can be seen in Table 4-2 each of the recorded anatomy laboratory sessions is given an Observation Label, which also encodes the recording time point. The first two alpha numerals 'S1/S2' stands for Semester 1 or Semester 2. The second pair of alpha numerals 'W1–12' stands for the weeks within the semester (Week 1–12). The final pair of alpha numerals 'L1–7' denotes the anatomy practical session number in chronological sequence. Decoding an example, a transcript associated with an observation label 'S1W5L4' means that the original data was video-recorded on Semester 1, Week 5, and at the fourth anatomy practical session.

In Semester 1, in consultation with the video-recording technician, it was decided that only a single mobile camera would be used with a single wireless clip-on lapel microphone for the demonstrator. This procedure helped to limit the amount of post-recording video editing required, which ensured a faster delivery of the video record to the researcher. Due to the large space requiring coverage and the high mobility of the participants, the procedure requested that the technician film talk-in-interaction of a specific demonstrator, whom the researcher had anticipated would have been closely shadowing her/his self-assigned team (n=15±2). However, it was not anticipated that during certain sessions the teams intermingled and the students

spontaneously formed new configurations to complete their activities. There were also many unanticipated changes made by the demonstrators (who were in charge of the laboratory sessions) that made it difficult for the technician to adjust to with limited time and resources. Furthermore, mis-communication with the technician regarding the need for continuous recording meant that many early video records failed to cover the full hour-long sessions.

Furthermore, the ethics application for this research required that I, the researcher, conformed to certain procedures such as not being directly involved or present during the data recording sessions. This made giving feedback and adjusting the recording procedures on the fly impossible. Thus, the technician made many of the decisions in the first semester. Nevertheless, in the subsequent semester, due to a change in staffing circumstances the technician was not available during the pre-selected anatomy practical sessions. Therefore, an ethics amendment request was submitted and granted to allow the researcher to conduct the data recording personally with volunteer help. Learning from the recordings of Semester 1, in Semester 2, the laboratory observations were done using three separate cameras and three Bluetooth wireless microphones for three different participants. The decision was made to sacrifice the demonstrator's interaction in favour of the students' dialogues.

In closing, the data loss due to mis-communication and the lack of staff/equipment in Semester 1 recordings resulted in fragmented interactions that are not usable for analytical purposes or footages where the audio and video recorded interaction did not match (i.e. two separate interaction). Consequently, the data limits the extent to which a full CA analyses may be carried out, and the work around

decisions for this data set was to focus only on the beginnings of the laboratory sessions and openings of table-talk.

4.3.3 Post-Recording Data Processing and Handling

In compliance with ethics requirements, all softcopies of the data were stored in password encrypted storage medium (server, computers, and external hard drives/USB drives). After each anatomy laboratory session, the video-recording technician processed the raw video footage to ensure that the audio was synchronised with the video footage. In Semester 1, the task was relatively straightforward with one video recording and occasionally two to three audio channels. In Semester 2, the post-recording data processing was significantly more complicated for the technician. The technician had to synchronise three sets of video footage and audio recordings, and combine them into one video file. In this way, the anatomy laboratory interaction could be viewed from three different angles. This improved the clarity, and helped to get a more accurate representation of the environment, the movements and positions of participants, and the verbal and non-verbal features of participants' interaction.

4.4 Ethics

This project was approved by the Monash University Human Research Ethics Committee (MUHREC) (Project reference number CF12/3918 – 201201875), and all subsequent changes to the recording procedures and protocols were submitted to MUHREC for review and subsequently approved. Due to the large number of consenting students, I was able to give the recording technician freedom to record all persons, events, and activities occurring in the laboratory session, and avoid any ethical issues with the capture of potentially identifiable images without participants' consent. All the names of participants and locations in this study have been de-

identified, and pseudonyms are used in all transcripts and written works. The original audio-video records of the data provided with this thesis have not been de-identified, but participants have explicitly given consent for the data to remain in its original form.

4.5 CA Transcription and Data Analysis

Following the data collection, the data was analysed following the process outlined by ten Have (2004) in Figure 4.2.

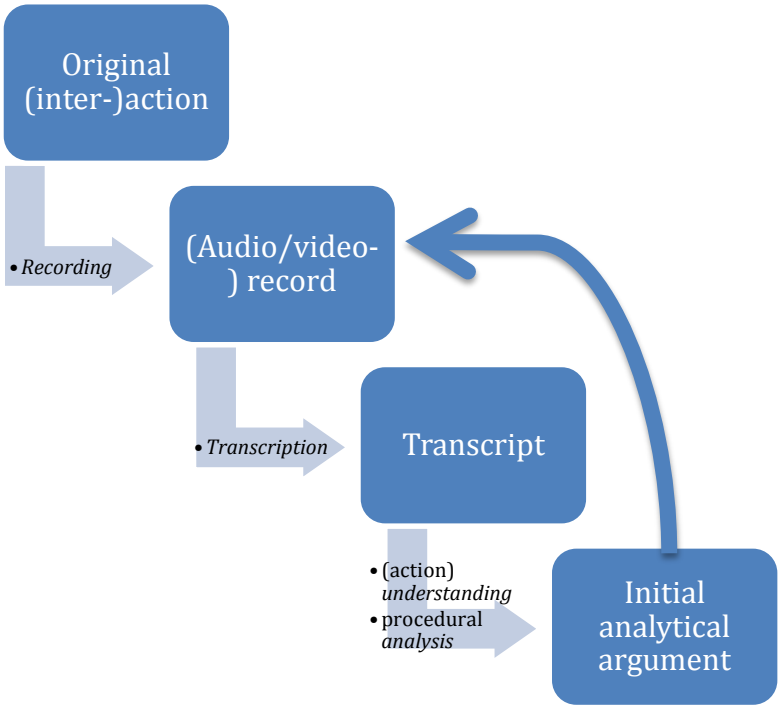


Figure 4.2 Schematic process illustrating the linear transcription process of CA and the generation of transcript data to allow further analysis.

As illustrated in Figure 4.2, the CA stepwise and cyclical analysis approach is inductive and is one that focuses on the collected data, whereby the researcher may cyclically immerse him- or herself in the recordings (Hepburn & Bolden, 2012; Mondada, 2012; Sidnell, 2012; ten Have, 2004). The cyclical process also encourages the researcher to always go back to the source audio/video-record and verify the transcribed data. Following this process, the CA researcher enters into a

cyclical bottom-up CA analysis process: transcribing, forming initial analytical argument, re-examining data, refining transcripts, and re-formulating analytical argument. In CA, the original recordings are also usually made available and accessible to other researchers and readers to be viewed and verified. This contributes greater objectivity, validity, and reliability in the treatment of valuable and hard-to-obtain field data.

During the data transcription and analysis process, CA encourages an *unmotivated looking* approach centred on repeated viewing of the data, while putting aside or examining one's preconceived notions of what should be seen (Filipi, 2014; Sacks, 1995). This process allows patterns to emerge from the data as the analyst becomes more familiar with the data set. This is critical in CA because the approach does not assume any pre-existing theories to be imposed on the interaction. Instead, as noted in Chapter 3, CA allows the analyst to examine *what* is happening in the interaction, *how* it is being done, and most importantly to ask the question of *why that now* about the data (Hepburn & Bolden, 2012; Sacks, 1995; Schegloff & Sacks, 1973; Sidnell, 2012). As a result, the CA analytical approach necessitates that the specific research questions be derived and be emergent as the analyst gains familiarity and better understanding of the data. Abiding by the precept of CA methodology, the research questions for this thesis are stated later in this chapter following the preliminary introduction of the data. Furthermore, it is expected that through this process I, the analyst, will be more able to develop an emic perspective[21] of the interaction as a member of the group who is both an anatomist and a laboratory demonstrator.

[21] That is the participants' perspectives in how they understand and make sense of the interaction.

The analysts' ability to understand the talk relies on the recipient-designed nature of their turns, which means that talk or actions are produced with the intention that others may understand them. Unlike other top-down approaches, the CA approach restores analysts and participants as social agents and provides a set of methods to explicate their knowledgeability of their own social actions and that of others (Boden, 1994; Heritage, 1984b). CA data-driven observations and the detailed transcription of the recordings, gives the analysts distance from their own potentially un-interrogated use of common sense to understand the social encounter as they immerse themselves within the data and the participants' perspectives (ten Have, 1990). Upon identifying a procedure or pattern of interaction, analysts check their perspective alignment to those of the participants based on the actions and responses demonstrated in the preceding and subsequent sequences. This constant looking for evidence in the actions of subsequent turns in the sequence is called *next-turn proof procedure*, and it empirically grounds and checks analysts' theoretical constructs within the observable data (Hutchby & Wooffitt, 2008; Sacks et al., 1974).

The ability of CA analysts to take up and understand the positions of others is not only supported by their own experiences and the fact that social interaction and actions are designed to be understood by others, but there is now emerging evidence from experimental social psychology and neuroscience which suggests that the brain is functionally social. More specifically, there is a particular developed part of the brain called the right temporal parietal junction (RTPJ) that is actively used in understanding other people's perspectives, thoughts, and minds (Saxe & Kanwisher, 2003; Saxe & Wexler, 2005; Scholz, Triantafyllou, Whitfield-Gabrieli, Brown, & Saxe, 2009; Young, Dodell-Feder, & Saxe, 2010). This neuroscience evidence supports the conversation analysts' ability to position themselves in the positions of

the observed participants. However, CA researchers do not derive claims about the participants' perspectives simply from their own understandings, the distinguishing characteristic of CA method is that it compels the analysts to ground their understanding of the perspectives within the empirically observable behaviour of participants. Without the RTPJ neuro-circuitry, the CA analyst will only be able to describe the visible social actions but not be able to understand and explain their observations of the interaction from the participants' perspectives.

Besides asking themselves the standard CA questions of 'what actions are produced' and 'why that now?', in order to achieve a critical perspective while using *unmotivated looking*, CA researchers have found it useful to conceptualise and see interaction as a series of interaction problems to solve (Filipi, 2014; Sacks, 1995). This helps to clarify the research questions and make the organisation of interaction more tangibly visible. Following the clarification of the interactional challenges that the participants have to resolve, in presenting this analysis the CA analysts employ rich descriptions of the context and a *next-turn proof* procedure (Hutchby & Wooffitt, 2008; Sacks et al., 1974). The next-turn proof procedure identifies a particular interactional move or utterance that the CA analyst is interested in and then provides an account explaining the participant's action. Then the analyst looks to the next-turn or reciprocated action or response to show how the participant's understanding and orientation aligns with the analyst's account. In doing so, analysts may provide multiple possible accounts to be validated by the next-turn, or at least to suggest a set of the most plausible explanations. This summarises the key analytical principles of CA. Next, the CA transcription process, conventions, and adjustments adopted for this thesis will be detailed with sample extracts from the transcripts.

4.5.1 CA Transcription

In CA, the recorded source data is transcribed by capturing the fine details of the interaction using a set of standardised CA coding notations first developed by Jefferson (1984) (See Appendix A for CA transcription used in this thesis). The system aims to capture verbatim how utterances are uttered by speakers and include ways to capture words that are cut-off, audible breathing, tongue clicks, pauses, etc. This may also include the minutiae of talk and gesture, including direction of eye gaze, orientation of the body, embodiment[22], and the use of tools (Filipi, 2009; C. Goodwin, 2000, 2013; Mondada, 2011; Nevile, 2015; Rendle-Short, 2006; Streeck, 2009). It is important to note that the use of curly brackets { to denote the onset of non-verbal transcription is modified in this investigation, and the non-verbal transcriptions are denoted by still-frames, as illustrated in Example 4-B (p. 152). Transcripts should always be read line by line, with words and actions to the right within each line and subsequently lines below to be assumed as forthcoming and unfolding to the participants of the interaction.

The transcription of the data was completed using Transana (Version 2.53). The use of Transana was essential because it allowed the analyst to remain close to the original data recordings by having inbuilt software capabilities for playback of various multimedia source data to facilitate transcription (e.g. slow down/speed up playback with various speed setting, and incremental rewinding or jumping ahead in the data segment to allow for more fine control of the video record for transcription). More importantly, the transcript could be 'time stamped' to the original data, which

[22] Embodiment refers to the way people's bodies shape and reflect aspects of their thinking and cognition and vice versa. This helps to make cognition visible, and it is different from orientation of the body, which refers specifically to how the body itself is physically positioned in space or in relation to one another.

links the transcript to a segment in the video record. This function helps to empirically ground the iterative analytical process within the data.

The CA transcription process in this thesis follows the established cyclical practice previously discussed, where transcripts are refined as understandings of the data deepened and the research questions emerged through many cycles of analysis (see Figure 4.2 p. 146). Example 4-A below depicts the opening verbal utterances from video record of S1W1L1 which shows 12 lines of verbal utterances that were initially transcribed using CA transcription annotations to initiate the first cycle of data analysis (see analysis of the transcript in Chapter 5).

Example 4-A (S1W1L1) Verbal CA transcript at the beginning of analysis. Refer to the video file of this data segment at https://dl.dropboxusercontent.com/u/88971137/Extract_5-I_S1W1L1_Demonstrator_Nadia_Laboratory_Introduction.mp4

```
(S)=unidentified student speaking;
SF#=Female student identified;
SM#=Male student identified, if no number then there is only one identified male
student present.
1     Nadia:  <hey guy::::s::> (.) u::m::: so I don't know if you guys
2             <all:: know: each other> pretty   [well:]::?
3     (S):    ((from off screen to the right))  [ya:  ]
4     Nadia:  sharp head turn to SF1
5     SF1:    [((nods head and gazes at demonstrator))
6      {nods head and looks at SF1 who increases frequency of nod
7     Nadia:  [ye::p,tsk•hhhhh
```

This extract exemplifies what an early transcript representing the video record looks like. As the analyses were written up, the verbal transcriptions were refined, and the necessary non-verbal features that coincided with the verbal utterances were transcribed in the line above the verbal utterances using { to indicate the onset of the non-verbal action first used by Filipi (2001, 2009). However, unlike traditional CA transcript that transcribe the non-verbals using word descriptions or symbols, in this thesis frame-grabs are used to capture the non-verbal features and to bring the analysis closer to the interaction being analysed. This approach was inspired by the

works of a number of authors who also use frame-grabs or stills in their data analysis (C. Goodwin, 2000, 2013; Koschmann et al., 2011; Rendle-Short, 2006; Stokoe et al., 2013). Where necessary, verbal descriptions were used in conjunction with the frame-grabs for better clarity, as can be seen in line 5 “sharp head turn to SF1” of Example 4-B.

Example 4-B (S1W1L1) Verbal and Non-Verbal CA transcription after several round of analysis. Refer to the video file of this data segment at https://dl.dropboxusercontent.com/u/88971137/Extract_5-I_S1W1L1_Demonstrator_Nadia_Laboratory_Introduction.mp4

```
(S)=unidentified student speaking;
SF#=Female student identified;
SM#=Male student identified, if no number then there is only one identified male
             student present.
```

Line 1 represents the non-verbals captured in the still-frame (picture) and transcription which co-occur with Nadia’s verbal utterance on line 2

```
1        {
             ((turns head right gaze scans students))
2     Nadia: {<hey guy::::s::> (.) u::m::: so I don't know if you guys
```

Line 3 represents the non-verbals which are circled for emphasis and co-occur with Nadia’s verbal utterance on

```
3            {
4            {<all:: know: each other> pretty  [well:]::?
5     (S):   ((from off screen to the right))  [ya:  ]
```

```
6     Nadia: {
      sharp
             head turn to SF1
7     SF1:   [((nods head and gazes at demonstrator))
8             {nods head and looks at SF1 who increases frequency of nod
9     Nadia: [{ye::p,
```

In many circumstances coloured circles and arrows (Refer to Example 4-B above) were also used to focus attention on non-verbal features of analytical interest in the frame-grabs. Arrows are used to denote gaze and its direction, or to denote directions of body movement. Note also the use of balloon labels (in solid blue line 1 of Example 4-B) to facilitate participant identification. In addition to the use of stills and symbols, non-verbal features are described and highlighted in the written analysis.

4.5.2 The Identification and Conglomeration of Interesting Data Using Transana and NVivo 10

In this thesis, each of the laboratory sessions was repeatedly viewed sequentially to develop a sense of the structure, organisation, and progression of pedagogical phases and activities. To begin the analysis, the video files were viewed and coded using NVivo 10. NVivo 10, like Transana, is software developed to facilitate qualitative data analysis. However, unlike Transana which has been developed specifically for data transcription, NVivo 10 acts more like an all encompassing data library system for cataloguing and sorting data of all formats, including researcher generated notes and transcription. One of the strengths in using NVivo 10 instead of Transana in the early stages of analysis was that NVivo 10 allowed for initial ‘coding’ (Or ‘nodes’ in NVivo language) of the video data segment, sorting them into different themes or categories without having to transcribe them. This allowed for more targeted transcription and workload management. Another strength of the NVivo 10 catalogue system is that once data segments are ‘coded’ all the data identified and labelled with the same ‘code’ become a ‘Node’ that conglomerates all the sources together. The ‘Nodes’ can be structured to reflect the analytical structure. Having all the coded segments pooled and readily identifiable helps the analyst to review and refine the

coding. Thus, NVivo 10 facilitated *unmotivated looking* (Filipi, 2014; Sacks, 1995), by allowing the analyst to begin identifying, coding, sorting, and conglomerating segments of the video without the need for a transcript (as in Transana). In this process, preliminary research questions were starting to be formulated based on the anatomy laboratory session recordings and allows the researcher to virtually manipulate theoretical conceptions emerging with increasing familiarity and understanding of the data.

After many cycles of transcription and analysis, the following research questions were developed, which were further refined by updating the literature reviews under the guidance of the data.

1. What are the key phases in the laboratory, and how and by whom is each initiated and closed?
2. How is interaction sequentially organised in the anatomy education laboratory?
3. How do anatomy laboratory participants locally manage and flexibly adapt practices to suit their immediate interactional needs and to achieve shared understanding?
4. How does asymmetry, affiliated with institutional membership and identities, emerge through epistemic practices and turn-taking, and how is it managed?

The purpose of the first research question was to determine whether there are patterns in the way students and demonstrators go about organising the sessions and the laboratory activities. Through repeated viewing of the data, it was determined that most anatomy laboratory sessions consisted of three general phases, an introductory phase, a table-talk phase, and a summary/conclusion phase (See Figure

4.3 p. 155). For this thesis, the focus will be on the introduction and table-talk phase. The summary/conclusion phases are important, but outside the scope of the present study. In order to identify the different pedagogical phases of the anatomy laboratory, the analyses examined the ways in which students and demonstrators were moving and positioning themselves around the laboratory space, the particular categories of activities that they were engaged in, and identifying particular actions to examine what caused the actions and what reactions followed. Research questions 2, 3, and 4 are targeted at explicating the micro-details of interaction and understanding the interaction from the participants' perspectives.

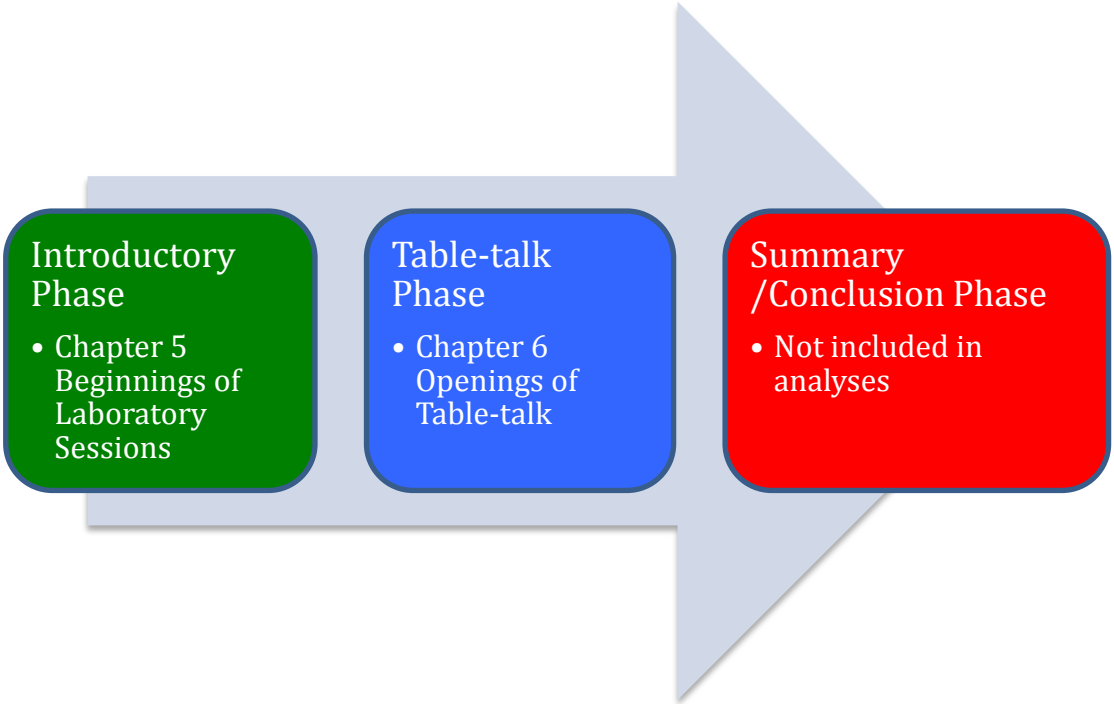


Figure 4.3 The three general phases of the anatomy learning laboratory session, which have been identified in this investigation.

Figure 4.3 summarises the three general phases of a typical anatomy laboratory session. The *introductory phase* orients and transitions demonstrators and students to the task of teaching and learning. The *table-talk phase* is where the majority of the teaching and learning activities take place. Finally, the *summary/conclusion phase*

typically occurs at the end the session, but due to insufficient data it will not be analysed in the present investigation.

Following the definition of general organisational phases, the interactions within the two phases of interest to this thesis were examined. The goal at this stage was to examine the organisation of interaction events particular to either the introductory phases or the table-talk phases. To examine the organisation of these events, NVivo 10 was again used to code for entire complete instances of interaction, where an interactional event might have begun and terminated. More specifically, the analyses focused on the demonstrator-student pedagogical interactions that were self-initiated or solicited by students. The development and termination of these interactions were tracked by looking for evidence that initiated or terminated interaction as displayed and oriented to in the verbal and non-verbal action of the participants. Special attention was given to the preceding and succeeding actions, with additional data coded at both the initiation and termination to demonstrate the completeness and accuracy of the analyst's interpretation. The coded interaction was viewed repeatedly and transcribed using CA conventions, and the specific research questions for each of the two phases were iteratively developed and refined in the process of assembling their respective chapters. At each stage, the original source data was viewed with the CA transcript and frame-grabs of the non-verbal actions made in the process of writing up the analysis.

Before continuing, it is important that we clarify the terms *opening* and *introductory phase* which are important for the data chapter. In CA the term *opening* is often used to describe actions and sequences at the beginning of conversations (Schegloff, 1968), but the term has also been used to describe the start of particular sequential organisation interactional sequences that achieve pragmatic functions such

as *opening up closings* (Schegloff & Sacks, 1973). In the education instructional setting *opening* or the term *beginning* have been used to describe sequences at the beginning of instruction to set agenda (Benwell & Stokoe, 2002; Sinclair & Coulthard, 1975) or at task beginnings (Hellermann, 2007; Mortensen, 2009). All in all, *opening* is generally used to describe sequences and actions that allow interactants to go from a state of co-presence to interacting, and this shall be the definition for the thesis. This is different from the *introductory phase* because *opening*s are only a part of the interactions that can occur in the introductory phase, and to avoid confusion the definition of *introductory phase* was based upon the macroscopic pedagogical organisation and progression of laboratory sessions. Thus, in this thesis the *tutorial opening* described in Benwell and Stokoe (2002), which involves agenda and identity negotiations, is equivalent to the *introductory phase* which has its own complete set of interaction with *opening(s)* and *closing(s).* Accordingly, the definition of *opening* may be reserved to describe the specific set of interactional sequences that allow participants to initiate interaction with one another.

4.5.3 Recommendations for Reading the Transcripts and Watching the Original Video Records

At this point, it becomes relevant to clarify how to approach the data and transcripts that will be analysed in the data chapters (5 and 6). The data segments, which are analysed in Chapters 5 and 6, are organised under *Extracts*, and for each extract there is an associated short video file representing the data transcribed in the extract. It is recommended that readers first access and view the video files using the internet address provided in the descriptive title of each extract. After viewing the full video for each extract, the reader may wish to read through the full transcript of the video segment while watching the video before reading the detailed CA analysis of each

segment of the full transcript. Note, when reading the transcripts please keep in mind the relationship of the non-verbal and verbal lines which are highlighted in Example 4-B (p. 152) using a red rectangle and explanations in red coloured font (lines 1–2), and an orange rectangle with explanations in orange coloured fonts (lines 3–4).

4.5.4 Summary

Thus far, this chapter has explained in detail the research design for this investigation. It has described the institutional context from which the data was collected, and it has discussed how the participant characteristics, and the curriculum characteristics provided additional research potential to examine and understand how these characteristics may contribute to the interaction under investigation. The details of the CA data collection, transcription, and analytical process have been discussed leading to the stating of four research questions regarding the organisation of anatomy laboratory interaction and the resources that participants draw upon to co-construct, understand, and manage their social action.

4.6 General Summary and Description of the Data

In preparation for the data chapters, the general interactional characteristics and observations of the video records forming the *primary corpus* will now be briefly discussed starting with its inherent limitations and how they have influenced the CA data analysis. Leading into the data chapter is a general description of the characteristics of the data from the primary corpus.

4.6.1 Specific Notes, Challenges, and Limitations of the Recorded Data

To begin, generally each of the anatomy laboratory sessions video-recorded were one hour long and overseen by two medically-qualified demonstrators. However, six video records only totalled 234 minutes (3.9 hours) of video-recorded data. This was

due to errors and mis-communications with the technician to conduct continuous recording, as discussed earlier. See Table 4-2 (p. 142) presented earlier for details of observation recording time points and their duration. More critically, the data set only captured three more or less complete formal laboratory introductory phases out of the six sessions recorded. These introductions were obtained from the following sessions: S1W1L1, S1W2L2, and S2W7L4. In the three initial recorded-observations (*i.e.* S1W1L1, S1W2L2 and S1W5L4), the microphone was attached to the demonstrator and the professional video-recording technician was instructed to follow the demonstrator. The assumption was that the demonstrators would normally have stayed in close proximity to their supervised group of 15 students. In S1W1L1, it was more or less true, however, there were unforeseen circumstances in S1W2L2 where the absence of two other demonstrators meant that only one demonstrator was available to look after the anatomy laboratory session with 30 students. Meanwhile, the other demonstrator looked after the anatomy tutorials that were simultaneously occurring.

By S1W9L7, it became clear that the recorded footage was not sufficient to give a good overall picture of all the interaction occurring in the learning space. From Semester 1, there was no available interaction data among students in the absence of the demonstrators. Subsequently, starting with S1W9L7, the camera perspective shifted to the students, and significant changes were made to the recording protocol. It should also be noted that due to a series of unfortunate and unforeseen circumstances with scheduling, equipment, and communication, the S1W9L7 data recording lost all the audio recordings and that two of three additional camera recordings were irrecoverably deleted by accident by the video-recording technician.

In Semester 2, three wireless microphones were set up and attached to three student participants. The additional cameras were set up to be more or less stationary to cover the largest area possible. In addition, recruiting additional voluntary video-recording staff created an ideal two-person recording crew that ensured that recording equipment was optimally set up and relocated to maintain focus on the student participants. The new recording set-up gave a more holistic view of the laboratory space and the activities occurring in the anatomy laboratory sessions. Using the different recording procedure for Semester 2, the professional video technician was employed only for the post-recording processing of the video footage. The technician combined and synchronised the three camera footages into one convenient video file for viewing and transcription (See Example 4-C below).

Example 4-C (S2W2L1) [6:39] demonstrator Dan selecting individual vertebrae to introduce to students at the table. Refer to the video file of this data segment at https://dl.dropboxusercontent.com/u/88971137/Extract_6-IV_S2W2L1_6-39_Demonstrator_Dan_DeliveringResources.mp4

```
1            {
2     SF1:   {cuz I (ha:::nd) >not that I would do things that didn't (do ba[::d  ]<
3     SM:                                                                  [>hey<]=
4     SM1:   =>hey (sares) ((Sara)) are you'd< stay:: >in today:'s< class
```

```
5            {
6            {<six::: something six:::?>
```

Due to the many technical difficulties and challenges encountered in the data collection process, it was not possible to illustrate all aspects of the introductory phase and table-talk phase for each of the laboratory sessions recorded. Instead, the analysis of the laboratory sessions will focus on using the available data sample fragment to illustrate the social interaction dimensions of anatomy laboratory pedagogy.

This limitation is important to be mentioned here because this significantly limits the analysis of table-talk interaction to a predominantly teacher-student pedagogical perspective. It is acknowledged here that the study of student-peer interaction in the university education instructional context, where students are not only expected to but are often found to be doing self-guided learning, is critical to understanding university pedagogy. However, in the present corpus there are only two data recording sessions from the second semester where the student-peer interaction perspective is prominently featured. The limitation in the present data set to shed light on student-peer perspective for data collected from Semester 1 may hopefully be addressed by future investigations.

4.6.2 General Observations and Interactional Characteristics of Anatomy Laboratory

Unlike typical anatomy laboratories where one is likely to find everyone wearing a laboratory coat, for most of the sessions recorded here students were all casually dressed. Even the demonstrators were occasionally casually dressed. However, it is important to note here that for occupational health and safety reasons, the four large tables in the centre of the laboratory space were specially reserved for wet specimens, that is, any human remains not contained in a jar excluding those that have not undergone further processing (e.g. plastination) to make them safe for

handling without gloves. When such specimens are made available for specific sessions, students are expected to wear a laboratory coat and comply with university laboratory safety protocols such as no open-toed or open-heeled footwear. This can be unlike other anatomy laboratories, where students must wear laboratory coats at all times while they are in the laboratory.

In terms of the physical space, in Semester 1, students often flowed between the central learning area and the peripheral learning zones. The students' movements were dependent on their progression in their laboratory workbook and the location of the learning resources that would help them complete the activities. Demonstrators moved around the laboratory to ensure that they were available to help students in need. It was not always clear whether the demonstrators had arranged specific areas or groups of students that they were responsible for, but it was rare to find two demonstrators in the same general area of the laboratory.

In Semester 2, the focal point seemed to have switched around. This is likely due to changing laboratory logistics and circumstances. Half of the large tables in the central area (See Figure 4.1) needed to remain free so that the laboratory technician could set up for a following laboratory session. To accommodate this, three sets of the same learning resource were placed on each of the long rectangular tables located in each of the three learning zones around the periphery. This effectively made the laboratory space more passive and confined in terms of student movements as students started their laboratory learning session sitting with their demonstrator at their respective tables around the periphery. It was observed that with this new laboratory protocol and configuration in Semester 2, students generally remained at their respective tables and seats working with the available resources there until it was their turn to use the shared resources at the two central tables. At which point,

the demonstrator would be responsible for bringing his/her students over to show and study the shared resources at the centre of the laboratory together.

Besides significantly fewer movements of students around the laboratory, the students also tended to work while remaining seated at one of the large tables around the periphery of the laboratory. As a result, students were physically closer to one another and thus were more exposed and able to hear one another's conversations. Interestingly, this appears to have fostered more group cohesion and seemingly made social interaction easier between individual students. Certainly, in Semester 2 it felt as if the students transitioned from co-presence to interaction very spontaneously with students switching and joining various conversations around them. However, the new social dynamic made the identification and analysis of smaller learning team configurations more difficult because everyone was working around the same table. The changed social configurations meant the laboratory participants could develop new interaction patterns and practices. Nevertheless, if one followed the conversation and studied the interaction it became obvious that there were in fact multiple small teams being formed around this one table, with multiple concurrent conversations. In the laboratory configuration of Semester 2, students' participation within a conversation or opening an interaction happened much more fluidly. It was almost as if by the close proximity every one could easily flow in or out of any given interaction and conversation. Having described the general 'feel' of the anatomy laboratory sessions recorded, the discussion will now begin to focus on the organisation of the laboratory session and the interaction to be detailed in Chapters 5 and 6.

Interaction in the introduction and table-talk phases of the anatomy laboratory sessions is the focus of data analysis presented in Chapters 5 and 6 respectively. The

introductory phases of anatomy laboratories featured students and demonstrators arriving at the anatomy laboratory space, engaging in general greetings and chatting with peers, updating and discussing matters relevant to the conduct of the laboratory session (demonstrators), and engaging in various forms of preparation activities (e.g. laying out materials and resources, taking up a spot around the laboratory, forming working teams, etc.). These introductory phases strongly feature organisational activities which may or may not include an extended segment of instructional talk from the demonstrator concerning the activities and processes of the laboratory session. Furthermore, interaction in the introductory phases helps students and demonstrators transition into conducting the teaching-learning interaction and activities, but the length and form of the introductory phase may vary depending on the perceived needs and requirements of both the students and demonstrators.

The introductory phases were usually found to be succeeded by the table-talk phases in the anatomy laboratory sessions recorded. The table-talk phases feature students and demonstrators becoming engaged in the planned laboratory activities, or other social activities with each other or their peers. In this phase, demonstrators were often found to be intermittently engaged with individual students or small groups offering assistance, engaging in various forms of small talk, or various forms of student management. The students in this phase were found to be either working on the activities by themselves or in groups depending on the situation and activities, but they were also engaged in off-task behaviour with varying degrees of relatedness to the learning activities of the laboratory session. The table-talk phase of anatomy laboratory sessions often ended with time running out for the hour-long sessions, which were often signalled by students packing up to leave for their anatomy tutorial session. Alternatively, the phase was sometimes wrapped up with a formal

summary/conclusion phase initiated and led by the demonstrator in charge of the group. The boundaries and precise moments for the shifts from one phase to another were difficult to define precisely. Occasionally, there were defining moments but most of the time shifts were more gradual and based on general activities.

This concludes the methods section. Next, Chapters 5 and 6 of the data analysis and discussion section presents the CA analysis of participants' pedagogical interaction in the introduction and table-talk phases respectively.

Chapter 5 Dissecting the Introductory Phase: Demonstrators and Students Doing Laboratory Introductions

5.1 Introduction

As stated previously, anatomy learning laboratories like other formal education institutional settings, such as classrooms, tutorials, and science learning laboratories, share a common goal of bringing students and demonstrators together to learn. Social interaction is the central phenomenon of such face-to-face teaching and learning. Yet the review of existing anatomy laboratory pedagogy literature has shown there to be a paucity of research that adopts an interactional perspective to investigate teaching and learning. In contrast, in the 50 years of CA research dedicated to studying interaction, CA researchers have identified important features of interactional organisation (e.g. turn-taking organisation, sequential organisation, and epistemics); made progress in understanding interaction as multimodal and laminated social actions; and described sequencing regularities in the structure of talk-in interaction and in educational contexts. More importantly, CA researchers have shown that social interaction in the university context is an under-investigated phenomenon.

The university anatomy laboratory learning context thus provides an interesting opportunity to examine the features and organisations of interaction which hitherto has been unexplored from a CA perspective. Furthermore, the anatomy laboratory context (with its own pedagogical approaches, physical facilities, and instructional resources) inevitably fosters context-specific social dynamics and interaction that provide new opportunities to examine how different interactional structures and features are augmented and oriented to by participants to suit their interactional needs and to facilitate a co-constructed ‘common-sense’ understanding of their laboratory social activities.

This chapter is the first of two data chapters that will explore the social dynamics and interaction that characterise the anatomy learning laboratory. Specifically, this chapter aims to examine the interactional organisation of anatomy laboratory introductory phases in terms of how the created interactional space facilitates participants' transition into the joint task of learning anatomy. Guided by the research questions explicated in Chapter 4, data analyses will demonstrate how and by whom the introductory phases are initiated and closed; how interaction in this phase is sequentially organised; and how each instance of interaction is locally managed from moment-to-moment to suit a variety of different purposes. A key focus of the analysis will be to examine how radiography students and demonstrators establish and orient to membership categorisation and how this is consequential for the sequential organisation of talk-in-interaction in the laboratory introductory phase. The analysis reveals the role of epistemics in establishing the flow of interaction and its relationship to participants' roles and identities. Altogether, the data being examined uncovers the budding formation of a *community of practice* in which the participants exhibit to different degrees their "…mutual engagement, joint enterprise, shared repertoire, reification and participation and economies of meaning." (Hellermann, 2008, p. 9). In addition, as participants interact in the laboratory they co-construct, manage, and renew the micro-culture of their community of practice.

Structurally, the chapter is divided into three sections. The first section describes the analytical focus whereby the analyst conceptualises the interaction of participants in the introductory phases as a series of interactional problems to solve (Filipi, 2014; Sacks, 1995). Based on the analyses of data, a sequential and structural framework of the introductory phase is presented. This framework provides the backbone for the

data analyses and in the second section three different extracts of the introductory phase are presented, analysed, and discussed in chronological order:

- Extract 5-I in Section 5.3.1 shows demonstrator Nadia managing the first encounter between demonstrator and students in Week 1
- Extract 5-II in Section 5.3.2 shows demonstrator Pete managing the introductory phase for the entire laboratory with an absent demonstrator in Week 2; and
- Extract 5-III in Section 5.3.3 shows demonstrator Lucy managing a quick transition to the laboratory table-talk phase in Week 5.

Each of the extracts highlights the changing context-sensitive characteristics of interaction in the laboratory introductory phases. The last section of the chapter concludes with a general discussion and summary of the findings.

5.2 Analytical Focus: Openings

The introductory phases of anatomy laboratory sessions are analytically interesting because as previously mentioned the context of the anatomy laboratory recordings could be regarded as a *differential of novice experience* for both students and demonstrators. The former (student participants) were undergoing a transition from the traditional classroom setting of secondary education to the lecture based self-directed learning model of university education. The latter (demonstrator participants) who are all medical practitioners, could be considered to be experienced users of anatomy knowledge, and are likely to be experienced users of the anatomy laboratory given their medical undergraduate training, but have had either no or very little experience in teaching in such a setting[23]. Thus, as will be shown in the

[23] Prior to the commencement of teaching anatomy demonstrators take part in an orientation day where they are familiarised with the curriculum and content structure of the courses they will be

analysis, in this situation students and demonstrators draw upon their respective previous relevant classroom and/or anatomy laboratory experiences to navigate and co-construct the learning, as reflected in the sequence organisation of the interaction. Given their respective inexperience of anatomy learning/teaching, the analysis will also examine how differential epistemic statuses and stances become displayed and attached to participants' emerging identities.

Similar to openings of everyday conversations, those in the anatomy laboratory are also regularly co-constructed by participants in their talk because such openings allow participants to shift from a state of independent non-interacting physical co-presence to a state of collaborative interaction (Hellermann, 2007). Therefore, it is important to examine the different purposes that opening sequences achieve in the anatomy laboratory introductory phases and to track any observable patterns of regularities. Thus, the chapter will demonstrate that participants regularly display and engage in a variety of different actions which develop, sustain and terminate 'instances of interaction'. More importantly, these participant-displayed actions follow implicit rules and possess regularities which have become apparent and observable in participants' orientation to them through the repeated viewing of laboratory introductions with "unmotivated attention" (Sacks, 1995).

Before continuing the discussion on the approach to analysing laboratory introductory phases, it should be noted that the participant interactions being examined varied widely in their length and complexity. Some consisted of few utterances lasting only a few seconds (e.g. Example 5-A) while others were extended instructions that lasted for several minutes or more. Therefore, it was initially difficult to determine where one complete instance of the laboratory introductory

---

teaching. They also receive a one-hour workshop called "Teaching on the Run" provided by the anatomy department at the research site.

phase began and ended, but through repeated viewing and developing familiarity with the data the boundaries became more clearly delineated. Nevertheless, there is not a single precise moment that defines the opening or closing of introductory phases, rather in most of the data there is a gradual shift instead of a clear boundary.

Example 5-A (S1W4L4) [00:20] An example of a very short opening interaction in the introductory phase of the anatomy laboratory between demonstrator Pete and his students. Please watch the video file of this data segment available at https://dl.dropboxusercontent.com/u/88971137/Example_5-A_S1W4L4_00-20_Demonstrator_Pete_Short_Introduction.mp4

```
13                          {
14    Pete:   so you        {draw on each o::ther::
```

```
15                  {
16                  {(            ) two per group
```

```
17              {
18              {(1.2) ((tutor organising pens on table))
19    Pete:     (ready o::)
20    Lucy:         (     )
21    ((Recording Cut Out))
```

In the analyses of interaction in the introductory phases, C. Goodwin's (2013) conception of interaction as multimodal and as composed of multiple laminated layers will be adopted. In adopting such a view the analysis will tease apart the layers of interactional resources used by the participants, which may include social relationships, grammatical structures, gestures, physical positioning in space, other

participant responses, etc. However, the analyses will focus upon the layers and resources that are oriented to by the participants, which are part of the *taken for granted* common sense understandings that participants draw upon to comprehend one another's social actions. Thus, participants themselves act as *spotlights* to help identify the actions relevant for analysis, based on what becomes prevalent and relevant to the participants themselves (C. Goodwin, 2000).

5.2.1 Conceptualising Interaction as Problem for Participants to Resolve in the Earlier Parts of Anatomy Laboratory Sessions

Besides conceptualising social actions as possessing and comprising multimodal and laminated layers, Sacks' (1995) conceptualisation of *interaction as a series of problems* that the participants need to resolve provides both a useful and tenable approach to the analysis of anatomy laboratory openings. Participants at the very beginning of anatomy laboratory sessions confront a series of interactional problems as they interact with one another. The first problem concerns establishing co-presence and demonstrating recipiency in readiness for formally starting the laboratory session. The second problem concerns how participants organise, manage, and communicate their transitions from the introductory phase to the table-talk phase (discussed in Chapter 4), where the principal work of learning takes place. The difficulty and challenges of these problems can vary significantly depending on a number of socio-cultural and temporal factors, such as at what time point during the semester is this session taking place, at what time point during the anatomy laboratory introductory phase are the participants arriving (i.e. early, on time, and late), what activities are being conducted, how groups are being formed, what different roles are being assigned or made relevant, etc. More importantly, in the opening of the anatomy laboratory sessions demonstrators must ensure that students

know what they need to accomplish, how they will accomplish it, and that the tasks will be completed in a timely manner in order to accomplish the laboratory aims. As such, the introductory phases play a significant role in the processes of reifying or making real the intended laboratory curriculum, which influences the quality of learning. The analysis in the following section will illustrate the context sensitivity of the problems and demonstrate how participants manage, resolve, and co-ordinate their interaction. Before presenting the analysis, Section 5.2.2 will briefly summarise the findings to provide a general orientation.

5.2.2 Summary of the Findings: Laboratory Session Opening Sequences-Finding a Structure of Regularities

In examining the data of the seven laboratory sessions, there are noticeable modifications in how the sessions are conducted as the content and activities are changed; however, there is a developing regularity in how students engage with the demonstrators. The most obvious emerging structures are the sets of instructions and directions from the demonstrators, and students' orientation to them. Demonstrators and students co-operatively construct and orient to regular stages in their interaction. These stages are illustrated in Figure 5.1 (p. 173). It is important to note here that these stages may be highly variable in their length, from a few lines (as in Example 5-A p. 170) to longer sequences of instructions (as in Extract 5-II p. 198, which will be analysed later). They can also vary in their format, from a monologue-like format to a more conversational exchange determined locally.

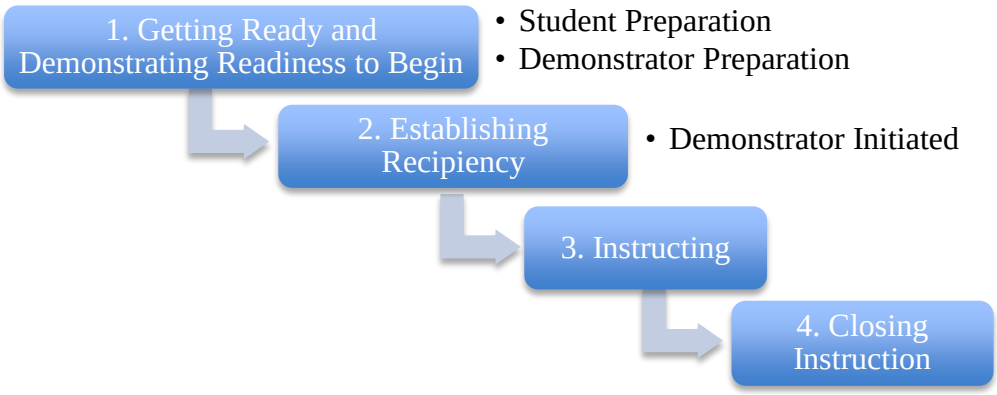


Figure 5.1 Sequential organisation of the anatomy laboratory introduction

Unlike previous models (Benwell & Stokoe, 2002; Sinclair & Coulthard, 1975; Stokoe, 2000), that emphasise a three-part construction of:

a) future projection

b) contextual details delimiting/justifying the task, and

c) orientation to immediate next task

The sequential organisation of anatomy laboratory demonstrator formal introductions showing greater variability. More importantly, the data will show the significant embodied interaction involved in this phase.

The four stages will be briefly discussed. The first stage, *Getting Ready and Demonstrating Readiness to Begin* (See Figure 5.1 p. 173), occurs prior to the formal introductions of the anatomy laboratory sessions, which are initiated by the demonstrators. This stage begins when demonstrators and students physically arrive at the laboratory, and begin their respective preparations for the commencement of the session. Recordings and personal observations of the first stage (*Getting Ready and Demonstrating Readiness to Begin*) show students and demonstrators engaging in a variety of activities, such as chatting with their peers, organising learning resources or studying the laboratory manual. Some of these activities are captured in the data recorded, but clearly missing from the recordings is how the participants

arrive and enter the laboratory. Although not shown in the recordings, after arriving in the laboratory students first put their bags and personal belongings away in the cubicles available in the hallway of the laboratory. Before returning to the main laboratory students gather their materials (e.g. writing instruments and laboratory manual) and pull on their laboratory coats (if needed). However, the data recordings in this corpus all generally start with students having already taken up their post around the demonstrator or with demonstrator instructions already underway.

The second stage is *Establishing Recipiency* (See Figure 5.1 p. 173). It is up to the demonstrator to formally open the laboratory session by verbally soliciting students' attention. This is done once most of the preparation work has been completed and students and demonstrators have mutually demonstrated and physically oriented to each other's co-presence and readiness to begin. The solicitation from the demonstrator sits at the interface of two stages, which are *Getting Ready and Demonstrating an Orientation to Readiness to Begin* and *Instructing* (See Figure 5.1 p. 173). As analyses will demonstrate, at this juncture demonstrators become critical agents in signalling the change in their activities that leads everyone into the *Instructing* stage of the introductory phase. The demonstrator's signals function to establish recipiency, and once this has been accomplished with students oriented to his/her signal then the opening transitions to the *Instructing* stage or third stage.

This stage can be said to begin immediately after the attention of students has been established (See Figure 5.1 p. 173). Whilst there are significant variations in the organisation of this stage of the introductory phase, it is the demonstrator who initiates it. It is also at this stage that the demonstrator's agenda, purpose, and function of an introduction become apparent through the ways in which s/he structure

and produce the utterances once they gain the students' attention. During this stage, the tendencies are for the demonstrators to continue their dominant speakership role as they describe and outline the laboratory activities that will take place.

The final stage of the introduction is the *Instruction Wrap-Up/Closing*. In this stage, the demonstrator begins to signal an imminent end to his/her instruction via the content, prosody, speech speed, volume, and/or use of discourse markers. However, the boundaries of this stage become difficult to determine because closing can be opened up by students; this again shows the local contingencies that bear on the sequential organisation of the stages for laboratory introductory phases. As such the 'instruction wrap-up/closing' is again a co-constructive element of interaction.

It is important to understand that the boundaries of these stages are far from being clearly defined, and that there is a gradual shift of topicality which reflects those observed for conversation in university settings (Benwell & Stokoe, 2005; Stokoe, 2000; Stokoe et al., 2013). One of the reasons for this is the co-constructed nature of interaction. Nevertheless, there are other reasons that are associated with asymmetries relating to membership identity categories and agenda setting.

5.3 Anatomy Laboratory Introductory Phases as Series of Problems to Solve

The following analyses include three extracts. The extracts were selected from anatomy laboratory sessions observed in Semester 1, and they represent Sessions 1 (Extract 5-I), 2 (Extract 5-II), and 4 (Extract 5-III) respectively. The extracts are presented chronologically, starting with the analysis of an extract from Semester 1 Week 1 Laboratory Session 1 (S1W1L1). This chronologically ordered presentation best illustrates the developing temporal context in which the introductory phases reside, and it demonstrates the developing practices of how introductory phases are

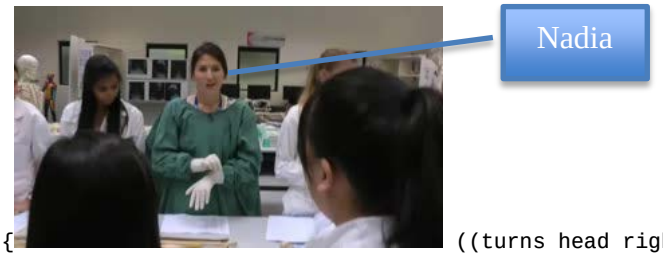
achieved in the anatomy laboratory community of practice. The analysis of each extract is preceded with the full transcript that is to be analysed before a specific examination of selected segments representing different stages of the introductory phase previously summarised. As discussed in Chapter 4, it is highly recommended that prior to reading the analyses readers watch the original video segments available via the video file link in the descriptive title of each extract.

5.3.1 S1W1L1 Demonstrator Nadia Building Rapport with Students (Extract 5-I)

This is the first anatomy laboratory session, for both students and demonstrator. In these extracts, the recording focuses primarily on the demonstrator, Nadia.

Extract 5-I (S1W1L1) The laboratory introductory phase between demonstrator Nadia and her students in her first meeting with students where they conduct self-introductions and build rapport. Please watch the video file of this data segment available at https://dl.dropboxusercontent.com/u/88971137/Extract_5-I_S1W1L1_Demonstrator_Nadia_Laboratory_Introduction.mp4

```
(S/SF/SM)=unidentified student speaking; ‘F’ denotes female; and ‘M’ denotes male
SF#=Female student identified
SM#=Male student identified
```




```
1            {                                  ((turns head right gaze scans
students))
2     Nadia:  {<hey guy::::s::> (.) u::m::: so i don't know if you guys
```

```
3            {
4            {<all:: know: each other> pretty  [well:]::?
5     (S):    ((from off screen to the right))  [ya:  ]
```

6 Nadia: {
sharp head turn to SF1
7 SF1: [((nods head and gazes at demonstrator))
8 {nods head and looks at SF1 who increases frequency of nod
9 Nadia: [{ye::p,

10 {

11 tsk•hhhhh {>>if we can just go quickly around so i can get to know you guys a little bit=

12 {
13 =so {my name is Nadia i'm one of the doctors at the royal hospital
14 .hhhhh uh:::m:: and i am going to be doing=

15 {
16 ={anatomy and radiology tutorials for the next three MONTHs::

17 {
18 Nadia: {what year are you guys in?
19 SF1: [°firs::t:°]

20 (S): [>firs::t<]
21 {nods head
22 Nadia: {first yea::r (.) awesome=

23 {left hand shake side to side {gaze jump from student to student to right
24 ={>so have you done much<
{anatomy at all::::?
25 (SM): [ya::.]

26 {students' awkward expression
27 SF1: [(too much] {thi Hhh s(hhh)week hhhh)

28 {
29 Nadia: {s::wee::::t >

30 { {

31 {so yu gonna be {<pro::::s: >=

```
32              {
33      Nadia:  {=>alright<=if yu can go around tell me yur name:   [::e        ]
34      SF2:                                                        [°>yep<°    ]=
35      SF2:    =um::: Natalia
36      Nadia:  NATAlia awe::some:
```

```
37      Nadia:  {
38      (SF):   {NAn:cy
```

5.3.1.1 Demonstrating readiness to begin, establishing co-presence and recipiency: Membership categorisations and embodied practices of demonstrator and students

The recording starts with students having already taken up their position around one of the large rectangular tables in the centre of the laboratory (Refer to layout of laboratory in Figure 4.1on Page 136 of Chapter 4-Methods) with their materials laid out in front of them. Nadia stands among the students in her green surgical gown on one of the long sides of the table, her laboratory manual and notes are laid out in front of her. Her hair is tied back in a pony-tail and she wears white latex gloves that crimp the loose wrist collars of her surgical gown. She adjusts her latex gloves as she begins to address the students.

```
1               {                ((turns head right gaze scans
                students))
2       Nadia:  {<hey guy::::s::> (.) u::m::: so i don't know if you guys
```

```
3            {_
4            {<all:: know: each other> pretty  [well:]::?
```

At the beginning of the recording in the above segment of the transcript, Nadia and her students display their own embodied readiness as well as their orientation to each other's readiness. They are demonstrating their readiness to begin and have established physical co-presence, but have yet to establish recipiency.

The first step in the analytical process is an evaluation of how Nadia and her students display and demonstrate their readiness to begin. From the students' perspective, this is demonstrated by students having their materials (such as writing instruments and laboratory manuals) ready in front of them and by keeping their chatter to a minimum. As well, it is evident in their gaze and bodily orientation towards the centre of the table where Nadia is standing; strong indicators that they are ready to engage and participate (frame-grab of line 1) (C. Goodwin, 1980, 2000, 2007; Rae, 2001). As for Nadia, as previously described she displays her readiness through her central positioning, body orientation, and displays of culture-laden objects (such as clothing, writing instruments, and laboratory manual). The sequential positioning of these multimodal actions are significant because they are positioned prior to the opening verbal utterance (pre-opening/beginning) (Mortensen, 2009; Schegloff, 1968) and echo previous findings that showed the importance of mutual orientation between co-present participants as a pre-requisite for talk to emerge (C. Goodwin, 1980, 2000, 2007; Mondada, 2007; Mortensen, 2009; Rae, 2001). However, despite the students' general body orientations towards the centre of the table, their heads and gaze are not necessarily oriented towards Nadia (line 3).

These displays signal that while co-presence has been established, the establishment of co-attention needed to formally begin the anatomy laboratory session has yet to take place.

The anatomy learning laboratory being an education institutional context, to a certain degree, compels the demonstrator to initiate (Benwell, 1999; Benwell & Stokoe, 2002, 2005); therefore, further work and action are required to move from this state of co-presence towards establishing recipiency. It is up to the demonstrator, Nadia, to initiate which she does in line 2 by saying, "<hey guy::::s::> (.)…" uttered just as she finishes adjusting her latex gloves and turns her head and gaze to her right. In this pre-beginning/pre-opening position, Nadia's utterance functions as an *attentional* which sets up the attention needed for her ensuing talk (Mortensen, 2009; Schegloff, 1968, 2007a). Following this, a transition relevant space (TRS) is created as Nadia begins her scanning of the students surrounding her to establish gaze and consolidate their participation framework (C. Goodwin, 1980, 1981). Such spaces as pauses frequently occur in the pre-opening sequences as participants endeavour to establish co-recipiency (C. Goodwin, 1980; Mortensen, 2009). This space is quickly filled by Nadia with an elongated "u::m:::", which allows her to hold the floor and indicates that she intends to continue talking (Rendle-Short, 2006; Roberts et al., 2015). *Um* is also commonly used to mark the beginning of a new topic or a shift in topic in academic monologues (Rendle-Short, 2006). Noteworthy are Nadia's head-turning and gazing signals to draw attention from her students (C. Goodwin, 1980, 2000; Mondada, 2007), which create a laminated turn and action for establishing recipiency composed of both a physical embodiment and a verbal utterance (C. Goodwin, 2013).

What is noteworthy following Nadia's solicitation is the limited amount of body orientation displayed by the students immediately to her left and right (line 3). It is noteworthy because interaction generally occurs in adjacency pairs (Roberts et al., 2015; Schegloff, 2007a; Schegloff & Sacks, 1973), which in this situation means that Nadia has produced a summons (the first-pair-part) that demands a corresponding (verbal or non-verbal) response in the second-pair-part (Schegloff, 1968; Stivers & Rossano, 2010). Yet despite their proximity, the students appear to be distracted in the frame-grabs of lines 1 and 3, even after Nadia solicits their attention with her utterance in lines 2 and 4. Nevertheless, Nadia appears to have gained sufficient embodied response from students off-screen to her right, so she continues with her utterance.

In terms of her embodied practice, Nadia stands among the students in close proximity. By being in such close proximity, she is then able to use a slow and clear voice with elongated syllables as she engages with students. Nadia is also smiling as she completes her attentional, "<hey guy::::s::>". All these features help to establish a positive environment that invites interaction and are appropriate in an introductory or first encounter. These interactional features also characterise Nadia's approach to build an engaging relationship with her students that invites their participation and input.

The unfolding interaction between Nadia and her students also depend on mutual orientation to institutional membership categories of demonstrator and student, and more importantly, how participants act and make relevant these identity categories into and out of being by doing 'being' a demonstrator/student. For example, Nadia assumes the role of a demonstrator by initiating interaction and taking on the responsibility to approach and engage with her students. Whereas

Nadia's students to varying degrees assume their roles as being a student by responding or not responding (verbally/non-verbally) to Nadia's attempt to build participation and engagement. Previous CA research has interpreted similar interaction behaviour as students demonstrating resistance to their academic identity (Benwell & Stokoe, 2002, 2005; Stokoe et al., 2013). However, such interaction behaviour may be more appropriately interpreted as non-engagement or disengagement from the ongoing *demonstrator-student group* talk.

There are other noticeable features that help to establish or define the encounter as belonging to a particular educational or institutional context, which in turn contributes to the different membership categories. For example, Nadia is wearing a green surgical gown and latex gloves, in contrast to the students' white laboratory coats. The dress code provides a means for marking the different institutional social status of the demonstrators and students. It is very likely that the students in this first initial session of the laboratory, where they have never met any of the demonstrators before, are able to orient to the role differences based on this distinction in dress[24]. Therefore, the above analyses shows how membership categorisation may already begin to contribute to participants' interaction in the opening of interaction in the introductory phase, as has been previously noted by Benwell and Stokoe (2002, 2005).

In this first extract participants need to resolve the interactional problem of how to establish recipiency in a first laboratory encounter, where the demonstrators had not been formally, or formerly, introduced to the students by the subject coordinator. Using the CA analytical conventions, it has been shown how demonstrators and

[24] Although dress can be one marker of role differentiation, another physically observable features might be relative age based on physical appearances, or as will be seen later, embodied category displays such as standing taller or a commanding presence. Alternatively, who the demonstrators are may be established over time through tutorials and additional laboratory sessions. Regardless, the data will show that students continue to exhibit their orientation to the demonstrators' roles.

students in the anatomy laboratory exhibit their readiness to begin and establish co-presence and recipiency using multimodal actions and displays in the pre-opening sequences. These pre-opening sequences provide some important prerequisites that facilitate the work of the verbal utterances to summon attention and establish mutual attention and recipiency. More importantly, the analysis drew attention to how membership categories are established very early on in the interaction through visual displays such as appearances and the laboratory coats. Furthermore, membership roles (i.e. student and demonstrator) are embodied by laboratory participants and established through their verbal and non-verbal actions, such as the mutual orientation to the asymmetrical interaction preference for the demonstrator to initiate interaction. Through this process the participants also begin to demonstrate their shared orientation to the institutional culture and identities that facilitate the demonstrator and students who are unknown to one another to establish their relationship to each other in an institutional sense. In doing so, laboratory participants draw upon institutional cultural knowledge and resources, which to a certain extent also inform the common sense understanding of how they should behave. Thus, participants establish relationships and resolve the interactional problem of how to establish recipiency in a first laboratory encounter.

5.3.1.2 Preparing for transitioning into the table-talk phase: Epistemics, membership categorisation and embodied practices of demonstrator and students

The next stage in this CA analysis is an examination of how Nadia and her students utilise the *Instructing* Stage to facilitate their transition into the table-talk phase of the laboratory session. Having established recipiency, Nadia enters into her *Instructing* Stage whereby she continues to solicit information and responses from

her students to foster their rapport-building. The analytical process begins with the same segment, but with the focus upon what follows Nadia's summons.

```
2     Nadia:  {<hey guy::::s::> (.) u::m::: so i don't know if you guys
```

```
3             {
4             {<all:: know: each other> pretty  [well:]::?
5     (S):    ((from off screen to the right))  [ya:  ]
```

```
6     Nadia:  {
              sharp head turn to SF1
7     SF1:    [((nods head and gazes at demonstrator))
8     {nods head and looks at SF1 who increases frequency of nod
9     Nadia:  [{ye::p,
```

Upon completion of the summons, Nadia is able to progress the talk. In this next segment Nadia initiates a question first-pair-part, "u::m::: so i don't know if you guys <all:: know: each other> pretty [well:]::?" (lines 2 and 3), she leans her entire upper body forward as she finishes the utterance (see red ovals in lines 3 and 6). Nadia's talk suggests an approach to enable her and the students to become more familiar with one another, which in this context is an appropriate action to build conversation and rapport. It could also be interpreted as the next action in establishing the institutional character of this educational context, where Nadia displays unfamiliarity with her students and with her students' social relations with one another. This is achieved through Nadia's utterance, which declares her K- epistemic status (Heritage, 2012b, 2012c; Mondada, 2013a) in lines 2–4, "so i don't know if you guys <all:: know: each other> pretty[well:]::?". In terms of the epistemic gradient created by the grammatical structure of Nadia's utterance, the epistemic gradient would be

steeper if Nadia had asked, ‘do you guys all know each other?’. Or Nadia could have created a more moderate epistemic gradient had she asked ‘you guys all know each other, right?’, which makes more assumptions about student relationships with one another, and allows Nadia to display or assume a more knowledgeable status. Regardless, the question creates sufficient epistemic gradient that subsequently solicits responses from the students that inform Nadia and clarify for her the level of familiarity the students have with one another (lines 4–9). Nadia’s turn design uses the display of epistemic status to propel the laboratory interaction forward, just as predicted by Heritage (2012b). Without the renewal and/or the maintenance of such an epistemic gradient the interaction would come to a close (Heritage, 2012c) or there might be an awkward gap of silence, given students expect the demonstrator to organise participation and activity (Lerner, 1995). Hence, Nadia’s utterance demonstrates how she embodies her institutional role and obligations as a demonstrator, and from an epistemic perspective, Nadia’s sequence also mobilises and makes relevant a *second-pair-part* as a response to her question (Drew, 2012a; Lerner, 1995; Levinson, 2012; Roberts et al., 2015; Stivers & Rossano, 2010). From the CA perspective, Nadia creates epistemic gradients that solicit information from her students and she effectively demonstrates the use of epistemics to drive the unfolding sequences (Heritage, 2012c) between Nadia and her students to build conversation and rapport. It cannot be ascertained whether Nadia is consciously aware of her interactional behaviour, but her behaviour is evidence for her interactional competence as a social member as well as a member within this institutional setting.

Indeed, Nadia’s initial question is answered in lines 5–7 with a “ya:” from one student and head-nodding from another, i.e. SF1 who is positioned second to her

right. The students' responses not only demonstrate orientation to the epistemic gradient created by Nadia, they show their uptake of the implicit agenda for self-introductions suggested by Nadia's question. This laboratory opening is unlike the UK tutorial openings observed by Benwell and Stokoe (2002, 2005) where they found evidence for university students' resistance of academic identity and affiliated academic tasks in the interaction with their tutors. Unlike the UK tutors in the Benwell and Stokoe (2002, 2005) study who began their tutorials by setting the learning agenda and tasks and holding students accountable to their academic responsibilities (i.e. pre-readings and homework), Nadia is focused on building a relationship prior to getting down to the business of the laboratory practical session. Furthermore, Nadia does not hold the students accountable to any pre-reading and learning. Perhaps this particular pedagogical approach, allowing the demonstrator to disregard individual student academic accountability, decreases the likelihood for relationship tensions.

Next, Nadia demonstrates orientation to the student responses in line 6 when she turns her head sharply to the right and fixes her gaze on SF1. Nadia's orientation to her right is interesting, considering that she is surrounded by students on both sides, and in focusing her gaze to one side she must forego the other side. If Nadia had taken up the head of the table (at either one of the narrower ends of the table), she would not be in a situation where her head turn would put such a large proportion of the student out of her peripheral vision. Regardless, Nadia's attention to her right either suggests that she has a tendency to favour her right side or she is attending to more responsive students to her right such as SF1, who responds to Nadia's utterance and interacts with the demonstrator with single word responses or obvious body signals. Nadia's fixed gaze to the more responsive students is particularly interesting,

and is evidence for the recipient designed nature of her instructional talk, which seeks to establish recipiency. That is, despite the demonstrator-group interaction context, Nadia chooses to engage and focus her interactions upon the more responsive students, and actually takes the students' responses as group consensus, which is confirmed by Nadia's acknowledgement of these responses with a sustained tone "ye::p," in line 9. Nadia's acknowledgement is accompanied by head-nodding and gaze directed at SF1 in line 8. In response, SF1 increases the frequency of her head-nod (line 7). This more focused and directed interaction provides the necessary second-pair-*part* to Nadia's question and allows the interaction to progress. In this way Nadia confirms that students indeed know each other, and indicates her understanding of this fact.

The actions described and analysed within the CA context thus far provide evidence that the participants establish and continuously orient to membership categories. More importantly, through analysing the interaction between Nadia and her students, it is made clear that participants are mutually orienting to the 'classmate' relationship between students. To clarify, for the purpose of the laboratory, students recognise and identify one another as members in the 'student' group. This is based on students' demonstration to Nadia that they indeed know each other, although they may not necessarily know each other personally. In contrast, the demonstrator, who is considered to be outside that group, has been placed in a more authoritative membership group, as indicated by her actions. So in this case the demonstrator treats students as a membership group of which she is not a member, and the students also identify the demonstrator as being 'not one of them'. This is evident in the way that the demonstrator addresses the students as a group in line 2, "{<hey **guy::::s:**:> (.) u::m::: so i don't know if **you guys**". The students then answer

the demonstrator's question, "((from off screen to the right)) [ya:]" (line 4) and "[((nods head and gazes at demonstrator))" (line 6). Without attributing the demonstrator role to Nadia, the students may choose not to respond, but they comply by responding.

At this point of the laboratory session, students have placed Nadia in a special category of membership with speaking rights priority, and students demonstrate orientation to her membership category, as well as the affiliated rights to that category, when they remain silent to allow her to speak, or subsequently answer her questions and introduce themselves. As discussed in Chapter 3, turn-taking organisation may be augmented in institutional talk (Benwell & Stokoe, 2002; Drew & Heritage, 1993; Egbert, 1997; Hellermann, 2005; Lerner, 1995; McHoul, 1978; Mehan, 1979a; Mondada, 2013b; Stivers et al., 2009). The fact that all the students give the floor to Nadia by remaining quiet is a demonstration of that augmentation. It is similar to the status of the classroom teacher (McHoul, 1978; Mortensen, 2009).

In addition to Nadia's different dress, her age and her different activities (that is, she does not take part in their orientation week, lectures, or other laboratory tutorial sessions, all of which set her apart), the transcripts yet provide further grounds for the claim that she belongs to a different category from the students as displayed through the interaction and the orientation to the specifics of the institutional context. Students also orient to the institutional character of this specific context: they are in the human anatomy learning centre of a university attending a formal anatomy session as part of their curriculum schedule, and there is an older person dressed in more formal and professional-looking attire speaking to them. So by virtue of being a new and unfamiliar face, demonstrators are already allocated to their roles in this context. Nonetheless, as we will see later in lines 13–16, Nadia confirms her role and

expertise by telling students her name, her profession, and how long she plans to be engaged in “doing anatomy and radiology tutorials”. As will also be demonstrated in the subsequent analysis, this orientation to membership leads to the delegation of speaking rights that is fundamental to creating the sequential organisation observed in the transcript, and is typical of an education institution (Benwell & Stokoe, 2005; Lerner, 1995; Lindwall & Lymer, 2014; McHoul, 1978; Rendle-Short, 2006; Stokoe, 2000).

As lines 6–9 have shown, Nadia, who is satisfied with the forthcoming second-pair-part from the students to her question, follows this up by explicitly stating the purpose of her introduction with animated facial expressions as illustrated on the following page.

```
10                          {
11    Nadia:  tsk•hhhhh {>>if we can just go quickly around so i can get to know you
              guys a little bit=
```

```
12                  {
13              =so  {my name is Nadia i'm one of the doctors at the royal hospital
14              .hhhhh uh:::m:: and i am going to be doing=
```

```
15              {
16              ={anatomy and radiology tutorials for the next three MONTHs::
```

```
17              {
18      Nadia:  {what year are you guys in?
19      SF1:        [°firs::t:° ]
20      (S):        [>firs::t<  ]
21              {nods head
22      Nadia:  {first yea::r (.) awesome=
```

```
23              {left hand shake side to side {gaze
                jump from student to student to right
24              ={>so have you done much<
                {anatomy at all::::?
```

Nadia maintains an epistemic gradient by continuing to display her *K- epistemic status* in designing her request for the student to self-introduce, “tsk•hhhhh {>>if we can just go quickly around so i can get to know you guys a little bit=” (line 11). Nadia’s request has been designed with politeness devices such as the use of ‘if’ (Benwell & Stokoe, 2002), but she also embodies the need for politeness/hedging and her K- epistemic status as she shrugs her shoulders and makes a facial expression that shows her uncertainty (line 10) (Mondada, 2013a; Roseano et al., 2014). It is noteworthy to reflect upon how Nadia provides information about herself (lines 13–16) prior to further engaging the students and soliciting more personal information from them (such as their names, year of study, and how much anatomy have they learned) (lines 17–24). In doing so to foster the rapport-building and trust, Nadia makes a transition to her epistemic status from line 12 to line 16. She goes from a state of information request (K- status) to a K+ status where she is providing information about herself, which assumes that students would not know anything

about her. Subsequently, Nadia provides a brief biography of herself including her name, occupation, where she works, and even how long she will be teaching anatomy. Volunteering this information might be seen as a way of building trust and forming a personal relationship with the students. In a similar fashion to the UK university tutors reported by Benwell and Stokoe (2002, 2005), Nadia demonstrates recognition of her request for students to self-introduce as potentially face-threatening for the students, who may not be comfortable or willing to introduce themselves. Nadia mitigates her potentially face-threatening act by starting with her own self-introduction which delays the need for students input; thus easing the students into the task. These are important interactional features in Nadia's utterances that demonstrate her understanding of the interactional context and her social competence by looking after the recipients' needs and face in the designing of her turns.

Continuing to follow Nadia's display of her epistemic status, in line 17 Nadia switches her epistemic status yet again (now K-) and begins to solicit more information from her students. Nadia first asks the students, "What year are you guys in?" (line 17), and then following students' responses and her evaluation in line 18–21, she then asks, ">so have you done much< {anatomy at all::::?" (line 23). In line 23, where Nadia asks the students about how much anatomy they have learnt previously, one can get a sense of the ease with which Nadia is building rapport and fostering a conversational dialogue with her students. Students react positively and cooperate in this. This is exemplified in a student's response in line 26 below, which jokingly volunteers more information about how she feels that they have learnt too much already.

```
25    (SM):  [ya::.    ]
```

```
26                    {                                    students' awkward
            expression
27    SF1:    [(too much]{thi Hhh s(hhh)week hhhh)
```

```
28            {
29 Nadia:     {s::wee::::t >
```

```
30            {                                    {
31            {so yu gonna be                      {<pro:::::s: >=
```

```
32            {
33    Nadia:  {=>alright<=if yu can go around tell me yur name:   [::e        ]
34    SF2:                                                        [°>yep<°    ]=
35    SF2:    =um::: Natalia
36    Nadia:  NATAlia awe::some:
```

```
37    Nadia:  {
38    (SF):   {NAn:cy
```

Humour is often used to create alignment and affiliation between interaction participants (Benwell & Stokoe, 2002, 2005), and the students' response to Nadia's question is one such example. At this point, Nadia makes an evaluative comment about their anatomy learning and assigns a K+ epistemic status to students'

anatomical knowledge, “so yu gonna be {<pro:::::s: >” (line 30). This evaluation wraps up this segment and the talk then turns to self-naming in line 32.

In this extract, it is also important to note the presence of the Initiation-Response-Evaluation (IRE) sequence structure (See Chapter 3) (McHoul, 1978; Mehan, 1979a). The first occurrence is noted at line 17 with Nadia asking the question (I), “what year are you guys in?” The students’ overlapping responses follow in lines 18 and 19 (R), “[°firs::t:°]” and “[>firs::t<]”. The evaluation comes from Nadia in line 21 with an acknowledging head nod (E), “First yea::r (.) awesome.” The second IRE starts at line 23 with Nadia initiating a question (I), “>so have you done much< {anatomy at all:::?”. Students respond (R) in lines 24–26 with “ya”, funny facial expressions, and the joke about “too much” (line 26). The IRE sequence’s closing evaluation (E) comes from Nadia in lines 28–30, who says, “{s::wee::::t > {=so yu gonna be {<pro:::::s: >=”. This sequencing structure is presented to draw attention to the demonstrator’s assessment in the third-turn sequence. In both IRE examples, the demonstrator uses positive evaluations such as “awesome” and “sweet”. In the second example, the demonstrator puts even more prosodic emphasis on her evaluation, “{s::wee::::t > {=so yu gonna be {<pro:::::s: >=” (lines 28 and 30). The embodied displays are important in constructing rapport and building affiliation.

Also noteworthy is the repetitive use of informal talk in the interaction. This is an important feature of Nadia’s utterance in this opening. Students co-operate in constructing rapport and building affiliation by responding to her questions and accepting her invitation, as can be seen in line 26, “[(too much] {thi Hhh s(hhh)week hhhh)” by smiling (lines 27 and 29). The CA analyses have identified a number of interactional features that enable Nadia and her students to affectively engage with

one another, and have allowed for a characterisation of Nadia's rapport-building approach.

The interaction continues with students introducing themselves one by one around the table, but the recording cuts out not long after the naming begins and does not resume until participants have already entered the table-talk phase. Thus, it is not possible to determine how the remaining introductory phase is conducted. Nevertheless, it is very clear that Nadia is the primary driver in this early 'ice-breaking' session. Through her displayed lack of knowledge of and about the students, she effectively displays her epistemic status in soliciting information and mobilising responses from her students (Lerner, 1995; Levinson, 2012; Stivers & Rossano, 2010). This depicts a personable approach in which the instructor attempts to understand and to get to know her students. Through the public display of epistemic status, and the exchange and provision of information organised in the IRE sequence frequently observed in education institutional settings (Lee, 2007; McHoul, 1978; Mehan, 1979a; Zemel & Koschmann, 2011), the present analysis demonstrates and confirms how interaction is locally organised and managed by the participants. Thus, the emergent sequential organisation of this laboratory introductory phase shows how the 'instructing' stage is managed by the demonstrator to suit their negotiated agenda for building rapport and relationships.

5.3.1.3 Summary

This extract from the first anatomy laboratory session has illustrated how a demonstrator and a group of students orient to each other's readiness to start using both embodied and verbal resources. The use of artefacts and laboratory attire also helps participants establish membership categories; however, it is important to recognise that much of the membership categorisation work is implicitly

accomplished by the institutional context. All of these actions, and the features of the context, establish specific roles: Nadia and her speaking rights, students and their listening audience status.

Given that this is the first anatomy laboratory session for the students and the demonstrator, the analysis has paid particular attention to the rapport-building process of the instructing stage. This is the stage where the demonstrator gradually co-constructs a communicative environment with his/her students by manipulating and managing the relative epistemic gradients between him/herself and his/her students through varying displays of epistemic status. Most importantly, Nadia consistently empowers the students to respond by deliberately designing simple K-status display questions that mobilise and facilitate quick responses from her students. Additionally, Nadia's talk-in-interaction features extensive use of informal language/slang, body positioning that is responsive to students' talk and inviting response, facial expressions (e.g. smiles, frown, and uncertain) and gestures (e.g. pointing, shoulder shrugs, hand movements for emphasis) that contribute to this collaborative process. Lastly, it should be noted that the extensive analytical focus on the demonstrator is not meant to diminish the importance of students' contributions, which are visible in their responses and willingness to collaborate in the interaction.

5.3.2 S1W2L2 Demonstrator Pete Providing a Laboratory Overview for the Students (Extract 5-II)

The detailed analysis of S1W1L1 introductory phase has showcased most of the stages in the sequential organisation of laboratory openings with the exception of the 'Instruction Wrap-up/Closing' stage. The different stages of the openings remain largely consistent throughout the observable data of formal laboratory openings. More interestingly, these stages bear some resemblance to the three-part tutor

instruction sequences observed by Benwell and Stokoe (2002) in UK university tutorial settings as consisting of a) future projection, b) contextual details delimiting/justifying the task, and c) orientation to immediate next task that also resembles teacher instruction (Sinclair & Coulthard, 1975). However, unlike the three-part tutor instruction sequences described by Benwell and Stokoe (2002), the demonstrators in this setting seem to individually adopt a different approach. As the data shows, some are more flexible and conversational and others more formal, such as Pete's laboratory introduction, which is the focus of this section of the chapter.

In the previous extract the process whereby sequential organisation is influenced by participants' displays of and orientations to membership categorisation and epistemics was described. It highlighted participants utilising and orienting to these two resources in order to develop the sequential organisation in the immediate context of their interaction. In this second extract, the analysis will expand on the similarities and differences in the interactional characteristics present within each stage of the opening. In so doing, the analysis confirms the post-positivist contention that social interaction is not prescriptive but responsive to local participant management based on the immediate context and the specific interactional needs of the participants.

The extract is from the anatomy laboratory recording made in Semester 1, Week 2, and laboratory session 2 (S1W2L2). Prior to the start of this laboratory session, the two demonstrators present had just been informed that the other two demonstrators were running late because of a misunderstanding about the schedule. As a result, the two demonstrators were left to run both the anatomy laboratory session and the simultaneously occurring anatomy tutorial sessions in the adjacent laboratory space. This meant that for the 30+ students in the laboratory session there was only one

demonstrator. Due to this sudden change in the demonstrator roster, I, the researcher, remained on site after the recording had started to see if the demonstrators needed assistance. Thus, I can be seen in the recording (line 75–117). The demonstrator, Pete, wearing the green surgical gown, had to improvise the introduction on the spot to deal with this sudden change in the demonstrator rosters. Students were not aware of these circumstances. Once again the full transcript for the extract will first be presented before providing the CA analysis on specific segments of the interaction.

Extract 5-II (S1W2L2) The laboratory introductory phase between demonstrator Pete and his students. Please watch the video file of this data segment available at https://dl.dropboxusercontent.com/u/88971137/Extract_5-II_S1W2L2_Demonstrator_Pete_Laboratory_Introduction.mp4

```
(S/SF/SM)=unidentified student speaking; ‘F’ denotes female; and ‘M’ denotes male
(S’s)=students as a group
SF#=Female student identified
SM#=Male student identified
R=Researcher
```

```
1            {
2     (S’s):  {((background chatter))
3     Pete:   ((shuffles on spot and turns slightly to left and grounds self))=
```

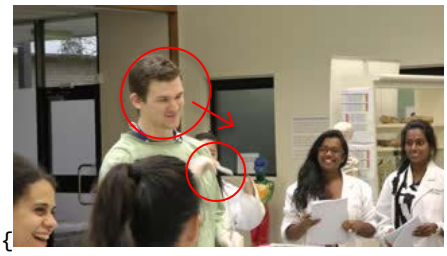
```
4                                 {                                 strikes pen against
             edge of manual in left hand
5     Pete:   =>>g’day<< everyone.  {(0.2) so::, today:: >everyone's< in luck,
```

6 {{

7 {cauz- <yu- don't need> {your laboratory coats >cuz< there is nothing wet which is fantastic=

8 (S): =((no:::.))

9 (.) ((demonstrator orients to student))



10 {right arm upswing with elbow bent {

11 Pete: {[padon? (0.2) then you can {keep it on (.)=

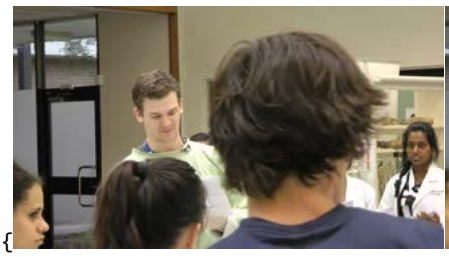
12 (S's): [Hhhahhh]hhhhhhhhhhhhhhhhhh]

13 (S): [((inaudible))]

14 {{

((on inbreath))

15 Pete: ={(Hhhhe•hh)um. >look< we going through from about



16 {{

17 {page ni::↑ne (.)ok::↑ so: for this:=

18 {
((large right arm wave down to right))
19 {sorta:: section?
20 (0.2)
21 Pete: and >>then in the next<< hour you're gonna flick around and go into the tute rooms with::: the=uhh, the other girls you met

22 {
23 {(.) from last week
24 (.)

25 {
((flips laboratory manual to right hand and looks down))
26 Pete: .hh {>okay:::?< (.) so::: (.) essentially

27 { balancning gesture
28 {what we're- learning a bit <today:::? i:s:.>

29 {
30 {surface anatomy

31 {
32 {an:d sorta having a good feel of every

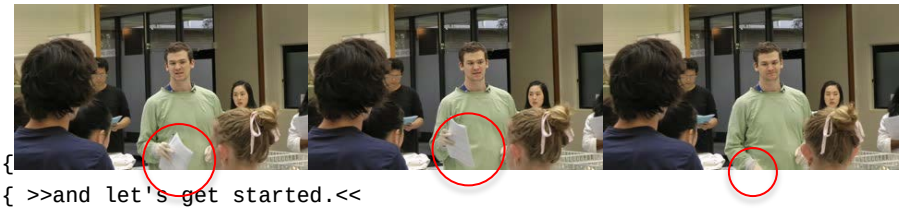
33 { left hand pulses at left chest
34 {sorta hard bony=
35 {
36 {part there is on your body and sortaf what that correspon:(hh)ds:=
37 {
38 ={>okay(hh),<=
39 {
40 Pete: =.hhhh {if you get <s::TUCK>
41 {
42 {as for >sort- sortof< what <they are feeling>?=
43 {
44 ={.hh we've got some textbooks that we'll lay OUT
45 {
46 {°an'° yu've also got the skeletons,=

{
=.hh {an::d >the proper bones< to feel. (.) an:d >°have a good one°<.
(.)
Pete: okay.=
Pete: =.hh -so you'll need a par:tner,=
uhhh (0.2)
so:: they suggested

{ fans manual
{loose clothing >so if< there's=

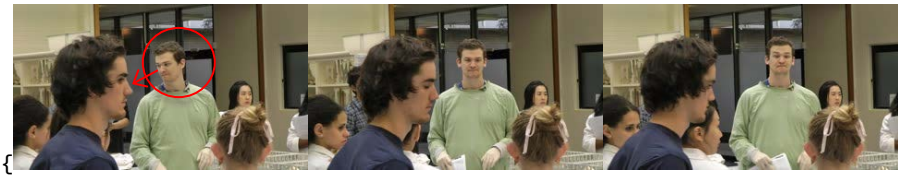
{
{excess clothing that you don't want,=
then (.) feel free to >removit<

{
Pete: {.hh umm:: (.)



{
Pete: { >>and let's get started.<<
(.)

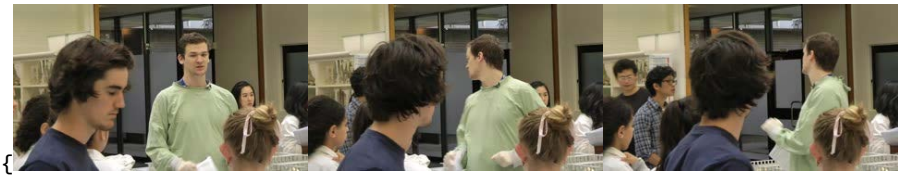
{
Pete: { mkay?=



Pete: {
(SF): {=>are we suppose to< be:: in

{
{gru:ps:::?=

{ {
Pete: [=tsk {>so yu] can:: {(.)=
R: [=ya::]



{
Pete: ={>>you can do::little

{ {
((tutor moves aside from his original spot))
{groups: {[:::<<]
R: [ya well ( ) you

{
{do you remember the groups

{
((finger draws counterclock circle))
{that you were in last week?=
(SF): =why [:?]
(SM): [=yep.]
(0.2)

{ ((slight head nod))
R: {Ya:::

{
{so back in that-

{
((slight head nodding))
{that sort of group setting

{ {
{that would be ((kinda ni- {[ni-))]
(SF): [Sorry]

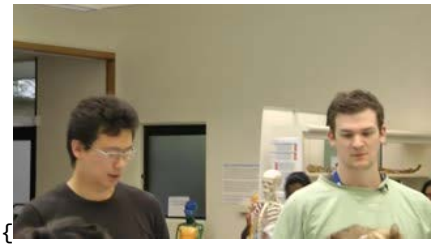
{
{((but i wasn't here))
R: (0.6)

97 {

98 (SF): {Can we just like (.)

99 {

100 {do- do groups anyone(0.2) °i°s doing the same thing >here<?



101 {

102 R: {(0.2) uhhhhmm=

103 { {

104 (SF): {(i was very up to {[team] b)=

105 R: [ya::]

106 {

107 Pete: {=>>yu know what<<

108 {

((with a slight shoulder shrug))

109 {Iuh- HhI jus (fink) we just go for it=

110 {((small quick head nods from Pete and R))

111 R: ={ya:: [::

112 Pete: [((nods head quickly))

```
113          {
114   R:     {[>°okay°<]
115   (SF):   [>okay<  ]
```

```
116   (1.0)  ((notices approaching demonstrator))
```

```
117          {
118   Pete:  {>do wutever feels good<=
119   Lucy:  >°you know where they are°< ((high pitched))
```

5.3.2.1 S1W2L2 'getting ready and demonstrating readiness to begin'

At the beginning of the recording, there is substantial background chatter (line 2), and in the frame-grab in line 1 (see below) Pete takes up a central position among the students spread around the laboratory space. His tall stature, green surgical gown and gloved hands, which are holding a pen in the right and a laboratory manual in the left, make him highly visible and display his readiness to begin.

```
1            {
2     (S's): {(background chatter)
```

Similarly, students demonstrate their readiness to start by orienting their bodies so that they more or less face Pete. The mutual body orientations are reached completely non-verbally, suggesting the pivotal importance of the body in sense-making and establishing recipiency in the social organisation of learning spaces (C. Goodwin, 2000; Mortensen, 2009). Having demonstrated their readiness to begin Pete and his students move quickly to the next stage of the laboratory opening.

5.3.2.2 S1W2L2 'establishing recipiency'

Before Pete utters his projected summons "=>>g'day<< everyone" (line 5), the camera pans in on him, and he shuffles slightly on the spot before he turns slightly left to position himself (line 3).

```
3     Pete:  ((shuffles on spot and turns slightly to left and grounds self))=
```

```
4                                   {                                 strikes pen
            against edge of manual in left hand
5     Pete:  =>>g'day<< everyone.  {(0.2) so::, today:: >everyone's< in luck,
```

```
6            {                                   {
7            {cauz- <yu- don't need>                 {your laboratory coats >cuz<
            there is nothing wet which is fantastic=
```

A micro-pause follows immediately after his solicitation (line 5), which sets up the "=>>g'day<< everyone" as a summons/attention in the pre-beginning position to orient students' attention. However, during this time Pete begins another summoning action by tapping his pen against the spine of his laboratory manual (line 4). The tapping continues until he says, "cause- <yu-d don't need> your laboratory coats" in

line 7. Students quickly quieten down. By the time Pete says, “so::, today:: >everyone's…” in line 5 there is minimal background chatter being picked up by his microphone.

Before continuing with the analysis, it is noteworthy to analyse an example of students embodying their readiness to begin that can be identified in the frame-grabs of line 6. The camera captures two students arriving late (marked by blue arrows) with their laboratory coats on and manual in hand. The students turn and orient their body toward the demonstrator despite being positioned slightly to his back left side. In doing so, these late arriving students show their readiness to engage, and their rushed entry demonstrate their orientation to Pete’s readiness to begin and to the fact that Pete’s formal introduction is underway.

Returning now to how Pete and his students manage the ‘establishing recipiency’ stage. His elicitation of their attention *g’day everyone* (line 5) is achieved in a well-projected voice that successfully penetrates the background chatter. The combined effects of Pete’s clear institutional role and his actions quickly settle the students’ chatter to a minimum and he is able to continue with his *instructing* from line 5 onwards. Thus, although by himself, Pete easily manages the 30+ students in a large space.

5.3.2.3 S1W2L2 ‘instructing’

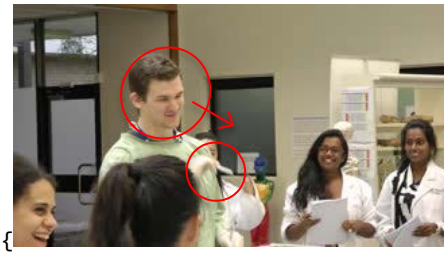
Once Pete succeeds in eliciting students’ attention, he quickly launches into an overview and status update of what students will be doing in their laboratory session, which forms a part of Pete’s ‘instructing’, “so::, today:: >everyone's< in luck, cauz- <yu- don't need> {your laboratory coats >cuz< there is nothing wet which is fantastic=” (see lines 5–7 in the following segment of transcript), which foreshadows and creates a context for his description of the activities to be undertaken. The

following analysis of *instructing* will show how Pete manages changing participation frameworks moment-to-moment that show when and how membership categories are being made relevant.

```
5     Pete:   =>>g'day<< everyone.  {(0.2) so::, today:: >everyone's< in luck,
```

```
6             {                                          {
7             {cauz- <yu- don't need>                    {your labcoats >cuz< there is
              nothing wet which is fantastic=
8     (S):    =((no:::.))
```

```
9             (.)                                        ((demonstrator orients to
              student))
```



```
10            {right arm upswing with elbow bent {
11    Pete:   {[padon? (0.2) then you can        {keep it on (.)=
12    (S's):   [Hhhahhh]hhhhhhhhhhhhhhhhhh]
```

To begin: Pete's utterance in lines 5–7 establishes the participation framework with Pete as the demonstrator telling the students that what they will be doing in their laboratory activity will not require their laboratory coats. This is achieved through Pete using the second person *you* along with a swinging gesture of his right hand, which is holding a pen (line 6). Pete also starts his instruction by informing about not needing to wear a laboratory coat in the laboratory session. Pete's assessment, "which is fantastic" inviting students' affiliation assumes that, like him, students would be pleased about this news.

In terms of epistemics, Pete is displaying a *K+ epistemic status* and acting to inform students assuming that they have a *K- epistemic status* regarding their laboratory activities and the lack of wet specimens. Pete assumes his *K+ epistemic status* because as the laboratory demonstrator it is institutionally his job and responsibility to know the activities, and it shows that he also considers it his responsibility to inform the students (Heritage, 2012b, 2012c; Koole, 2010; Raymond & Heritage, 2006). However, the data also shows how Pete may be justifiably assuming and assigning students with a K- epistemic status based on the fact that the students are visibly all wearing their laboratory coats. As further evidence, Pete indicates that he is informing the students by using the second person pronoun *you* in his utterance, as well as pointing to them with his pen in his right hand, which can be seen in the frame-grabs in line 6. There are no student reactions that would suggest that the remark is understood as being sarcastic. In fact, contrary to Pete's opinion that not needing laboratory coats is "fantastic" a student response in line 8, "((no:::.))" appears to indicate that some students may not share the same opinion on Pete's news.

The news of the wearing of the laboratory coats brings attention to another important issue. That is the differential status of Pete and students, as denoted by the surgical gown worn by the demonstrators, and the laboratory coat worn by the students. This is linked to membership categorisation previously discussed. Pete's news differentiates his surgical gown from the students' laboratory coats. We can note his deliberate use of second person pronoun 'you' when talking about the laboratory coats as opposed to using first person pronoun 'we' or 'our'. This suggests that Pete's surgical gown possesses an additional purpose besides protection from wet specimens, which is to visibly differentiate his demonstrator institutional status.

Thus, Pete's instructing subtly begins to assign and make relevant membership categories and identities. This is important because, as it will be explained later, the differentiated roles form the basis for different institutional responsibilities and activities as well as basic participation frameworks. As the preceding discussion on epistemics has demonstrated, membership categories have bearings on who has epistemic obligations to know and to inform.

The student utterance, "((no:::.))" (line 8) creates a momentary shift in the participation framework from multiparty to individual as Pete responds to the student (C. Goodwin, 2007; M. H. Goodwin, 1990; Mondada, 2013b; Rae, 2001). At this point of the laboratory session there is a moment of rapport-building between Pete and his students, in which he singles out the objecting student and makes a joke that s/he can keep the laboratory coat on (line 11). Noteworthy is the word choice and construction of Pete's response in line 11, which begins with *padon* [sic], which typically indicates trouble hearing or comprehension (Kitzinger, 2012; Schegloff et al., 1977). However, this should not be taken at face value, based on how quickly Pete is able to come up with a joking response, it seems that *padon* [sic] is more likely to be marking a disruption in Pete's instructing act, suggesting that the student response is unexpected. With the student off-screen it is difficult to ascertain whether there are any additional interactional features that allow Pete to quickly align with the students' opposing response following a momentary pause (0.2), before making the joke about the student keeping the laboratory coat on. Having thus marked the disruption Pete then creates the interactional room to change participation framework to create the joke.

The shift in participation framework is further made clear by Pete's gesturing (Mondada, 2013b). Since in English *you* may represent both the singular and plural

second person pronoun, Pete establishes a participation framework that differentiates between the demonstrator and the students using gestures that accompany the use of *you* in lines 6 and 7, “cauz- <*yu*- don't need> {*your* labcoats >cuz<…”. His gesture clarified that the ‘yu’ is a second person plural pronoun addressed to all the students. Now in making the joke, Pete is once again using the second person pronoun, “padon? [sic] (0.2) then *you* can {keep it on (.)=” (line 11), and because of the ambiguity of English Pete clarifies what he means by *you* using a pointing gesture with a pen in his right hand (line 10) that points at the particular student. This means that Pete is addressing his comment to that particular student. Thus far, Pete’s choice of the second person pronoun *you*, as opposed to the first person plural *we*, sets up a distinction between demonstrator and students, and with the aid of interactional context and gestures Pete has been able to differentiate his use of the second person singular and plural pronoun to effectively establish different participation frameworks for instructing and for joking. Pete’s use of pronouns are important in establishing and maintaining joint attention because the analysis will show that he continues to use them to manage how he and his students participate and to clarify roles and responsibilities in his instruction.

Following Pete’s joking banter directed at the student who voiced the opposing stance earlier in line 8, the joke generates a bout of laughter from the entire group, including Pete (lines 12–15). After the joking sequence, Pete needs to re-orient students and bring the group back to the task at hand, which can be seen in the following segment on the following page.

```
13    (S):     [((inaudible))]
```

```
14             {
               ((on inbreath))
15    Pete:    ={(Hhhhe•hh)um. >look< we going through from about
```

```
16             {
17             {page ni::↑ne (.)ok::↑ so: for this:=
```

```
18             {
               ((large right arm wave down to right))
19             {sorta:: section?
20    (0.2)
21    Pete:    and >>then in the next<< hour you're gonna flick around and go into the
               tute rooms with::: the=uhh, the other girls you met
```

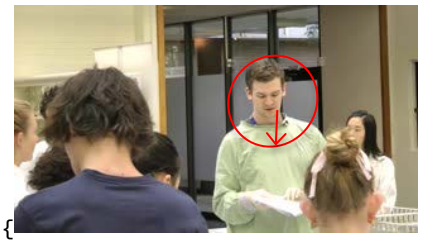
```
22             {
23             {(.) from last week
24    (.)
```

Pete accomplishes the transition back to task in line 15 with an audible inhalation, the discourse marker “um”, and a quickly spoken “ >look<”. The deployment of *um* without extended stretching of the syllables and a slight falling intonation towards its end at this point of the talk orients attention to ensuing talk (Benwell & Stokoe, 2002). This contrasts the stretched “um::” that is often a feature of processing delays in responding (Levinson & Torreira, 2015; Roberts et al., 2015). The *um* also marks a

shift in topic or activity, as noted by Rendle-Short's (2006) study of monologic talk in academic presentations. Such characterisations challenge the notion that *um* is indicative of delays in speech production alone, and draw attention to the need to closely examine the sequential placement and prosodic features of discourse markers. At this point, Pete also switches back to the use of the first person plural pronoun "we" as he begins his overview of what will be covered in the laboratory session. The pronoun switch reflects a changing membership relationship (Benwell & Stokoe, 2005; Stokoe, 2010). The pronoun switch signals the transition of membership from teacher to a community. In establishing this togetherness, the demonstrator proceeds to describe how he and the students will accomplish the common goal of learning anatomy (Benwell & Stokoe, 2002, 2005; Stokoe et al., 2013).

In providing his overview, Pete tells the students where they will be starting in the manual (line 17). Prior to saying this, Pete momentarily shifts his gaze down to his laboratory manual (line 16), and then raises his laboratory manual and points to it as he returns his gaze to the students. This action causes students to also look down and refer to their laboratory manuals (line 18). Then Pete continues to explain how they will proceed, "and >>then in the next<< hour you're gonna flick around and go into the tute rooms with::: the=uhh, the other girls you met {(.) from last week" (lines 21–23). First, we again note how Pete switches to the use of the second person pronoun. Pete is once again asserting his demonstrator status by highlighting and differentiating the tasks that the students will be required to do. In doing so, Pete also makes clear that when it comes time for students to go from the anatomy laboratory session to their tutorial session he will not be making the transition with them, and that the students will be looked after by the other demonstrators, "the=uhh, the other girls you met {(.) from last week" (lines 21–23). It is interesting that Pete here refers

to the other demonstrators as “girls”. This is perhaps a downplay of their membership category and status as demonstrators and to flatten the implicit institutional hierarchy (Benwell & Stokoe, 2002), and it is yet another example of the use of informal language to construct rapport and build affiliation. As Pete says “from last week” we note that Pete waves his right hand, which is holding his pen, back and forth to help clarify the relative time frame and the motion of swapping over from laboratory to tutorial.



```
                {
                ((flips laboratory manual to right hand and looks down))
Pete:   .hh {>okay:::?< (.) so::: (.) essentially
```

```
            {                                    balancning gesture
            {what we're- learning a bit <today:::? i:s:.>
```

```
            {
            {surface anatomy
```

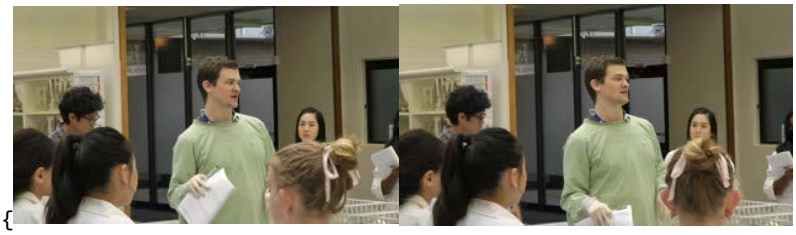
```
            {
            {an:d sorta having a good feel of every
```

```
            {                                    left hand pulses at left chest
            {sorta hard bony=
```

35 {
36 {part there is on your body and sortaf what that correspon:(hh)ds:=
37 {
38 ={>okay(hh),<=

As Pete finishes off this instruction he looks down at his laboratory manual briefly (line 25) and utters, ".hh{>okay:::?< (.) so::: (.) essentially" (line 26). The many pauses and restarts in Pete's speech production have been previously observed in other university tutors and it has been suggested to be a pre-beginning device for planning of utterance, as well as functioning as an orientation that more is to come (Benwell & Stokoe, 2002, 2005). In fact, Pete is actually marking a shift in his instructing, and it is marked in this case by the discourse marker *so*, which is often used to demarcate topic shifts (Rendle-Short, 2006). Pete then continues explaining to students the main focus of their laboratory session (lines 26–36): surface anatomy, what learning surface anatomy means, and what learning it involves procedurally. At the end of this segment of the overview and prior to the launch of his next segment, Pete marks this shift with "={>okay(hh),<=" (line 38). Pete's *okay* in line 38 may be interpreted as a place for students to confirm their understanding. However, the lack of an obvious pause and his audible inhalation seems to have negated that function. Furthermore, in the next segment of the transcript in line 40 Pete takes an audible in-breath, which projects an extended multi-turn talk (Drew, 2012a; Lerner, 1995; Sacks et al., 1974; Selting, 2000), before he continued on without pause to describe what to

do if students should encounter any troubles or difficulties with their learning and the activity tasks (lines 39–48). This suggests that the *okay* was being used as a discourse marker indicating shifts in topic, rather than a request for student confirmation (Benwell & Stokoe, 2002).



```
39                          {
40    Pete:   =.hhhh     {if you get <s::TUCK>
```

```
41            {
42            {as for >sort- sortof< what <they are feeling>?=
```

```
43             {
44            ={.hh we've got some textbooks that we'll lay OUT
```

```
45            {
46            {°an'° yu've also got the skeletons,=
```

```
47                 {
48            =.hh {an::d >the proper bones< to feel. (.) an:d >°have a good one°<.
49    (.)
50    Pete:   okay.=
51    Pete:   =.hh -so you'll need a par:tner,=
```

At the end of the next segment (line 39–48), in line 49 he utters *okay* again, but this time he leaves a slight pause (line 49) before he says, “okay.=” in line 50 with

falling intonation indicative of termination. So in structuring his instruction, Pete divides his instructional content into smaller chunks through the discourse marker *okay* followed by a shift in topic focus. These are also likely points where students might interject with questions, as there are usually micro-pauses around these *okays*, and in the designs of a turn by speakers (Drew, 2012a; Lerner, 1995; Roberts et al., 2015). Yet, it is questionable whether such micro-pauses are sufficient to allow students to interject should they have a question.

Another point to note in the segment (lines 39–51) is Pete's description of what students can do should they get stuck, "=.hhhh {if **you** get <s::TUCK>" (line 40) between lines 40–48. Pete first uses the second person pronoun to indicate that he is speaking to the students as a large group, but he switches to the first person plural pronoun when he offers a first solution, "hh **we**'ve got some textbooks that **we**'ll lay OUT" (line 44). It appears that he is once again setting up a distinction between the demonstrator and student membership categories, and that it is the demonstrator or the teaching team's job to provide the textbook and instructional resources. Then he says, "°an'° **yu**'ve also got the skeletons, .hh{an::d >the proper bones< to feel. (.) an:d >°have a good one°<. (.)okay." (lines 46–50). Once more, Pete's pronoun usage is noteworthy, becoming instrumental in delineating the teaching/learning roles and activities. Pete's troubleshooting advice is somewhat unexpected in that he does not specifically mention that the students can approach him for help, which is typically considered one of the roles and responsibilities of the anatomy laboratory demonstrator. Instead, Pete encourages students to find a solution for themselves. This pedagogical approach that first encourages students to use the various instructional resources and tools that will be provided may represent Pete introducing and making relevant university education culture to foster independent self-guided

learning. Alternatively, Pete may be assuming that students will know they can approach him as well. Nonetheless, the scenario Pete constructs is that, *we* (the demonstrators) will provide *you* (the students) with the resources, but *you* (the students) also have other resources and tasks that you can do to help yourselves.

Before an examination of the final set of Pete's instruction in his laboratory session overview in the next section, the difference between Nadia's instruction stage and the one delivered by Pete will be addressed. In contrast with the more conversational and rapport-building interaction of Nadia's interaction with her students, Pete has opted for a more traditional monologic instructional talk that provides an overview of the learning activities (Benwell & Stokoe, 2002, 2005; Sinclair & Coulthard, 1975). This approach is arguably because Pete found himself running the laboratory session for 30+ students. Consequently, Pete delivers his overview in sections demarcated by discourse markers such as 'okay' and 'so', the functions of which have been previously observed in academic seminar talk (Rendle-Short, 2006). Furthermore, in the early part of the analysis it was noted that Pete uses epistemics in quite different ways to Nadia, who establishes epistemic gradients to mobilise and encourage response. In Pete's instructing monologue, epistemic status was displayed and established within participants' institutional identities as demonstrator and student. In a sense Pete imposes the demonstrator and student institutional identity by asserting his knowledgeable epistemic status as the demonstrator regarding the laboratory activities and procedures. This approach and agenda necessarily puts students in the epistemic category of *to be informed* (K-), and, as the analysis has shown, students consented to this epistemic status associated to their institutional role by giving Pete extended turns at talk. Furthermore, students showed their implicit acceptance by embodying listenership through maintaining

gaze and, where appropriate, referring to their laboratory manual as they listened to Pete's instructions. Finally, the analysis has shown how Pete's use of pronouns was not only employed in his interaction to make relevant the student and demonstrator identity categories, but it was also used to establish different participation frameworks (i.e. demonstrator-group, demonstrator-student, or the collective community). In addition, Pete effectively uses the pronouns to delineate and associate different activities and responsibilities that belong to the institutional membership categories of student or demonstrator, which was particularly evident in Pete's troubleshooting instruction.

5.3.2.4 S1W2L2 'instruction wrap-up/closing'

In the previous segment of Pete's instruction it was revealed how he covered what to do if students were having trouble with the task. This trouble-shooting advice usually comes towards the end of instruction. It marks the gradual transition towards the closing of instruction. Thus, the analysis begins with the final segment of Pete's instruction regarding logistics, attire, and tips for the body painting activity. As he is getting close to the end, Pete's speech speed increases, which is typical of closing talk (Rendle-Short, 2006; Schegloff & Sacks, 1973). Following a pause, he quickly says 'okay' (line 50) with breathier tone and a continuing inflection, which again indexes a shift as he begins wrapping up the instruction:

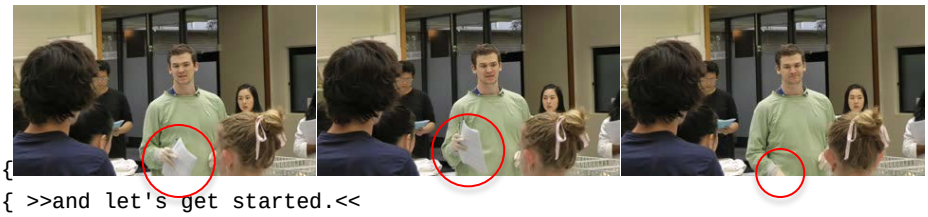
```
51    Pete:   =.hh -so you'll need a par:tner,
52            uhhh (0.2)
53            so:: they suggested
```

```
54            {                                fans manual
55            {loose clothing >so if< there's=
```

56 {

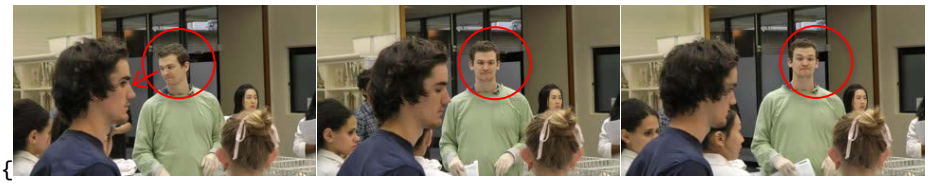
57 {excess clothing that you don't want,=
58 then (.) feel free to >removit<

59 {
60 Pete: {.hh umm:: (.)



61 {
62 Pete: { >>and let's get started.<<
63 (.)

64 {
65 Pete: { mkay?=



66 Pete: {
67 (SF): {=>are we suppose to< be:: in

68 {
69 {gru:ps:::?=

In this final set of instructions, Pete's use of the pronoun continues as he instructs students to organise themselves logistically, "=.hh -so **you**'ll need a par:tner," (line 51) and provides a set of recommendations that appears to have come from the lecturers using, "so:: they suggested loose clothing >so if< there's" (line 53–55). From the perspective of CA, Pete's pronoun switches are noteworthy here because he had not used this pronoun previously. In using this pronoun Pete is clearly indicating that the suggestions or recommendations are not his, but rather those of the department's lecturer, or writers of the laboratory manual in this case. Pete's pronoun switch makes relevant this new institutional identity category (i.e. department lecturers/academics), and he draws a distinction between himself, the demonstrator and *them*. Furthermore, the use of *they* may also be setting up the distinction between *them* and *us*, and in this context it can also be understood as, "they suggested (*to us*) loose clothing", which reinforces a sense of community formed by the demonstrators and students.

Besides the pronoun-switching, Pete's voice and delivery in this final set of instructions are in line with instruction prosodic features of terminal completions noted by Gardner (2001). For example, Pete's volume drops significantly, and the more frequent appearances of discourse markers like 'so' (line 53 and 55) that mark shifts, and "uhhh (0.2)" in line 52 with the pause and the "umm:: (.)" in line 60 both come at transitional relevant spaces after Pete makes his points. These vocalic features appear to signal that Pete is running out of things to say, and indeed in line 62 the terminating instruction is revealed, ">>and let's get started.<<", a brief pause (line 63) and "mkay?=" (line 65). Line 62 is also accompanied by a looping wave of Pete's right hand (line 61), as if to wave students onwards to the task. In addition, Pete can be seen to be visibly gazing down and away in the first picture in line 66

after he says “mkay”, an embodied signal for disengagement, which stands in sharp contrast to his gaze maintenance with the students in the prior talk. However, Pete’s verbal utterance “mkay?=” serves two functions, first to check for students’ understanding by providing a slot for confirmation, and second to check their agreement with his instruction/agenda. In doing so, Pete also makes relevant potential expansion sequences forthcoming from students.

In fact, Pete’s “mkay?=” leads to additional sequences seeking clarification (lines 67–118). The sequence is initiated by a student, “{=>are we suppose to< be:: in {gru:ps:::?=” (lines 67–69). Pete can be seen orienting to this question via his gaze shift in the second and third frame-grabs of line 66 as well as line 68. For the purposes of the present analysis, the process of this clarification is not of concern, other than to note its presence and location in the closing sequences of instruction. However, it does illustrate one of the additional possible activities that can occur in the *instruction wrap-up/closing* stage that delays the imminent closing of interaction. As such, the student seeking clarification process also delays the transitioning to the next phase of the anatomy laboratory session, the *table-talk phase*. Next, the analysis jumps ahead to the final termination of this laboratory opening. It begins with Pete establishing an answer for the student in line 109.

```
109   Pete:   ={Iuh- HhI jus (fink) we just go for it=
110            {((small quick head nods from Pete and R))
111   R:      ={ya::    [::
112   Pete:             [nods head quickly
```

```
113           {
114   R:      {[>°okay°<]
115   (SF):    [>okay<   ]
```

116 (1.0) ((notices approaching demonstrator))

117 {
118 Pete: {>do wutever feels good<=
119 Lucy: >°you know where they are°< ((high pitched))

The student's question is resolved in consultation with the researcher (line 109–118, data not analysed here) and students are told that they are free to form their own preferred groups. Recall that it has been mentioned earlier that due to the sudden change in demonstrator rosters, the researcher has, on this occasion, remained briefly in the anatomy laboratory after the recording has started to make any adjustment to the recording procedure or offer suggestions for group configurations. At this point, Pete makes another closing statement, "do whatever feels good" (line 118). This gives a conclusive final remark and empowers students to make decisions for themselves regarding group logistics and arrangements. Note also that in this final stage of Pete's instruction the participation framework shifts considerably, with large groups of students breaking off and transitioning to doing the assigned activities.

It is argued that the analysis of this particular closing sequence, observed in Pete's instruction, demonstrates that the students themselves differentially determine the closing. In other words, those students with additional questions can co-construct additional expansion sequences with the demonstrator. However, for those students not needing further instruction or clarification, Pete's terminal instruction back in line 66 may then be considered as the complete closing and termination of their

interaction with him. Although, based upon the recordings, it seems a fair number of students shared the same question as the student seeking clarification regarding group assignment.

The analysis of Extract 5-II has confirmed that volume, terminal phrasing, gaze, and gestures are all resources deployed to achieve closure of some kind of actions in talk. Here the action is an explanation of what students will be doing in class and the initial instructions. As the analysis has illustrated, students orient to these closing signals and cues by displaying their understanding and acceptance or by seeking further instruction and clarification when these were not clear.

5.3.2.5 Summary

Extract 5-II demonstrates consistencies in the sequential organisation of the laboratory introductory phase with those associated with the instruction of teachers (Sinclair & Coulthard, 1975) and the studies of UK university tutors (Benwell & Stokoe, 2002). The analysis has revealed that Pete's instruction also consists of a) future projection, b) contextual details delimiting/justifying the task, and c) orientation to immediate next task. In addition, Pete's laboratory opening instruction demonstrates how institutional roles and identities are embodied in participants' interaction. That is, Pete assumes the higher epistemic status role of the instructor, which then subsumes students to the lower epistemic status role of listenership. Furthermore, the micro-examination of participants' interaction indicates that they default to the traditional institutional membership roles and hierarchy, which allows Pete to set the agenda for his instructing with no evidence of resistance and a high level of compliance from the students. In addition, Pete's intention and agenda to progress the laboratory session in his pedagogical approach may be deduced from the

emergent sequential structure of the opening and closing of Pete's overview of the laboratory session.

The detailed CA analysis of Pete's introduction facilitates an appreciation for how the presentation and sequential structure is significantly different when compared to how Nadia approaches her *instructing* stage presented in Extract 5-I, which focuses on building rapport through the ways in which the participants establish epistemic status. Nonetheless, meaning is constructed both verbally and non-verbally and through the use of other semiotic features. Objects such as laboratory coats and laboratory manuals continued to feature in establishing roles and membership within the group and the data showcased interaction as being locally managed and context bound.

One of the key factors that contributed to the differences between the two extracts was the decrease in teacher-to-student ratio for this particular laboratory session. A detailed examination of Pete's interaction has identified the distinctive switching from first to second pronouns to create shifts in participation frameworks. These represent changing relationships between different membership categories. From a CA and pedagogical perspective, it was remarkable to note that a close examination of the way Pete uses the pronouns such as *we*, *you*, and *they* can be a powerful way of establishing participation frameworks, relationships, and to connote a sense of community with his students. These findings contribute to the developing argument that participants establish a micro-culture through their interaction that draws from and relates to participants' developing sense of a community of practice.

5.3.3 S1W5L4 with Demonstrator Lucy Leveraging Established Laboratory Practice and Culture to Manage a Quick Transition to Table-Talk Phase (Extract 5-III)

The general context of this extract is that the demonstrators are trying to get students to undertake a body-painting activity[25], which students have had prior experiences with in the second laboratory session but for different body regions and new anatomical structures. Unlike previous extracts, the data in Extract 5-III captures more actions and interaction that can take place in the 'Getting Ready and Demonstrating Readiness' stage of the introduction, such as updating or briefing other demonstrators on news related to the laboratory/tutorial sessions or assisting with laying out laboratory materials. The data reinforces the notion that participants locally manage interaction, but demonstrators have a dominant role in the construction of the laboratory introductory phase.

Following the previous approach, this section will shift focus to an examination of the impact of participants' orientation to membership categories influencing their epistemic assumptions and displays of epistemics. However, the analysis of participants' interaction in this extract will illustrate how participants' social practices further observably show them to be orienting to and drawing upon their respective emerging understandings of a shared community of practice. Recall that the elements of a community of practice advanced by Hellermann (2008) for language classrooms, which is founded upon the earlier work of Lave and Wenger (1991), include:

- *mutual engagement* (i.e. mutual understanding of their individual roles, competencies, and subsequent changes to them)
- *joint enterprise* (i.e. common goal of learning anatomy)

[25] The activity involves students using a marker to draw and trace out anatomical structures on one of their peers; and in this session they are focused on drawing the superficial veins of the upper limb.

- *shared repertoire* (i.e. how anatomy laboratory sessions are conducted and how students should go about learning anatomy)
- *curriculum reification and participation* (i.e. participants shared ritual practices of the anatomy laboratory session), and
- *economies of meaning* (i.e. shared laboratory practices and actions that are meaningful to the participants).

In addition, unlike previous extracts where there is a clear transition from one stage of the introductory phase to the next, in this extract, the demonstrator (Lucy), is observed alternating between giving introductory instructions and *doing preparations*. This is because the demonstrators are trying to finish up some last-minute preparations to have everything ready for the students.

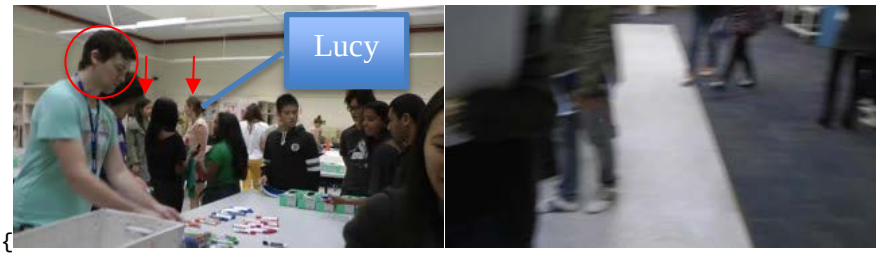
Following the previous approach to presenting the analysis, the full transcript of the interaction is presented before analysing individual segments. The analysis of this data segment will challenge the linearly progressive stages of the laboratory introductory phase depicted in previous extracts, which is uniquely represented by how Lucy and Pete manage their switching between various interactional activities evident throughout the video records. Thus, unlike previous extracts, the individual analysis will not be separated by headings that represent different stages of the opening. The analysis will still progress sequentially but each segment will highlight and discuss significant interactional events that show progressivity and how a developing sense of community of practice affects epistemics and membership categories.

Due to unforeseen circumstances beyond the control of the researcher at this particular data collection session, the transcript and recording starts at some point near the beginning of the anatomy laboratory session. However, it is not possible to

ascertain exactly when the recording started or how far into the laboratory session is the recording. Nevertheless, the research has remained true to CA methodology and the recordings have not been intentionally edited and remain in their original and true form. Furthermore, in following CA transcription conventions, the transcript directly reflects the data recordings and consequently there are several missing segments in both the recording and transcript which are beyond the control of the researcher. In addition, there are several segments with very poor audio quality for Pete, which could not be transcribed because only Lucy wore the wireless microphone.

Extract 5-III (S1W5L4) The laboratory introductory phase between demonstrator Lucy and her students. Lucy is working with demonstrator Pete in this laboratory session and each of them has an assigned group of students that they are responsible for. Please watch the video file of this data segment available at https://dl.dropboxusercontent.com/u/88971137/Extract_5-III_S1W5L4_Demonstrator_Lucy_and_Pete_Laboratory_Introduction.mp4

```
(S/SF/SM)=unidentified student speaking; 'F' denotes female; and 'M' denotes male
(S's)=students as a group
SF#=Female student identified
SM#=Male student identified
1     Lucy:   and things.(.) SO ABOUT A:::::, IF ONE OF YOU GUYS OF EACH PAI::R WANT
              TO GRAB a:: pen:::
2             .hhh EM:::: GRAB THE::::=
3     ((Recording cut out))
4     ((Lucy, in a pink sleeveless shirt, talking to another demonstrator shown by
              red arrows in the first picture of line 8))
5     Lucy:   =nancy said that we coulds- we could- (.)=
6             =give them tutorials for eh::m:: or for presentations for next week (.)=
7             =the next session if we wan::t:ed to: just to spread it
```




```
8             {
9             {ou::t or we can just lea::::ve it as the
10            final thing=
11    Lucy:   =i >>was a bit<< con:fu::sed, i just kind of left it. (.) i just seemed
12    ((Recording cut out))
```

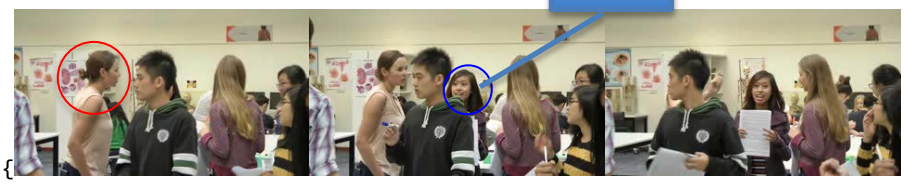
13 {
14 Pete: so you {draw on each o::ther::

15 {
16 {( ) two per group

17 {
18 {(1.2) ((tutor organising markers on table))
19 Pete: (ready o::)
20 Lucy: ( )
21 ((Recording Cut Out))

22
23 Lucy: >OKAY::: GUY::S: COME ON< (and be) pai:::red u:p:
24 (0.2)
25 SF1: we are doing in pair:::s?=

26 {
27 Lucy: ={you::: doing in pai::rs ye::p.=
28 SF1: =oh::. (in pairs) o::kay:: (.) o:kay::



29 {
30 Lucy: {>you can do it as a three if you end up that way::=

31 {

32 Lucy: ={but one of you gra::b a colour of each pen< (.) and start cracking on:::.

33 (1.0) ((Lucy takes a big step to adjacent table and moves to central position))

34 { {

35 Lucy: {>(hay) guy::s can we grab the colours::.< {((disengages by turning 90 degrees right))

36 (1.0) ((Lucy scanning for student engagement in task))

37 ((Recording cut out))

Before beginning the detailed analysis of different segments of the transcript, it is important to note that it can be observed from the transcript and the recording that in the S1W5L4 introductory phase demonstrators did not bring all their students together, as was the case in previous extracts. This is evidence to support the central role the demonstrators have in moderating the pedagogical interaction, and therefore the experiences that students have in the anatomy laboratory.

5.3.3.1 S1W5L4 sequential analysis of session's progressivity and a developing sense of community practice shown in epistemics and membership categorisation

The recording unintentionally begins with the camera on the video-recording technician's foot, but one can hear the demonstrator, Lucy, speaking loudly and giving instructions to students to get them ready for the laboratory activity:

```
1     Lucy:   and things.(.) SO ABOUT A:::::, IF ONE OF YOU GUYS OF EACH PAI::R WANT
              TO GRAB a:: pen:::
2     .hhh EM:::: GRAB THE::::=
3     ((Recording cut out))
4     ((Lucy, in a pink sleeveless shirt, talking to another demonstrator shown by
              red arrows in the first picture of line 8))
5     Lucy:   =nancy said that we coulds- we could- (.)=
6     =give them tutorials for eh::m:: or for presentations for next week (.)=
7     =the next session if we wan::t:ed to: just to spread it
```

```
8     {
9     {ou::t or we can just lea::::ve it as the
10    final thing=
11    Lucy:   =i >>was a bit<< con:fu::sed, i just kind of left it. (.) i just seemed
12    ((Recording cut out))
```

The unique laboratory circumstances depicted in the recording and transcribed in this extract reveal a situation where Lucy, in the early part of the introductory phase, has to alternate between laboratory/tutorial preparation activities and soliciting students to give her instruction. While the recording is quite fragmented in this part, it is clear that Lucy is the one doing the majority of the talking. In line 1 a partial utterance by Lucy is heard. There is no visual image of her but it sounds as if she is in conversation with another demonstrator. Part way through their conversation there is a prosodic shift in Lucy's voice as she begins to give the instructions that are recipiently designed for the students, "…SO ABOUT A:::::, IF ONE OF YOU GUYS OF EACH PAI::R WANT TO GRAB a:: pen:::". Lucy also uses the second person pronoun when providing the general instruction to her students, and this makes relevant a category specific activity "you guys (students)… grab a pen", which also helps to differentiate her talk regarding instruction with another demonstrator (lines 1 and 5–11). In contrast to Pete's instruction in S1W2L2, the full

transcript of Extract 5-III reveals and, as the following analysis demonstrates, the remainder of Lucy's instructions to students are brief (see lines 23 and 35) and do not contain the full description of the laboratory activities and procedures. Instead, Lucy tells students to get into pairs or to take the necessary resources; "grab the colours". Note however, due to the brevity of her instruction Lucy's constructed turn uses elongated syllable, "**SO ABOUT A:::::**,". This helps to orient students' attention in preparation for her forthcoming instruction. Furthermore, note her use of the conditional structure, "**IF** ONE OF YOU GUYS OF EACH PAI::R **WANT** TO GRAB A:: PEN", which recasts her instruction as a suggestion and recommendation instead of a command with full authority. Altogether, these features (i.e. pausing and conditional) are typical of hedging and politeness structures, which suggest an attempt to downplay the asymmetry of authority in the institutional membership relations, and have been previously observed in the instructional practice of UK university tutors (Benwell & Stokoe, 2002, 2005).

Following Lucy's initial instruction to students, she engages in another type of preparatory activity not found elsewhere in this data set. She informs the other demonstrator about her earlier discussion with the lecturer (lines 5–11). The recording cuts out in line 3 and whilst there is a lack of certainty about how much time elapses, once the recording resumes in line 5, Lucy is in conversation again with a demonstrator, who is most likely the same demonstrator prior to the prosodic shift, (marked by arrows in line 8–Lucy is the demonstrator on the right wearing a pink sleeveless shirt). Lucy's update includes how the lecturer (Nancy) wanted the demonstrators to organise the student presentations for a tutorial activity. Note the subtle prosodic shift in Lucy's voice as she returns to talking to the demonstrator, which sounds more conversational, softer, and less projected than her previous

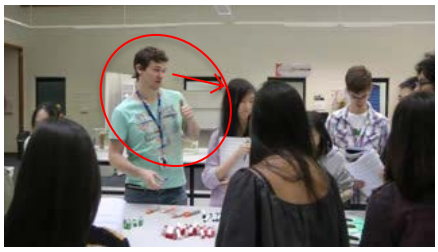
directives to students (lines 1–2). Lucy's pronoun shift to the first person plural *we* can also be observed as she talks to the demonstrator, "nancy said that we coulds- we could- (.)" (line 5) which establishes their shared identity. This is further consolidated as they continue to discuss the assignment of presentation to students, where Lucy uses the third person plural "give them tutorials for eh::m:: or for presentations for next week (.)" (line 6). Lucy does a self-initiated-self repair to clarify her time point reference, "…next week (.) the next session if we wan::t:ed to: just to spread it ou::t or we can just lea::::ve it as the final thing=" (lines 6–10). Note the frequent use and context of 'we' in talking about the pedagogical choices that the demonstrators have in Lucy's update. Based on Lucy's talk, it is apparent that the lecturer empowers the demonstrators to make certain instructional design decisions, and the talk confirms that the demonstrators have control over the implementation of the lecturer's laboratory curriculum. The power to exercise judgement is reflected in Lucy's utterance and switch to first person pronoun, "=i >>was a bit<< con:fu::sed, i just kind of left it. (.) i just seemed" (line 11), which shows how she has dealt with the lecturer's instruction and has chosen the option to "leave it (i.e. the presentation) as the final thing" (lines 9–10). However, the pedagogical implications of this set of findings argues for the need for better bilateral relationship and communication between the demonstrators and the lecturer to ensure alignment between the planned and the delivered curriculum. Perhaps the lecturer needs to create more opportunities for demonstrators to meet and clarify any instructional delivery issues that have risen.

Besides Lucy's talk, which features the demonstrator's roles, tasks, and responsibilities, Pete's actions also reveal another important demonstrator task in the laboratory introductory phase. In the first frame-grab in line 8, Pete can be seen

sorting the markers by their colours at the table to make it easier for students to find the different coloured markers. It is interesting to note that at this point there appears to be different division of labour, with Pete responsible for sorting out coloured markers and Lucy giving general instructions to the students and updating another demonstrator. Albeit, Lucy's instructions are minimal, and students seem more or less aware of what they are doing. Nonetheless, these actions show the demonstrators simultaneously getting ready for the laboratory activities while providing students with instruction. As can be seen below, even with the division of labour while Pete is sorting out the coloured markers, he also gives some brief forms of instructions to the students immediately around him gathering their materials (line 13–19).

```
13                          {
14    Pete:   so you        {draw on each o::ther::
```

```
15                    {
16                    {(            ) two per group
```



```
17
18              (1.2) ((tutor organising pens on table))
19    Pete:     (ready o::)
20    Lucy:         (      )
21    ((Recording Cut Out))
```

An examination of this brief segment featuring Pete switching from organising coloured markers to giving instruction to students illustrates the brevity of his

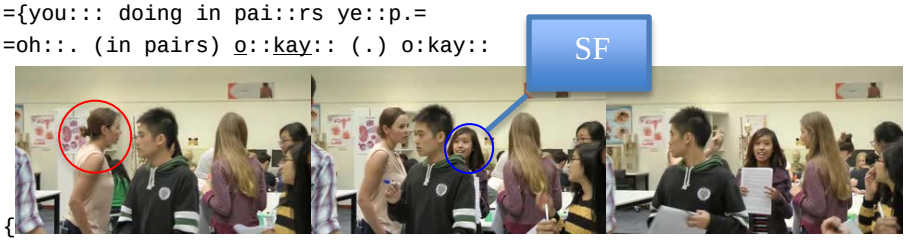
instructions to the students (lines 14, 16, and 19). Pete's utterances are accompanied by gestures that help to clarify each of the three segments of his instruction (lines 13, 15, and 17). The gesticulations help to make clear Pete's instruction, but understanding the meaning of Pete's multimodal instruction requires prior knowledge and understanding of the laboratory session. However, this is not a problem for these students because this is their fourth laboratory session and the second time students are engaged in the body-painting activity. This means that students can, to some extent, draw upon their understanding of the institutional culture which expects students to become independent self-guided learners. This data provides some evidence of this culture being established amongst the students, where many of them are seen to be reading their laboratory manual (blue circles in line 13). Without the background knowledge obtained from being a member of this community of practice in this institutional setting, it would be very difficult, if not impossible, to understand that Pete's instructions refer and are relevant to the body-painting activity. The data shows that participants have a *joint enterprise* and a shared *mutual engagement* in the task of learning anatomy; they have trust in one another's commitment in taking part, and understand their individual roles (students read the laboratory manual and know what activities they are doing) (Hellermann, 2008). More importantly, participants are developing a *shared repertoire* of regular patterns in their practices, language of communication, and routine, which gives them the necessary *economies of meaning* and, in this case, allows Pete to efficiently and effectively communicate his instruction, and for the student to understand the meaning of his actions (Hellermann, 2008). In demonstrating these elements of a *community of practice* participants also show that they are able to take an abstract curriculum and turn it into real practice, which Hellermann (2008) refers to as

reification and participation. These elements of a community of practice are also drawn upon in the demonstrator-demonstrator talk previously described. However, as the following extract shows, Lucy's assumed cultural understanding and practice causes problems in her subsequent interaction with students.

22

23 Lucy: >OKAY::: GUY::S: COME ON< (and be) pai:::red u:p:
24 (0.2)
25 (SF): we are doing in pair::s?=

26 {
27 Lucy: ={you::: doing in pai::rs ye::p.=
28 (SF): =oh:. (in pairs) o::kay:: (.) o:kay::



29 {
30 Lucy: {>you can do it as a three if you end up that way::=

31 {
32 Lucy: ={but one of you gra::b a colour of each pen< (.) and start cracking on:::.
33 (1.0) ((Lucy takes a big step to adjacent table and moves to central position))

Before examining Lucy's slightly troubled interaction with her students, further evidence is found in this segment that shows how some students are demonstrating the university institutional culture of self-guided and independent learning. While there are some students meandering (see video records), in the frame-grab in line 22,

a few students on the right side of the frame can be seen to be actually reading the manual prior to the commencement of the activity. This supports C. Goodwin's (2013) notion that there are cultural and knowledge-laden objects, and that they are important and useful objects and resources in social interaction and the construction of culture for a community. For this laboratory session, the laboratory manual describes a body-painting activity that requires students to draw in the superficial veins of the upper limb. The flexed arm (blue circle) that one of the students makes in the frame-grab in line 22 and 26 supports the interpretation that students are becoming self-guided and independent, because by flexing the student can make the superficial veins 'pop-out', making their courses easier to trace. Furthermore, in doing so the students are also demonstrating additional knowledge about how the human body works in relation to anatomical structures so that their task can be made easier.

In regards to Lucy's interaction with students, in this segment of the extract (lines 22–37) she engages a group of students located behind the table, who are in the background of the frame-grab in line 1 through her "OKAY:::: GUY::S", which, like previous examples of summons, sets up the attend needed for her ensuing talk (Mortensen, 2009; Schegloff, 1968, 2007a), and also uses elongated syllables in its construction (Benwell & Stokoe, 2002). Unlike previous examples of attention getting (line 2 in Extract 5-I; line 5 in Extract 5-II), this was immediately followed by, "COME ON< (and be) pai:::red u:p:". Before continuing with the analysis, for clarification purposes, the second picture in line 8 shows SF1, in a purple hoody immediately in front of Lucy, who is wearing a pink sleeveless shirt, and SF1's group members to her left. Returning to the analysis of Lucy's utterance, she communicates a sense of urgency for students to get underway with their activities,

which is prosodically displayed through the brevity and rhythm of her instruction. Furthermore, her instruction is abruptly closed, as indicated by the (0.2) second micropause in line 24. As such, Lucy's turn serves three functions. First, it shows Lucy's understanding that students have yet to form the right group logistics to carry out the activity. This is likely to have been based on her observation the group is made up of three students instead of pairs. Second, the brief instruction shows Lucy's assumption that students are not progressing with the activity as self-guided and independent learners. Furthermore, the brevity and simplicity of her instruction exhibits the potential assumption that Lucy makes about students already knowing the laboratory activity of the day, but who are not aware of the activity requirements to be in pairs. Finally, it serves as a brief directive to amend the grouping issue.

The pause is a strong indication that Lucy considered her introduction to be complete but, as previously discussed, often in the wrap-ups and closings stage of the introduction there is potential for delaying the termination if additional clarifications are required. Thus, the pause also indicates a transition relevance space (Ford, 2012; Mondada, 2007; Sacks et al., 1974) where another speaker can take the floor, which indeed is what occurs (line 25). An examination of the student's uptake of that transition space, in line 25 it can be seen that a female student (SF) initiates repair by seeking clarification with Lucy. In doing so, SF1 displays her K- epistemic status through her question, which suggests that she is perhaps not aware of the pairing requirement having already formed a group of three, and she is now inquiring and in a sense appealing to Lucy for the possibility of not being in pairs for the activity. SF1's action creates an epistemic gradient that necessitates further clarification from Lucy. Indeed, she confirms the pairing requirement in line 27, "={you::: doing in pai::rs ye::p.=". Subsequently, SF1 responds, "=oh::. (in pairs) o::kay:: (.) o:kay::",

but she displays her surprise at the “news” of Lucy’s response, as indicated by her change of state token *oh* (Heritage, 2012b). SF1’s response also confirms a change in her understanding (Mondada, 2013a), and supports the earlier interpretation of line 25 that SF1 did not know about the grouping requirements. However, the elongated syllables communicate hesitancy in taking up this suggested arrangement, and indeed SF1’s turn shows signs that Lucy’s response may not be preferred (i.e. *dis-preferred* in CA speak). In Lucy’s next turn (line 30) following SF1’s utterance in line 28, she demonstrates her alignment and understanding of the *dis-preferred* response and provides an alternative solution, “{>you can do it as a three if you end up that way::=” (line 30). However, while Lucy concedes to the implied request, she is also keen on getting the laboratory session started “={but one of you gra::b a colour of each pen< (.) and <u>sta</u>rt cracking on:::.” (line 32). Throughout Lucy’s utterance SF1 can be seen taking up Lucy’s exhortation (line 30 and 32) as shown by SF1’s embodied actions of disengagement by turning away from Lucy but towards her group. Lucy is oriented to this embodied display and physically disengages from the students by taking a big step towards the adjacent table (line 33).

34 { {

35 Lucy: {>(kay) guy::s can we grab the colours::.< {((disengages by turning 90 degrees right))

36 (1.0) ((Lucy scanning for student engagement in task))

37 ((Recording cut out))

In closing, this final segment will be briefly examined. It shows Lucy delivering her short instruction for the third time in this laboratory opening to yet another set of students. Lucy's instruction is characteristically brief, as has been previously noted, "{>(kay) guy::s can we grab the colours::.<" (line 35). In terms of her body positioning for this utterance, Lucy has turned to face her intended student recipients, but it cannot be ascertained how the students are oriented to her embodied opening (C. Goodwin, 1980, 2000, 2007; Mondada, 2007). In alignment with her previous characteristically short instructions, Lucy's disengagement seems to have taken place just as spontaneously and quickly as her engagement. In line 34 and 35 Lucy turns sharply right and embodies the closing of her instruction and interaction with her students. This analysis is evidence of how social interaction is not just verbal but also embodied in gestures, gaze, body movements and orientations.

In the previous two extracts the demonstrators were shown creating the summons that established a demonstrator-group participation framework, but in this extract Lucy constructs her verbal and non-verbal actions in different ways to achieve a sped-up version of the introduction for rapid transition into the *table-talk* phase. In fact, the transcripts have shown Lucy repeating similar instructions three times (line 1, 23, and 35), each of which is likely directed at different students, but it is difficult to confirm due to the poor quality of the recording (i.e. cut-off, angle and perspective of the shots, and distance from the participants being filmed). The brevity of her instruction and how it targets specific aspects of the problem (i.e. get into pairs and "grab the colours") suggests that Lucy makes assumptions about the reasons and issues for why students have not yet transitioned into the table-talk phase of the laboratory. In doing so, Lucy is embodying an expectation that by this point students should know how their laboratory session works, and they should be independent and

self-directed enough to get going with their laboratory activity. These are reasonable expectations because students and demonstrators have the same laboratory manual, which specifically details the learning objectives, activities, and procedures for every laboratory session. The assumption is based on her orientation to the 'student' membership category (i.e. what is expected of them in terms of laboratory behaviour with respect to learning and resources that they must bring with them). These expectations have already been established in the previous anatomy laboratory sessions she has shared with them. However, as analyses of the previous segments have shown Lucy's assumptions do not hold up and cause some interactional issues that had to be resolved through further clarification. Nevertheless, Pete's and Lucy's short instructional sequences seem to suit the context of this laboratory session at this time point in the semester, because they have relatively few interactional problems. Students' acceptance of the shorter and less informing utterances are a feature of this extract as well, and demonstrate their implicit understanding and general acceptance of the developing culture of independence and self-guided learning.

From a pedagogical perspective, this data points to the functional significance and the work that a formal introduction like Pete's in Extract 5-II can facilitate, which arguably may be more efficient (i.e. more quickly and less repetitions than the approaches here) at transitioning the learners from physical co-presence to actual learning collaborations (Benwell & Stokoe, 2002, 2005). Furthermore, the observations that some students still require further prompting and guidance from demonstrators suggest that students are still making the transition from the secondary school/classroom system to the more independent self-guided approach of university anatomy laboratory contexts. Nevertheless, the present extract demonstrates a less formal set of demonstrator instructions than in the previous laboratory sessions, as

seen by the paucity of instructional utterances. This substantiates what Hellermann (2008) has previously argued as developing "…mutual engagement, joint enterprise, shared repertoire, reification and participation and economies of meaning." (p. 9). The pedagogical implications will be discussed in Chapter 7.

5.3.3.2 Summary

To briefly summarise, unlike previous extracts, in this third extract the demonstrators did not act to form students into a larger cohort. Given the particular interactional context and participation framework of S1W5L4, the demonstrators have adopted a different approach to delivering their instruction with a different instructional goal that has not been seen in prior analyses. The CA analysis has shown how Lucy's talk is organised in order to manage her multiple tasks as a demonstrator. She keeps her instructions brief and focuses on getting students into the right group structures and with the right resources so that they can begin their learning activity. She manages each small group individually and repeats her instructions several times to different groups. In addition, Lucy is also involved in helping other demonstrators to ensure that they fulfil their instructional duties and responsibilities to pedagogically implement the intended curriculum by following up and relaying instruction from the lecturer. The private demonstrator-demonstrator talk reflects the instructional context of the anatomy subject and the roles that demonstrators play within the subject, which is designed and overseen by the lecturer. The demonstrators' talk reflects the fact that the lecturer relies upon the demonstrators to implement and deliver the anatomy laboratory and tutorial sessions for the students, who she may or may not necessarily see outside her formal lectures. This extract provides a rare insight into how demonstrators might deal with ambiguous curriculum instructions regarding how they should instruct students to prepare for presentations, which will certainly

have an impact on the students' learning experiences. The analysis argues for the importance of a feedback look or open channels of communication between the demonstrators and the lecturer(s) to ensure that learning goals are clearly understood and appropriately aligned with the instructional activities chosen and delivered. Demonstrators should not just rely upon themselves to figure out how to best resolve unclear procedures and instructions from the lecturer.

The analysis of Extract 5-III also demonstrates the potential issues that may arise due to the demonstrator's epistemic assumptions implicit in the construction of her instructions. Analyses show how participants are constantly monitoring one another's embodied signals and responses from moment-to-moment. As has been noted, participants display and demonstrate their orientation to closure or possible continuation of recipiency that become relevant in the transitional turn space both verbally and through embodied signals, such as continuing to face one another or turning away from each other. It is the intertwined combination that clearly signals the terminal closure of engagement and recipiency.

The relative success of the interaction between Lucy and her students demonstrates the participants' mutual orientation to one another's talk. The data is yet another example of the sequential organisation of laboratory introductions being co-constructed and locally managed by participants to suit their emerging interactional needs. As a result of this, participants have tremendous agency and influence on the trajectory of their pedagogical interaction via their own social actions which is continuously influencing and influenced by the unfolding sequences. Furthermore, in this extract, objects such as laboratory coats and surgical gowns that have previously played a more important role in helping participants orient to membership categories are taken out of the equation and become obsolete, as

demonstrators come to the sessions in casual dress. Yet, membership categories continue to be strongly displayed and oriented to in similar ways as in previous extracts. Demonstrators continue to hold speaking rights and have a dominant role in directing the co-production of the introduction with their students. In other words, demonstrators can act like social glue that draws everyone together. This provides evidence for the importance of the institutional context, but it is also evidence for membership to be established through a developing sense of familiarity. Yet, as has been revealed in this extract, the demonstrators may also choose not to assemble their students in the same fashion as in Extract 5-I and Extract 5-II.

Finally, and most importantly, the analysis of this final extract demonstrates how interactional practices are changing over time. With participants developing a history together in the anatomy laboratory sessions they begin to form and develop a community of practice with its own cultural practices that renew but also recast educational institutional roles and identities. In particular, compared to earlier analyses, Extract 5-III shows evidence of learners redefining their student roles and gaining increasing levels of self-sufficiency and independence, but still requiring clarifications and directions from the demonstrators at times. In addition, the extract illustrate how the sequential structure of the demonstrators' introductions embody an expection of shared knowledge and understanding of anatomy laboratory procedures. This was illustrated by the short instructions given to three different groups, and it appears from the recording that only one group of students sought further clarifications. Furthermore, Extract 5-III characterises a pedagogical approach that stands in contrast to the direct teaching and instructing that features traditional teacher roles and identities previously identified in other education institutional settings (Benwell & Stokoe, 2002; Gage, 2009; Gardner, 2012; McHoul, 1978;

Mehan, 1979a; Seedhouse, 2012). The present extract finds evidence which suggests anatomy laboratory demonstrators embody slightly different roles, responsibilities, and relationship hierarchies that might better be characterised as those of a mentor or facilitator, who continues to guide and assist the students in their learning.

5.4 Discussion

The data thus far discussed have been selected from Semester One. While generally speaking, the openings consist of various activities that contribute to the formation of the four stages of introductory phases, the analyses show the demonstrators imparting their own styles and judgments of the purpose and utility of the introductions, which determine how they individually present and structure the content. However, students' exhibited behaviours continuously inform demonstrators, so that the outcome is an opening achieved collaboratively.

This is the first time that the formal introduction interactions of an anatomy laboratory session have been micro-analysed and described using CA in anatomy pedagogical education research. The analysis provides novel insights into understanding the pedagogical roles and identities of laboratory demonstrators and students. More importantly, it shows how teaching and learning is one and the same social phenomenon that is achieved collaboratively and progressed through participants' demonstrations and negotiations of understanding (Hindmarsh et al., 2011).

5.4.1 Laboratory Session Introduction Sequences — Finding a Structure of Regularities

In examining the interactional data from the Semester 1 anatomy laboratory sessions, there are noticeable modifications in how the sessions are conducted as content and activities are changed; however, there is a regularity developing in how students

engage with the demonstrators. The most obvious structures emerging are the sets of instructions and directions from the demonstrators, and students' orientation to them. Demonstrators and students co-operatively construct interaction that shows regular sequential pattern and phases. These stages are illustrated in Figure 5.1 Sequential organisation of the anatomy laboratory introduction (p. 173) presented earlier in this chapter. It is important to note here that these phases may be highly variable in their length, from a few lines to a long set of instructions, as was demonstrated in the previous analyses. They can also vary in format, from a monologue-like format (e.g. Pete in Extract 5-II) to a more conversation-like exchange (e.g. Nadia in Extract 5-I), determined locally. Unlike previous models of teacher and tutor instructions that emphasise a three-part construction of a) future projection, b) contextual details delimiting/justifying the task, and c) orientation to immediate next task (Benwell & Stokoe, 2002; Sinclair & Coulthard, 1975; Stokoe, 2000), the sequential organisation of anatomy laboratory demonstrator formal introductions show greater variability. More importantly, the data reveals the significant embodied interaction involved in this phase.

5.4.1.1 Sequential organisation of anatomy laboratory formal introductions

The first stage, *Getting Ready and Demonstrating Readiness to Begin* (See Figure 5.1 p. 173), occurs prior to the formal introductions of the anatomy laboratory sessions, which is initiated by the demonstrators. This is a period of time used by demonstrators and students to get ready. This stage begins when demonstrators and students physically arrive at the laboratory, and begin their respective preparations for the commencement of the session. Demonstrators and students orient to different membership categories. This means that they have different responsibilities and hence are involved in preparations to get ready for the laboratory. Students'

preparation involves being on time, being present, storing their personal belongings in cubicles on the shelves in another part of the laboratory, putting on their laboratory coats (if needed), and bringing the necessary laboratory manual and writing utensils.

Demonstrators' preparation involved donning a surgical gown (if necessary), storing their personal belongings in the designated demonstrators' office, bringing their laboratory manual and any necessary writing objects. In addition, demonstrators may liaise with the lecturer and one another and, when and where necessary, help organise and hand out learning resources for students. The extents to which demonstrators assist with the organisation and handing out of resources varies from session to session. For the majority of the sessions in this study, demonstrators simply arrived at a laboratory that had been previously set up by the laboratory technician in consultation with the lecturer of the anatomy subject. Another administrative and organisational task for the demonstrators was to mark student attendance, as an 80% laboratory attendance is a requirement for students to pass the subject. This is occasionally completed in the 'getting ready' part of the laboratory session introduction, but demonstrators are just as likely to complete this at any other point in time during the laboratory sessions. Finally, besides administrative and organisational tasks, demonstrators need to familiarise themselves with the students they are teaching, the learning activities, and the relevant activity resources that are available for the particular laboratory session.

Recordings and personal observations of the stage *Getting Ready and Demonstrating Readiness to Begin* in the laboratory introductory phases show students and demonstrators engaging in a variety of activities, such as chatting with their peers, organising learning resources or studying the laboratory manual. Some of these activities are captured in the data recorded, but clearly missing from the

recordings is how the participants arrive and enter the laboratory. The recordings do not show how students flow into the laboratory space; how they put their bags and personal belongings away; how they gather their writing instruments, pull out their laboratory manuals, pull on their laboratory coats; or how they file back into the laboratory space. Data recordings all generally start with students having already taken up their post around the demonstrator or with demonstrator instructions already underway.

Once most of the preparation work has been completed and students and demonstrators have mutually demonstrated and physically oriented to each other's co-presence and readiness to begin, it is up to the demonstrators to formally open the session by soliciting students' attention verbally. This is the *Establishing Recipiency* stage (See Figure 5.1 p. 173). The solicitation from the demonstrator sits at the interface of two stages, which are *Getting Ready and Demonstrating an Orientation to Readiness to Begin* and *Instructing* (See Figure 5.1 p. 173). At this juncture, demonstrators become critical agents in signalling the change in their activities that lead everyone into the *Instructing* stage of the introductory phase; however, it is really accomplished with the mutual orientation of both parties to each other's readiness to start. Typically, demonstrators establish this recipiency through summons and attentionals. Characteristically, a pause follows the initial summons, as demonstrators wait briefly for student orientation. The summons from the demonstrator remains incredibly consistent in its location and structure. This signal functions to clearly indicate the transition to the *Instructing* stage.

Once students have oriented their attention to the soliciting demonstrator, participants are then prepared to continue to the next phase together, the *Instructing* stage (See Figure 5.1 p. 173). This stage can be said to begin immediately after the

attention of students has been established. There are significant variations in the organisation of this stage of the introductory phase as we have seen, but in all cases the demonstrator initiates. It is also at this stage that the demonstrators' agenda, purpose, and function for their introduction become apparent through the ways in which they structure and produce their utterances when they have the attention of students. During this stage, the tendencies are for the demonstrators to continue their dominant speakership role as they describe and outline the laboratory activities that will take place. In the present corpus, demonstrators generally go into a presentation style that reflects many features elucidated in the work of Rendle-Short (2006) on academic presentations, as well as research by Benwell, Stokoe, and other CA researchers that examines university instructional settings (Benwell, 1999; Benwell & Stokoe, 2002, 2005; Lindwall & Lymer, 2014; Stokoe, 2000; Zemel & Koschmann, 2011).

In analysing the three transcripts, notable differences in the interaction style were found. In the first laboratory session for the semester the demonstrator, Nadia, fostered interaction that encouraged rapport-building, while in the fourth laboratory session, students were expected to commence activities with minimal guidance, such that there was no preamble or pre-entry stages prior to the *Instructing* stage.

In regards to the final stage of the introduction, the *Instruction Wrap-Up/Closing*; it is important to note that the boundaries of these stages are far from clearly defined, and that there is a gradual shift of topicality, like those observed for conversation in university settings (Benwell & Stokoe, 2005; Stokoe, 2000; Stokoe et al., 2013). One of the reasons is that the demonstrator is in total control of how much instruction they intend or desire to give, which includes the length and amount of materials s/he intends to cover in the *Instructing* stage. Consequently, the

demonstrators control the moves to close their instruction, and may have the option to delay closure to provide further instruction (e.g. Pete in Extract 5-II), or to give as much or as little instruction as they deem necessary (e.g. Pete in Extract 5-II or Pete and Lucy in Extract 5-III). The other reason, and somewhat related to the first given reason, is that the 'wrap-up' may be signalled in a variety of different ways (Rendle-Short, 2006), including embodied displays (e.g. Lucy in Extract 5-III). That is, the demonstrator might be signalling an imminent end to his/her instruction via the content, prosody, speech speed, volume, and/or use of discourse markers. Last, students can postpone closing by seeking further clarification that moves the boundaries of this stage. This again shows the local contingencies that bear on the sequential organisation of the stages for laboratory introductory phases. As such the 'instruction wrap-up/closing' is again a co-constructive element of interaction.

Therefore, although there is asymmetry in the turn-taking organisation typically found in education institutional settings, which may be applicable in some university contexts (Emanuelsson & Sahlström, 2008; Lerner, 1995; McHoul, 1978; Mondada, 2013b; Stivers et al., 2009), the present analysis demonstrates that the emergent organisation also depends on students' orientation and deferral of their response and speakership until it becomes relevant in the sequential organisation led by the demonstrator. Similarly, the demonstrators are equally responsive to students' needs and are ready to modify their turns in response to locally emergent resources, which may create opportunities for humour and demonstrate affiliation and alignment.

5.4.1.2 An interactive basis to foster a community of practice: Relating sequential organisation, membership categorisation, and epistemics

Besides sequential organisation, analyses of the data also identified intricate dependent relationships between sequential organisation, membership categorisations

and epistemics (illustrated in Figure 5.2 p. 252). The analysis of the data suggests that the sequential organisation illustrated in Figure 5.1 (p. 173) is made possible by students' and demonstrators' orientation to each other's membership, relevant to the university education institutional context. This orientation helps to establish a locally managed participation framework and speaking rights for the unfolding interaction.

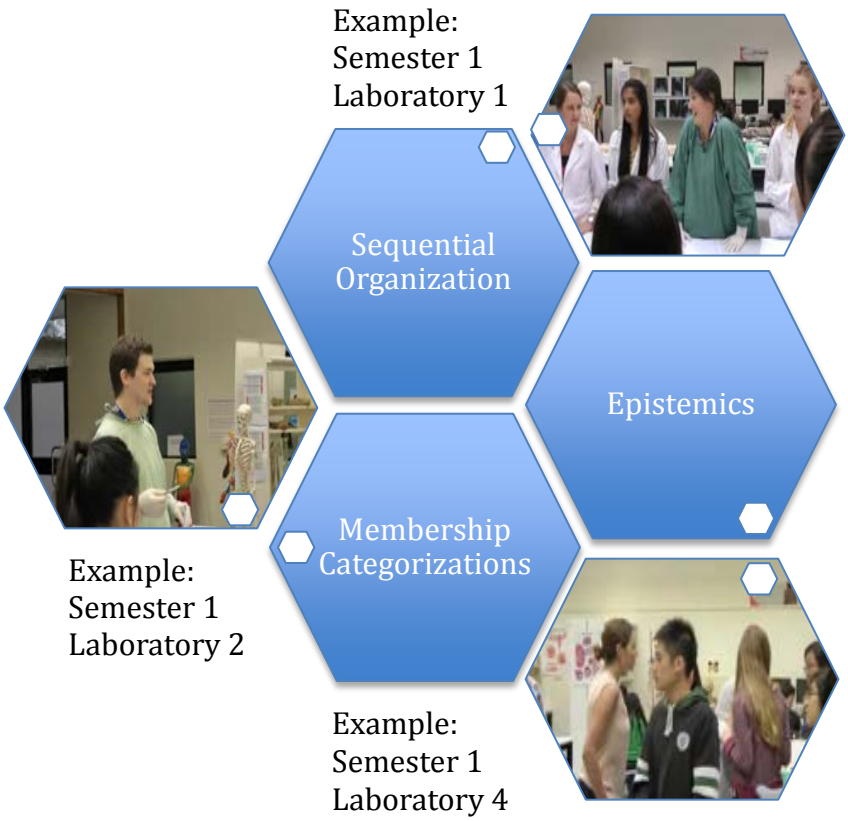


Figure 5.2 A model of the relationships between Sequential Organisation (Sacks et al., 1974; Schegloff, 2007a), Membership Categorisations (Mondada, 2013a) and Epistemics (Heritage, 2012c; Mondada, 2013a).

The examples in the figure show data that best represents the particular conversation organisational structures that are prominently featured in illustrating how demonstrator-student interactions in the introductory phase were able to achieve their intended functions. For example, in the rapport-building process between Nadia and her students in Extract 5-I (Laboratory Session 1), examining the conversational organisation from the sequential organisation and epistemics perspective helped to characterise Nadia's pedagogical approach. In Extract 5-II (Laboratory Session 2),

examining the sequential organisation and membership categorisations that Pete oriented and made relevant helped him to deliver his laboratory session overview to his students. Last, in Extract 5-III (Laboratory Session 4), it was shown how Lucy's interaction made relevant membership categorisations and their affiliated epistemics to co-construct introductions that rapidly transitioned students to the table-talk phase.

5.4.1.2.1 Membership categorisation

During the introductory phase, membership categorisation seems to be especially important because much of it appears to be demonstrator-led, and without the orientation to membership and institutional roles there will likely be far more competition for speaking rights and a need for re-negotiation of membership categories, as demonstrated in the work of Mondada (2013a). In the present corpus of data students defer to the authority and expertise of the supervising demonstrators, as exhibited by students taking up positions around the demonstrators, by demonstrators asking for and being granted attention, by complying with and silently accepting the demonstrators instruction, and so forth. Unlike the university students in the UK tutors study by Benwell and Stokoe (2002, 2005), who show resistance to their academic identity, the university radiography students in this corpus seem more or less compliant and cooperative, with relatively few signs of hesitancy in acknowledging and accepting their academic student identities and the authority and expertise of the demonstrators. This issue will be further explored in Chapter 6.

In the data, participants are oriented to their roles as either the demonstrator or the student. In large part, this is accomplished because participants demonstrate their awareness of the larger institutional context. That is, they are physically located in a human anatomy learning centre on a university campus. The institution assigns roles, based on whether participants are enrolled as a student or employed as a

demonstrator, however participants may choose to embody a myriad of additional identities and thus it is up to the participants to enact and make relevant their identities in the activities and social actions they carry out (C. Goodwin, 2013; Hellermann, 2008; Stokoe, 2010). Hence, students are registered with the university as students, they pay a student fee, and they sit in lectures on fixed 'student' seats. Whereas demonstrators are registered as staff members, they are paid by the university to instruct, and generally they do not attend lectures.

Students and demonstrators are mutually engaged with one another in anatomy laboratory sessions shown in the extracts of section 5.3. They also share the *joint enterprise* (Hellermann, 2008) of anatomy learning and teaching as part of the curriculum in the radiography program. Since anatomy laboratory sessions are a formal part of the curriculum, students are likely to assume that the sessions are presided over by a teacher or person with expertise of some sort. Furthermore, during their first-year orientation week [26], radiography students are informed of the procedures and conducts of the anatomy laboratory sessions, which helps to establish an institutional culture and expectation. Armed with this procedural knowledge or information, students are able to come into the initial anatomy laboratory sessions, identify the demonstrators, and then check the tutorial groups they have been assigned.

5.4.1.2.2 Epistemics

Another important contributor to sequential organisation is epistemics. As discussed in Chapter 3, Heritage (2012b) demonstrates that participants display epistemic status

[26] 'Student orientation' is a series of induction activities organised by the university, or depending on specific requirements, by the departments themselves. The activities are designed to give students the opportunity to familiarise themselves with their new environment, to foster new friendships, and to learn more details about their degree programs through their predecessors. During orientation week, students and staff also interact with one another and introduce details about the specific course or subject such as where lectures, tutorials and laboratory sessions take place and what format of teaching and learning are employed and to be expected.

and epistemic stance in interaction with one another. The displays of epistemic status and stance create epistemic gradients that invite information exchange. As information is exchanged in the moment-to-moment unfolding of interaction, participants display varying epistemic stances, causing changes to the direction and amplitude of the gradient. If this gradient is not maintained and is allowed to level out without further contributions from interactants then the conversations cease (Mondada, 2013a). In the current data corpus, participants' displays of epistemic authority, assumptions of each other's epistemic statuses and, most interestingly, uses of different epistemic stance to co-construct and locally manage their interaction with one another all illustrate the role of epistemics in action.

In the data presented in this thesis there is an opportunity to investigate the role of epistemics in the introductions of anatomy laboratory sessions as novice anatomy learners and teachers come together. In this curriculum context, students are mostly recent high school leavers. In preparation for this initial transition into an unfamiliar learning environment and introduction to an unfamiliar subject, students receive an orientation given by the radiography department. However, it is still necessary for the demonstrators to build trust and establish a rapport with the students during the first few sessions, since both parties are meeting for the first time and working with one another throughout the semester. Both students and demonstrator achieve interactional order with little training and prompting. This is evidence of how the participants themselves introduce relevant socio-cultural knowledge and resources based on their previous experiences as members of the formal education institution in order to mutually collaborate and co-construct the interaction captured in the data (C. Goodwin, 2013). Their multimodal practices and the transformation of relevant resources for their social actions institute a relevant micro-culture that is continually

oriented to, renewed, and modified throughout the course of each individual context and case of social encounter.

It is important to mention here that in this curricular context there is an obvious discontinuity in the allocation of demonstrators to different student groups from session to session as well as across the semester. For example, one of the demonstrators told the students that she would only be “doing the anatomy and radiology tutorials for the next three months” (Extract 5-I lines 13–16, p. 176). In the second semester the same group of students is introduced to another team of demonstrators. Thus, it is reasonable to expect that as demonstrators take over groups from session to session and across the semesters there might be more instances and opportunities for rapport and relationship-building. However, few instances of this have been captured in this data set. In fact, there is surprisingly little evidence of interaction where demonstrators attempt to establish a more personal level of relationship with students. The majority of interactions between demonstrators and students are, in general, efficiently and economically designed for getting to the business of anatomy teaching and learning. This will be discussed further in Chapter 6. Furthermore, names are rarely used or mentioned in student-demonstrator interaction after the first introductory tutorial. Consequently, it is of great interest to investigate the first formal introduction between students and demonstrators in their initial anatomy laboratory sessions, and analyse how rapport-building is accomplished in these instances. Despite these challenges, the laboratory participants generally appear to manage and organise their social encounters with ease, and this can be attributed to participants’ mutual orientation to understanding of the relevant micro-culture that is informed by the greater formal education institutional culture.

5.4.2 Summary

At this stage of the discussion, it becomes possible to understand the complexity of the relationship between sequential organisation, epistemics, and membership categorisations. Participants use epistemics on the premise that they orient to the different institutional membership categories; that is, student or demonstrator. Extracts from the data to be analysed in Chapter 6 will illustrate some of the different ways in which participants made use of epistemics to locally manage their interaction depending on their institutional roles. The extracts will also show how institutional roles contribute to establishing an implicit epistemic status that may be oriented to.

5.5 Conclusion

The extracts of Australian university anatomy laboratory introductions that have been presented modelled the following sequential organisation:

1. Getting Ready and Demonstrating Readiness to Begin
2. Establishing Recipiency
3. Instructing
4. Instruction Wrap-up/Closing

In each of the extracts, samples were presented and analysed to illustrate features that characterise each of the four phases. More importantly, the various exhibits showed that within their respective emergent sequential organisation students consistently orient to demonstrators having the responsibility to help them make the transition to undertaking the activity of the laboratory session. This may be done via constructing rapport and building affiliation (Extract 5-I), through detailing of the activities or procedures (Extract 5-II), or through giving specific directives on what to do (Extract 5-III). In making such transitions, fine-grained analysis of the interaction reveals how the demonstrators deploy different interactional resources in making such transitions.

For example, the use of informal language by young adults is a feature in building rapport and affiliation (e.g. “hey guys”, “you guys”, “the girls you met from last week”, “so yu gonna be pros”, etc.); discourse markers such as *okay* segment long pieces of instruction into smaller more manageable chunks of information (Pete in Extract 5-II); objects and artefacts like the laboratory manual are useful in facilitating communication of tasks and procedures; and semiotic resources such as body positions/gestures are important in establishing recipiency, clarifying changes in participation framework and reinforcing content of utterances. The membership identities and relationships are a cultural resource and product of the participants’ interaction in this specific institutional cultural context. How laboratory participants co-construct their social encounter depends on these socio-cultural norms, which are likely to vary across different universities, languages, and cultures. Nonetheless, the data indicate the influential effects and the importance of these socio-cultural substrates in serving as the raw resources for participants to co-construct social encounters that activate the micro-culture for developing their community of practice at a local level.

Each of the extracts also illustrated the different ways in which sequential organisation is influenced and dependent on membership categorisation and epistemics. All of the exhibits demonstrate the importance of membership categories and participants’ orientation to those categories in establishing speakership and listenership. The orientation to membership categories is largely accomplished by the institutional context, but is assisted by objects such as laboratory coats and latex gloves. Extract 5-I especially featured epistemics driving the sequential organisation of rapport-building, as the demonstrator varied her epistemic status to manipulate the epistemic gradient in order to develop a communicative environment. In Extract 5-II,

the demonstrator's careful use of personal pronouns signalled his orientation to membership categories that created a shift in participation framework. This shift created a change in the sequential organisation of the *instructing* stage that led to some rapport-building. Finally, in Extract 5-III, the demonstrator, Lucy, revealed her orientation to membership categories that led her to make epistemic status assumptions about students' knowledge about 'what to do' and procedures. These assumptions are evident in the brevity of her instructions. They also showed ways in which they were incorrect through students' initiation of repair.

The analyses of the various extracts confirm that anatomy laboratory introductions indeed possess a structure of regularities. They also confirm that within the regular phases of the introduction there is tremendous flexibility in how demonstrators and their students collaborate in co-constructing their interaction. The ways in which membership categorisation and epistemics are oriented to and displayed provide a solution to resolving the situation created by the differential 'novice' experiences of the demonstrator and students. By deferring to these two factors the demonstrators and students were able to manage, negotiate, and navigate the interactional challenges arising from their respective inexperience, and successfully made their transitions to the task of anatomy learning. In the next chapter, students' and demonstrators' interaction in the learning activities will be critically examined.

Chapter 6 Dissecting the Table-talk Phase: Openings of Student-Demonstrator Interaction

6.1 Introduction

In the previous chapter, the analysis demonstrated how multimodal and embodied interaction facilitated participants' readiness for transition into 'doing the business of learning' in the introductory phases of anatomy laboratory sessions. It showed how demonstrators utilise the formal laboratory introductory phases for establishing rapport and explaining/instructing about what they were going to do. The chapter also discussed how the sequential organisation of the formal laboratory introduction is illuminated by CA concepts such as *epistemics*, *membership categorisation*, and *multimodal* interaction that use both verbal and non-verbal resources for communication.

In this second and final chapter dealing with research findings, the analysis focuses upon participants' opening of interaction in the contexts of the laboratory *table-talk* phase, where participants conduct their teaching-learning activities. The aim of the analysis is to reveal the set of micro-cultural processes and guiding principles to which the participants show mutual orientation for initiating interaction with one another in their table-talk. As confirmed in the previous chapter, students are expected to work as independent and self-guided learners, which mean they often progress through their laboratory manual at different rates. This poses a pedagogical challenge that needs to be resolved when demonstrators and students interact with one another in this phase. Therefore, this chapter profiles the different ways demonstrators and students establish interaction with one another. In addition, the analysis will examine the sequential organisation of participants' interaction openings, and investigate moment-by-moment how they propose, negotiate, and establish an agenda and purpose for their interaction. In doing so, the investigation

will consider how membership identities, relationships, and institutional culture are oriented to by demonstrators and students during the process, and how participants achieve and display inter-subjective understanding both verbally and non-verbally. In addition, the chapter also continues to explore how institutional culture and notions of a community of practice become or are made relevant by participants to exhibit their inter-subjective understanding of the agenda and purpose for their interaction. Therefore the investigation continues to focus on how participants establish interaction, but in the context of conducting laboratory teaching and learning activities at the large activity tables in the laboratory, hence the term/concept *table-talk*[27]. Unlike Chapter 5 the analysis includes data from both Semester 1 and Semester 2. This is done to achieve a more complete profile of the diverse openings between demonstrators and student.

Structurally, the chapter is divided into four sections. The first section describes the analytical focus, which adopts the conceptualisation of interaction as a series of problems that the participants must navigate and resolve (Filipi, 2014; Sacks, 1995), introduced in Chapter 4 and also used in the data analyses of the previous chapter. However, in addition, this section will briefly highlight the contextual characteristics of anatomy laboratory teaching-learning interaction in the *table-talk* phase that introduces some pedagogical interactional challenges which participants must resolve. A general schema of how participants conduct openings based on the analyses within the chapter will also be presented as a guide. The next two sections contain the data analysis divided into two sections (6.3: Demonstrator-Initiated Interactions and 6.4: A Single Case Analysis of Student-Initiated Interaction).

[27] This term and concept of *table-talk* was introduced in Chapter 4, and it refers generally to all the interactions that occur in the laboratory activity phases and may consist of but are not limited to participation frameworks consisting of student-student, student(s)-demonstrator, or demonstrator-student(s) interactions. These interactions tend to occur at large tables within the anatomy laboratory, hence the term table-talk.

Section 6.3 contains a collection of six transcript extracts that have been selected and analysed to represent the three functions for which demonstrators in the corpus initiate interaction with students. The three functions are:

- Function A-Demonstrator Offering Help
- Function B-Demonstrator Delivering Resources to Students, and
- Function C-Demonstrator Managing Students' "On-Task" Behaviour.

Each function is supported by the analysis of two extracts selected to provide a contrast on how the same function might be achieved differently by different demonstrators. From the analysis of extracts for each function, an understanding of the demonstrator-student relationship and how the participants differentially manage and make relevant their roles to achieve a pedagogical/interactional function can be developed. Section 6.4 is a single case analysis of an extract selected to illustrate how a student initiates interaction with the demonstrator to seek help. This reflects the primary function of student-initiated interaction with the demonstrator observed in this corpus. The analysed extracts that have been selected for the two exhibits illustrate the dynamics of demonstrator-student interaction in the table-talk phase of the anatomy laboratory sessions. Furthermore, this thesis argues that the asymmetry in the single function (i.e. to seek help or clarification) for which students initiate interaction with demonstrators is, to some extent, a reflection of the institutional roles, identities, and relationships. The chapter concludes with a general summary and discussion of the findings.

6.2 Analytical Focus

The laboratory context is defined by a student self-directed learning orientation combined with high degree of social spontaneity and less rigid social learning structures that students would be accustomed to in the secondary school system in

Australia. As a result of this context, observations of demonstrator-student(s) and student-peer interaction in Semester 2 laboratory session recordings (data not analysed here) indicate that their table-talk interactions are more prone to begin and end more spontaneously. For the majority of the time in the table-talk phase, laboratory students are generally left to complete the activities at their own pace and the demonstrators typically "float" around the laboratory to help students in need. Thus, establishing contact between demonstrators and students, or even between students, is an interactional problem to solve (Filipi, 2014; Sacks, 1995). Furthermore, when demonstrator-student interaction is needed and formed, the parties involved must clarify the purpose, needs, and reasons for establishing contact, which is similar to other social encounters. However, as the analysis will later show, the institutional context of these interactions constrains, to different degrees, the purpose, needs, and reasons for demonstrator-initiated and student-initiated demonstrator-student interaction.

Therefore, the present analysis focuses on the beginnings of table-talk because it is the primordial site where the business and purposes of the ensuing interaction are made explicit and pursued in participants' subsequent interaction (Benwell & Stokoe, 2002; Stokoe, 2000). Furthermore, the sequential organisation of *openings* is devoted to agenda and identity negotiation, and is thus the site for organising subsequent educational activities where knowledge organisation is displayed and negotiated to support or reject identities and the epistemic status and stance associated with those identities (Benwell & Stokoe, 2002; Stokoe, 2000). Prior to the analysis of the data, it is important to again briefly remind readers of the demonstrator-oriented focus inherent in the present corpus, which has been discussed extensively in the methods chapter. This is in alignment with the goal to study laboratory pedagogy and, as a

consequence, it was decided that analysis and reporting of the student-peer interactions will be excluded from this thesis.

6.2.1 Laboratory Table-talk Phase as a Series of Interactional Problems to Solve: Establishing Co-Presence, Recipiency, and Reaching Mutual Understanding of Purpose

Initiating interaction is the first challenge that students and demonstrators encounter in the table-talk phase of laboratory sessions. This is a problem in this context because of the high student to demonstrator ratio (15:1) and the constant movement of students (especially in Semester 1 and less so in Semester 2). This is further complicated by the laboratory group work structure and the expectations for students to be independent and self-guided, which often lead to the formation of a variety of different group configurations all of which progress at different rates through the many activities. This is unlike classrooms where there is more teacher control and structure, and students are more likely to be working on the same activities at the same time; not to mention the different background experiences and training between a qualified teacher and the medically-qualified demonstrator. Regardless, this often means that help available from the demonstrator is limited, which can seem like a classroom. Furthermore, as previously mentioned the activities-driven learning approach often requires student group configurations based on a spread of student groupings and resources (See Chapter 4 Methods, Section 4.3.1 and 4.6.2), which are often physically spread over an area larger than a classroom in order to guarantee sufficient physical working space. This potentially creates more physical separation between the demonstrators and the students who require assistance.

As noted in Chapter 4 (See Section 4.6.3) in this data set, there are two general patterns of student-demonstrator geographical distribution within the anatomy laboratory. The first pattern is with the two groups of 15 students each congregating

around one of the large rectangular tables with their supervising demonstrator. This table-oriented distribution pattern (henceforth table-distribution) was observed in the first laboratory session of Semester One and in all of the laboratory sessions of Semester Two. The second pattern is with the students forming smaller groups ranging from two to five members. In this formation, the groups are spread around the various large tables within the laboratory space. In this latter pattern, the demonstrators tended to "float" around various regions of the laboratory space where their help is needed. This laboratory-distributed distribution pattern (henceforth laboratory-distribution) was observed in the second and fourth laboratory sessions of Semester One. Both of these patterns of student-demonstrator physical distribution in the laboratory space arose as a result of the prescribed laboratory activities, and the manner in which learning materials and resources are distributed. These patterns have implications for the ease with which interactions can be established between students and demonstrators because they change the proximity of the participants to one another.

However, regardless of the physical distribution of participants, the analysis of data contained in this chapter will confirm that the initiation of interaction in the present corpus appears to consistently require the management of three stages (See Figure 6.1 p. 266). First, participants must close down the physical distance separating them. In other words, they must be *Developing Physical Proximity* (See Figure 6.1 below) and presence. Second, participants must be physically *Positioning* themselves *to be Heard or Seen* (See Figure 6.1 below) by their intended recipients. Finally, participants must be engaged in *Establishing Recipiency* by producing an action or multi-functional vocal utterances, which in many circumstances is also

Communicating/Negotiating the Purpose of the interaction ((See 3. and 4. in Figure 6.1 below).

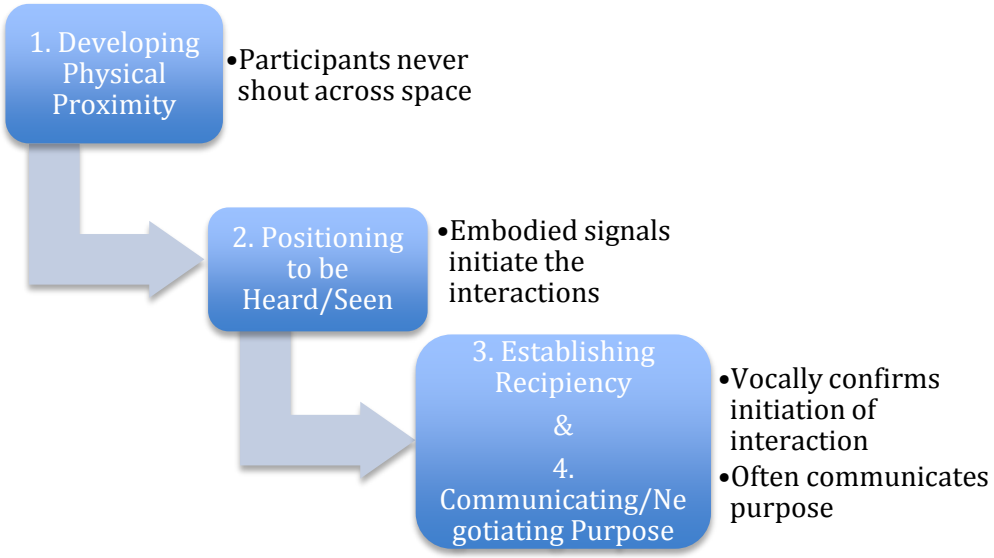


Figure 6.1 A schematic of the sequential organisation of participants' interaction beginnings in the laboratory 'table-talk' phase.

The following extracts illuminate how students and demonstrators utilise and modify these general principles to create locally sensitive actions in order to navigate and resolve the challenges that have been created by the context for initiating interaction. Furthermore, the extracts reveal how participants' actions to initiate talk places implicit responsibilities on who should speak next and what they should speak about (Benwell & Stokoe, 2002; Drew, 2012a; C. Goodwin, 2013; Heritage, 2012b; Lerner, 1995; Levinson, 2012; Roberts et al., 2015; Sacks et al., 1974; Schegloff, 1968; Stivers & Rossano, 2010; Stokoe, 2000).

6.3 Demonstrator-Initiated Interactions

From an anatomy laboratory pedagogical perspective, it is fundamentally important to examine what prompts the demonstrators to interact with students and how they initiate because, as the following analyses will show, the interaction establishes the demonstrator-student relationship and it also helps participants' to communicate their

respective needs and expectations for the interaction. Furthermore, such interaction forms a part of participants' teaching and learning experiences and impacts upon their perceptions of that experience. Analyses show that demonstrators initiate interactions with students primarily to achieve three functions:

- Function A-Demonstrator Offering Help (the most common function)
- Function B-Demonstrator Delivering Resources to Students
- Function C-Demonstrator Managing Students' "On-Task" Behaviour

Selected extracts from four laboratory sessions across both semesters will be presented to illustrate each of these functions and analyse how the interactions are initiated to achieve a common understanding of these functions.

6.3.1 Function A-Demonstrator Offering Help

6.3.1.1 Extract 6–I S1W1L1 demonstrator Nadia offering help

The first extract is from the S1W1L1 recording in Semester 1. The students and demonstrators are organised in a table-distribution pattern (see above under section 6.2.1), and the topics being studied for this laboratory session are "anatomical terminologies" and "introduction to joints" (See Appendix B for the activities). The demonstrator, Nadia, is working with 15 students at one of the four large tables in the middle of the laboratory space[28]. She shares the laboratory space with another demonstrator, Jenny, who is looking after the other group of 15 students.

This extract starts after Nadia has finished helping one group of three students at one corner of the table, and then makes her way over to another group of three. The students are located diagonally across from the first group. They are working on the

[28] There are four large tables located in the central area of the anatomy laboratory museum. Please see Figure 4.1 in the methods chapter for the floor plan of the laboratory layout.

first activity of the laboratory session, which is to complete a table on the different types of joints and their different characteristics (See Figure 6.2 below).

Anatomical terminology & an Introduction to Joints

PART A

Task 1. Observe the following joints and fill in the table (allow 20 minutes)

Display	Articulating Bones	Type of joint	Major functions	ROM	Joint Structures
1	Frontal and parietal bones				
2					Fibrocartilage disc
3		Gomphosis			
4		synostosis			
5					Long collagen fibres between bones
6				Circumduction Flexion Extension Abduction adduction	
7	First rib and manubrium				

Figure 6.2 Sample of student laboratory manual activity worksheet from Semester 1 Week 1 Laboratory 1.

The table in Figure 6.2 shows the laboratory manual activity table students and demonstrators are working on in the data analysis of Extract 6-I, which is on the following page.

Extract 6-I (S1W1L1) [2:45] demonstrator Nadia circling table to offer help. Please watch the video file of this data segment available at https://dl.dropboxusercontent.com/u/88971137/Extract_6-I_S1W1L1_2-45_Demonstrator_Nadia_OfferingHelp.mp4

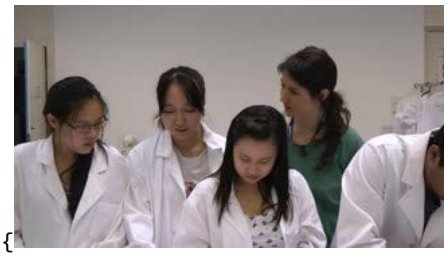
```
(S)=unidentified student speaking;
SF#=Female student identified;
SM#=Male student identified, if no number then there is only one identified male
             student present.
1     Nadia:  i haven't been over here ye(hh)t
```

```
2     (2.0)
```

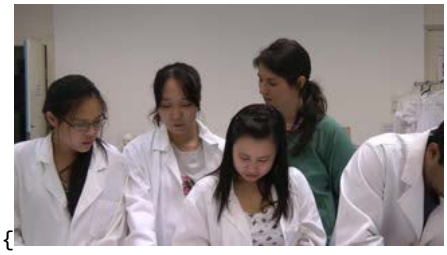
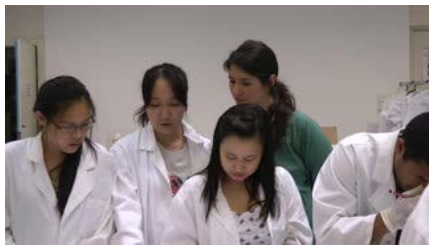
```
3                 {
4     Nadia:  {how you guys go::ing::?
```

```
5     SF2:    (0.2)
6                   [°uh::::::: ((gradually getting louder)) hehhh°=
```

```
7     Nadia:  [
```



```
8                   {
9     SF2:          ={(0.8)
```

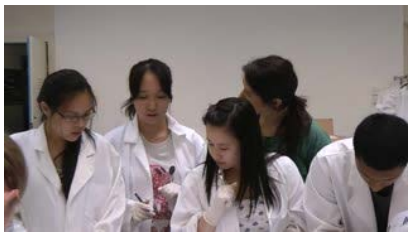



{

{°would this be like↑° (0.8)

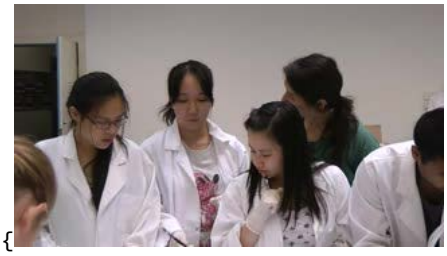
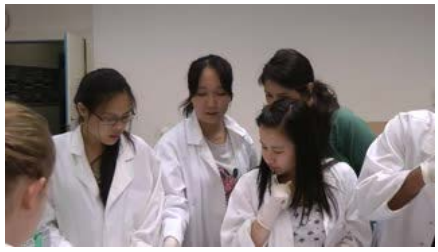
{ rotate left wrist

{>°somewhere along your< ar(hh)m or han:::d?°=



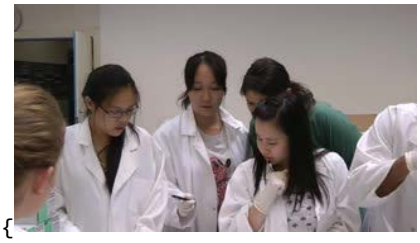
{

Nadia: ={ °tsk° pardon?

{

SF2: {would this be like



{

{<the hand or something> ((decreasing volume))=

Nadia: <c::ircumduction ye::::p:>

.hh >circumduction, flexion, extension, abduction, A::Dduction<

that's a lo:::t of [movemen]ts::

SF2: [°ya::°]

(0.6) ((students and tutors nodding their heads together))

Nadia: absolutely, so what kindof joint do you think that is,

(.)

Nadia: that a very mobile joint.=

=so we talked about the <three main join::ts::>

In this opening, Nadia initiates interaction with the students. First, she establishes physical proximity and co-presence by walking around the table to minimise the distance between herself and her targeted students.

```
1     Nadia:  i haven't been over here ye(hh)t
```

```
2     (2.0)
```

```
3                  {
4     Nadia:  {how you guys go::ing::?
```

```
5     SF2:    (0.2)
```

Second, she announces her presence, “i haven't been over here ye(hh)t” (line 1) as she positions herself physically to encourage and enact a shift in the participation framework (see lines 2 and 3) (C. Goodwin, 2000, 2007; Koschmann & LeBaron, 2002; Mortensen, 2009; Stokoe et al., 2013). However, it is not clear for whom Nadia has designed the utterance in Line 1 since the camera pans away. By itself, line 1 might be postulated as serving as an attention eliciting device that announces Nadia’s arrival and her availability as a speaker to the students. However, it seems to have solicited little to no response from students based on the prolonged gap (2.0) in line 2. It might be that the students do not feel that they are in need of the demonstrator’s help as they go about completing the activity worksheets in the

laboratory manual (see Figure 6.2 p. 268), which have been pre-designed by the lecturer. It might also be possible that the students have found Nadia's elicitation to be too ambiguous with regard to its intended, specific recipient, and thus have all remained silent. These explanations are based on the adjacency pair structures of summons/response, and in this case the lack of a response is indicating that Nadia's initial elicitation has either not been understood, which is unlikely, or the design of her elicitation presents an interactional problem for her respondents. In the absence of a student response, Nadia pursues a response by physically moving towards a group of three students (line 2 and 3), peering over their shoulders (line 3), and uttering a question, "how you guys go::ing::?" (line 4). This second utterance by Nadia attempts to establish recipiency with a specific group of students, as shown in the still frames in lines 2 and 3. It is also formulated as a question (the first-pair-part of an answer), which makes an answer (the second-pair-part) relevant and expected[29]. Through this question Nadia communicates a potential offer of help to further students' progress with their work, as well as her availability. The design of Nadia's question in line 4 also displays her awareness of how students are working: by themselves or with other students, referred to as participation framework (C. Goodwin, 2007; Streeck, 2009). This orientation to the participation framework is further displayed in Nadia's embodied approach in the delivery of line 4 as she positions herself between the two students and at ear level to SF2 (line 3-red circle and red line).

However, some interactional tension has been created by the design of Nadia's utterance, "how you guys go::ing::?" (line 4) and her embodied approach in the delivery of her line, which is directed at ear level to SF2 (line 3). This tension is

[29] For clarification of the adjacency pair structure in conversation and expected response, upon which this analysis is based, please refer to Chapter 3 (Schegloff, 2007a).

created by the multi-functionality of Nadia's utterance, which both functions to specifically target a group of students, as well as launch a request for information regarding the progress of their learning status. In doing so, Nadia establishes an epistemic gradient by displaying her K- epistemic stance, which also displays her assumption of students' K+ epistemic stance and status in the knowledge of their learning progress. However, Nadia's request is addressed to the group as a whole rather than an individual student, leaving them the option to self-select as the next speaker. Furthermore, Nadia's actions invite a shift in the students' participation framework, and consequently SF2 turns her attention away from her work with a slight turn of her head towards Nadia (line 5- blue circle). This is accomplished in the 0.2 seconds pause in line 5 before SF2 utters her response in line 6, "°uh::::::: ((gradually getting louder)) hehhh°". The above analysis shows how pedagogically Nadia established recipiency by creating an epistemic gradient that empower student contributions and invites recipiency through establishing close personal proximity. Even though, it can be noted that the spatial configuration with the large rectangular table makes it difficult to establish recipiency with all three students at the same time.

```
6     SF2:    (0.2)
7     [{°uh::::::: ((gradually getting louder)) hehhh°=
```

```
8     Nadia:  [{
```

9 {

10 SF2: ={(0.8)

11 {

12 {°would this be like↑° (0.8)

13 {((rotate left wrist))

14 {>°somewhere along your< ar(hh)m or han:::d?°=

The unresolved tension resulting from Nadia leaving students to self-select as next speaker is displayed, as SF2 self-selects to respond. There is observable hesitation in her turn in line 6, which opens with a soft elongated *uh*, a place-holder (Rendle-Short, 2006; Roberts et al., 2015) that gradually gets louder, which is followed by a prolonged pause of (0.8) in line 9. The pause might be interpreted as a potential gap that SF2 leaves open for the possibility of other students to take the floor. The other students working with SF2 remain silent, and in doing so show their recognition of the placeholder produced by SF2.

In this opening, SF2 has likely self-selected to speak for the group because of her proximity and her ear-level positioning next to Nadia relative to her peers, who are positioned to her front left and immediate right (lines 3 and 5). The physical positioning of SF2's peers creates barriers to Nadia's utterance, and as such also makes possible a plausible and justifiable non-response for these other two students. For example, it is challenging for SF1 to respond because she is standing with her

back to both SF2 and Nadia (line 5). Meanwhile, it is difficult for SF3, who is standing to the right of SF2, because she will have to speak through SF2, who is standing between her and the demonstrator. Consequently, the recognition of SF2's place-holder, "°uh::::::: ((gradually getting louder)) hehhh°, along with the challenging physical bodily configurations, create the conditions for SF2 to gain her speaking rights.

At this point, the opening interaction between demonstrator and her students has not been fully consolidated. Nadia's question, which also acts as a request for information seen earlier in line 4, remains unresolved despite SF2 responding to Nadia with slight turning of her body and vocal utterance, "°uh::::::: ((gradually getting louder)) hehhh°" (line 6). The trajectory of this opening will depend on Nadia's interpretation of SF2's utterance in line 6 (i.e. whether Nadia orients to these actions as indicating willingness to continue speaking), and the subsequent unfolding of that utterance. The long pauses (0.8) in lines 9 and 11 also seem to be indicating that SF2 is having some sort of trouble. Nadia's question now requires a forthcoming answer from SF2, who has self-selected to speak and takes up the speaking right given her peers' non-response (Sacks et al., 1974). According to previous work done on conversational openings (Schegloff, 1968), in this third position following SF2's response, the opening interaction needs to be consolidated by Nadia's recognition of SF2's response (line 6), despite being busy scanning students' work in their laboratory manuals (line 7–red arrows). Nadia's scanning embodies her understanding of SF2's trouble, as she looks for clues in the students' work in their laboratory manual, and is evidence for how Nadia understands SF2's response. Continuing with the analysis of Nadia's recognition of SF2's response, indeed in line 8 (red arrow and circle) she shows orientation to SF2's utterance by deliberately

looking up at SF2 after she has finished scanning students' work (C. Goodwin, 1980, 2007). Then without looking up (line 8), SF2 seems to have picked up Nadia's orientation when she continues her turn by formulating a question as a response to Nadia's inquiry (line 11).

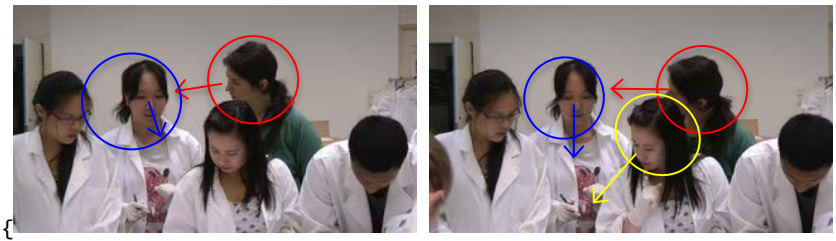
As SF2 responds to Nadia with, "°uh::::::: ((gradually getting louder)) hehhh° (0.8) °would this be like↑ (0.8) >somewhere along your< ar(hh)m or han:::d?°" (lines 6, 9, 11 and 13), Nadia scans the students' worksheets (line 7). Nadia's scanning co-occurs with SF2's utterance in line 6, and during this Nadia leans forward to look over SF1's shoulder (line 7), who is the student positioned in front and to the left of SF2 (See Extract 6-I line 3 for participant identification and positioning). The students and Nadia are likely to be looking at a semi-completed table in the students' laboratory manuals (see Figure 6.2 p. 268) (N.B. This has been determined by analysis of the subsequent interaction between Nadia and the three students - transcript not provided). As previously mentioned, Nadia's co-occurring actions in line 7 embody her understanding of SF2's utterance in line 6 as having trouble, as Nadia searches for clues of the students' progress by looking at their work in the laboratory manual. In other words, SF2's utterance trajectory projects a forthcoming question and Nadia shows orientation to that. This interpretation is further substantiated by the long pauses produced in SF2's utterance (lines 9 and 11), which often indicate a problem (Drew, 2012a; Ford, 2012; Levinson & Torreira, 2015; Roberts et al., 2015). However, Nadia's embodied actions might also be interpreted as subsequent actions that align with her previous question, "how you guys go::ing::?" (line 4). In this second interpretation, Nadia's actions serve to determine the status of her students' progress for herself by looking at students' work in their laboratory manuals (line 7) while waiting for a status report from the students. Nadia

completes the scanning of her students' work and turns her gaze to SF2 in line 8, just as SF2 reaches the end of the prolonged pause (0.8) (line 9). Furthermore, the frame-grab in line 8 clearly shows SF3's orientation and participation in the conversation as she focuses her gaze on SF2's pointing gesture (line 8 yellow circle and arrow).

Although the transcript breaks up SF2's response over several lines, it is in essence the second-pair-part to Nadia's question in line 4. Breaking up this response in the transcript makes recognition of the adjacency pairs difficult but it is necessary to demonstrate the unfolding synchrony being developed and demonstrated in participants' body positioning and gaze orientations (i.e. as stated, SF2' question co-occurs with Nadia looking at her as per line 10 first frame-grab red arrow and circle). Establishing this gaze orientation (C. Goodwin, 1980) is important as this allows Nadia to recognise SF2's gaze (line 10 blue arrow and circle), which is directed down at the laboratory manual, and this leads Nadia to direct her own gaze down towards SF2's laboratory manual (line 10 second frame-grab red arrow and circle) (Mondada, 2007). This gaze shift co-occurs with SF2's uttered indexical reference "°would this be like↑° (0.8)" (line 11). SF2's utterance is also accompanied by an embodied pointing gesture with her right hand holding a pencil (line 12 blue circle) to a particular part of her laboratory manual (line 10), and it is SF2's gaze that orients Nadia's gaze to this gesturing at the laboratory manual.

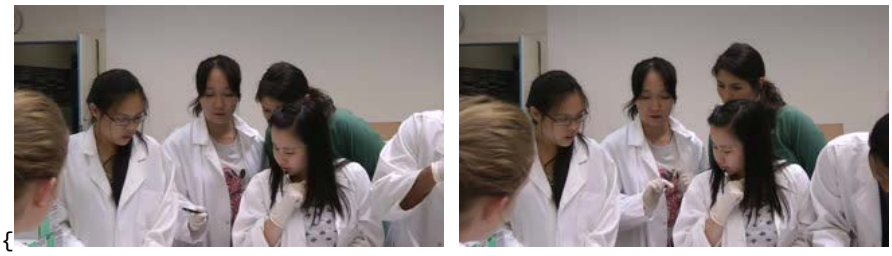
As SF2 utters the next part of her question, "°>somewhere along your< ar(hh)m or han:::d?°=", she withdraws her pointing right arm and makes a wrist rotation movement with her left wrist (line 12 blue circle). SF2 also backs up slightly (line 12 blue arrow) to create a shared participatory space (Streeck, 2009) in front of herself and Nadia for these gestures to be more visible (Mondada, 2007). The wrist rotation gesture that SF2 performs is a *circumduction* movement in anatomy terminology,

which is one of the movements under the “ROM” column on row 6 in the table of Figure 6.2 (p. 268). These embodied actions co-occur with SF2’s utterance. They are proffered so that Nadia can assess and confirm the responses SF2 has written in her laboratory manual. SF2’s actions introduce and orient Nadia’s attention to the laboratory manual, contextualising her indexical references like *this* (Mondada, 2007; Streeck, 2009), but at the same time they invite Nadia’s assessment and feedback.



```
14              {
15    Nadia:  ={ °tsk° pardon?
```

```
16              {
17    SF2:      {would this be like
```



```
18              {
19              {<the hand or something> ((decreasing volume))=
```

However, Nadia initiates repair, “°tsk° pardon?” (line 15), signalling that she has either not comprehended or clearly heard SF2’s response due to her low volume. Nadia can be seen leaning in and moving herself to a position to establish better hearing and gaze orientation with SF2 (line 14 red and blue arrows), who to this point has made minimal direct eye contact. Nadia’s action also indicates that she is having trouble hearing SF2, but SF2 does not establish mutual gaze orientation (line

14 blue arrows). In the frame-grab in line 14, SF1 can now be seen to show signs of orienting to the conversation as she directs her gaze down at SF2's laboratory manual (line 14 yellow circle and arrow). SF2 orients to the display of trouble, and rephrases her response, "would this be like [<the hand or something> ((decreasing volume))=" (line 16 and 18). The utterance resembles 'try-marking' (Sacks & Schegloff, 1979) where SF2 is unsure and is fishing for Nadia's assessment of the response written in her laboratory manual. SF2 also points to a part of her laboratory manual (line 15) as she produces the utterance, and Nadia can be seen to switch her gaze to the object being indicated by SF2's pointing (line 16 red arrows and circles) which establishes joint attention (C. Goodwin, 1986, 2013; Mondada, 2007). These types of gestures help participants in "making sense of the world at hand" (Streeck, 2009, p. 8) by drawing attention to the object that is being index referenced as part of the turn construction and sharing and confirming of inter-subjective understanding (C. Goodwin, 1986, 2013; Mondada, 2007). The gestures also facilitate participants in co-constructing and ensuring alignment of the emergent shared cognition between them.

```
20    Nadia:  <c::ircumduction ye::::p:>
21            .hh >circumduction, flexion, extension, abduction, A::Dduction<
22            that's a lo:::t of    [movemen    ]ts::
23    SF2:                          [°ya::°     ]
24    (0.6) ((students and tutors nodding their heads together))
25    Nadia:  absolutely, so what kindof joint do you think that is,
26    (.)
27    Nadia:  that a very mobile joint.=
28            =so we talked about the <three main join::ts::>
```

Indeed, following these actions, Nadia displays signs of aligned understanding with SF2 by first providing a more technical term, which is then followed by a response token "<c::ircumduction ye::::p:>…". Nadia provides the technical term either in response to SF2's wrist rotating motion, or perhaps because SF2 has pointed to the term in her laboratory manual, which we are not able to confirm. The response

token *yep*, provides a response to SF2's question, and also shows that Nadia understands SF2's question. It also confirms that 'circumduction' is indeed a movement of the hand. However, Nadia's stretched "ye:::p:" (line 20) is also serving to signal hesitancy in the response as well as its incompleteness[30], which is also being prosodically indicated by Nadia's slower and stretched "<c::ircumduction…" (line 20). Nadia immediately follows this with ".hh >circumduction, flexion, extension, abduction, A::Dduction<" (line 21). The breath signals that Nadia has more to her turn and functions as a place-holder for an extended turn (Levinson & Torreira, 2015; Torreira et al., 2015), which then allows Nadia to read the list of terms under the 'ROM' column in Row 6 of Figure 6.2. In addition, it allows Nadia to provide an evaluative statement "that's a lo:::t of [movemen]ts::". Nadia's utterance shows alignment and understanding of SF2's question and the co-occurring pointing gestures produced earlier. Nadia's actions are indicating that there is a problem with "the hand" as a proposed response, because it is not indicating a "joint type" and therefore it is not an appropriate answer for completing the information required for that particular row in the table (See Figure 6.2). Thus, following Nadia's confirmation of *circumduction* as being a movement possible for the hand, which is SF2's proposed answer, Nadia also draws attention to the many other movements that the "joint type answer", which the students need to identify, should also be able to do. This should signal to the students that there might be some trouble with SF2's response, "the hand".

However, Nadia's hint is rather vague, and does not clearly point out the problem with SF2's answer. Again, "the hand" is not a type of joint and does not

[30] Note that Nadia's response does not provide a complete answer to the task, because the activity table (see Row 6 in Figure 6.2 p. 302) requires a type of joint to be named, amongst other answers, and in the dialogue between Nadia and the student there has been no explicit mentioning of joint types or other relevant answers.

satisfy the answers required to complete the table. Furthermore, the interaction is complicated by Nadia's vagueness and her demonstrated dis-preference for SF2's answer, as exhibited by the stretched syllables and the evaluative statement that does not positively evaluate SF2's answer (line 22); as such Nadia's dis-preference does not follow more typical constructions that use indexicals (e.g. *well*, *but*, *etc.*) as prefaces that indicate dis-preference (Lee, 2007; McHoul, 1978; Roberts et al., 2015). Indeed, the dis-preference is prosodically marked by stretched syllables and slower speech speed, "<c::ircumduction ye:::p:>…" (line 21), and Nadia's drawing of attention to known publicly available information in the table (See Figure 6.2). Nadia's utterance in line 21 could also be interpreted as her response to the 'try marking' of SF2, and the stretched syllables demonstrates an awareness of the potential for her assessment to be potentially face-threatening to the student (SF2). This may explain why Nadia instead chooses to highlight and reiterate the available question hints given in the table (*i.e.* different joint movements). Furthermore, Nadia follows up with a tag evaluative statement, "that's a lo:::t of [movemen]ts::" (line 22). This evaluative statement could be seen as a face-saving strategy that Nadia is deploying to maintain her affiliation with the students (Benwell & Stokoe, 2002), since she has just hinted at a potential problem with SF2 simply putting "the hand" down as an answer. Nadia's tag statement re-directs her face-threatening action to the potential difficulty of the question itself, but it also draws attention to the question hints she wants the student to pay attention to without having to outright initiate a repair. In this regard, Nadia deviates from the preference for *teacher initiated student repairs* typically found in classrooms (Macbeth, 2004; McHoul, 1990), and instead tries to augment the process by trying to encourage the students to do a self-initiated self-repair with the assistance of her supporting hints.

Altogether, Nadia displays acute sensitivity and understanding of the trouble SF2 is having. Furthermore, in constructing her turn Nadia lists the significant anatomical movement characteristics provided to help the students figure out how to complete the other empty spots in that row. Nadia's tag evaluation statement also displays her empathy towards the student and attempts to develop affiliation by aligning herself with the students through indicating the challenging nature of the task. Following Nadia's statement, SF2 responds to Nadia's comment with a soft, "[°ya::°]", that overlaps the end of Nadia's utterance, and is followed by a (0.6) pause (line 23). During this space all parties nod their heads at the same time, which is evidence for the alignment Nadia establishes with her students and they demonstrate a common mutual understanding that 'there are a lot of terms and the task is indeed challenging'. The common head nodding by SF1 and SF3 shows their involvement and confirms their participation in the dialogue, and indicates *speakership incipiency* (Drummond & Hopper, 1993; Gardner, 2001). In other words, listeners are showing their attention to the speaker and demonstrating their understanding. However, the soft SF2 response, along with the gap, indicate that Nadia's hint has not been understood, and SF2 and her student peers nod their heads in agreement with Nadia's statement that indeed there are a lot of movements awaiting further instruction from Nadia. Thus, SF2's "ya" (line 23) and the students' head nodding (lines 23–24) are signs of their active listening (Danby, Butler, & Emmison, 2009; Drummond & Hopper, 1993; Gardner, 2001), and the pause in line 24 shows students' mutual orientation to the unresolved nature of SF2's inquiry, as they continue to give Nadia the floor. At this point Nadia and her students are beginning to negotiate an inter-subjective understanding of the problem.

The students' continuer (*ya*) and head nodding (lines 23 and 24) are also potential displays that students have not taken up Nadia's hint of SF2's problematic answer, or that the students are deferring epistemic authority to Nadia. Recognising this, Nadia resists the epistemic status and authority to provide a direct answer by providing the necessary epistemic gradient to move the discussion forward by uttering, "absolutely, so **what** kindof [sic] joint do you think that is," (line 25). This question also helps to clarify her earlier intention in lines 20–22 while maintaining face and affiliation. With the clear *wh*-question (line 25), Nadia also performs a pursuit displaying her understanding of the students' problem as one of not being able to identify a joint type and the likelihood that they have not understood her previous hints (Fox & Thompson, 2010). Therefore, by using the *wh*-question (e.g. *what*, *where*, *why*, etc.) Nadia is also trying to establish and determine her inter-subjective understanding of the problem with the students as well as create the possibility for establishing students' epistemic status about this (line 24) (Robinson, 2014; Sert, 2013).

Following the question there is a minimal gap where Nadia leaves a *transition space* (line 26). With no immediate forthcoming student response in the gap (Roberts et al., 2015) Nadia provides a further hint, "that a very mobile joint.=" (line 27). Detecting hesitation from the students, she provides further clarification, which scaffolds the question "=so we talked about the <three main join::ts::>" (line 28). At each utterance, Nadia is circumscribing ever smaller epistemic knowledge domains for her students (Benwell & Stokoe, 2002; Fox & Thompson, 2010; Heritage, 2012b, 2012c; McHoul, 1978; Mehan, 1979a; Stokoe, 2000; Zemel & Koschmann, 2011). In addition, using the first person pronoun *we* Nadia reminds the students about previous coverage of the topic, an action that performs an epistemic status check on

the students while holding them accountable for that knowledge (Sert, 2013). The sequential organisation is that of the IRE sequences initiated by teachers without a forthcoming response part from students (Macbeth, 2004; McHoul, 1990; Zemel & Koschmann, 2011).

By the end of Extract 6-I, SF2's question remains to be resolved. It continues with Nadia scaffolding and leading the students to a response through a series of question-answer exchanges, the analysis of which is beyond the scope of this present thesis.

In summary, Extract 6-I has demonstrated how embodied practices are used by the demonstrator to establish recipiency through her verbal and non-verbal actions. The establishment of physical proximity, the announcement of her presence, and the positioning of her body to be heard or seen all contribute to the initiation of interaction. The extract also shows how the initial vocal utterance is contextually produced and understood by participants to establish recipiency in order to make offers of demonstrator help or checks on student progress and understanding possible as next trajectories. Once interaction is established the students have certain obligations to speak next and to assist the demonstrator to understand their progress and assess their learning.

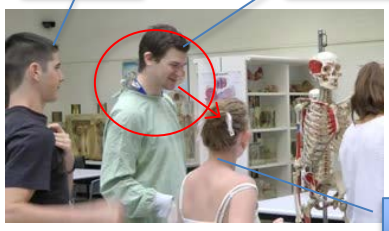
6.3.1.2 Extract 6–II S1W2L2 demonstrator Pete offering help

This next extract shows a different approach in initiating interaction and in offering help to students. The extract is taken from the second laboratory session of Semester 1. The students are engaged in a body-painting activity that requires them to surface landmark the underlying bony structures. In this particular laboratory session, the demonstrator, Pete, is managing the laboratory session by himself because the other two (out of four) demonstrators are late. This data segment begins as Pete finishes

helping his first-pair of students (Extract 6-II lines 1–7), and he starts to observe the next group of students (lines 8–13).

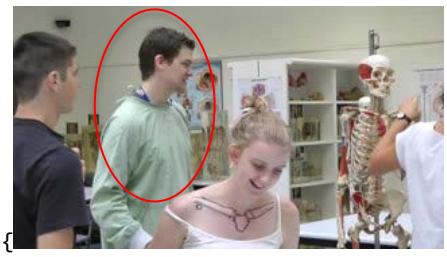
Extract 6-II (S1W2L2) [7:49] demonstrator Pete transitioning from one group to the next. Please watch the video file of this data segment available at https://dl.dropboxusercontent.com/u/88971137/Extract_6-II_S1W2L2_7-49_Demonstrator_Pete_OfferingHelp.mp4

```
1     Pete:   >an' that's-< that's one of your biceps goes there. (.)
2     SM1:    aw:: sick (that's sweet)
3     Pete:   °ya° {[wut]
4     SM1:         [(that's sweet)   ]
5     SF1:         [>ay ay ay        ] ay<=
```

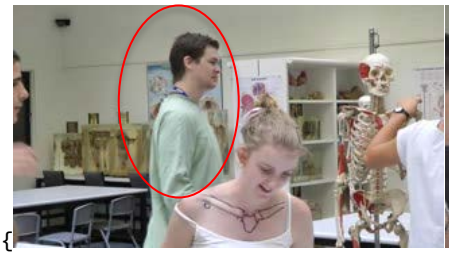


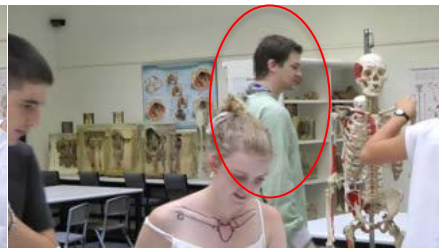

```
6                 {
7     Pete:   =wut {YA:::, exactly   yer strong one hhhheheha hahaha.
```

```
8                      {
9                      {hhhhhhh
10    ((end interaction with SM3 and SF9))
11            (1.0)
```



```
12            {
13    Pete:   {°uhkay?°
```





```
14            {
15            {(1.4)((Demonstrator begins to listen in to adjacent group))
```

16 Pete:

17 {

18 Pete: {mtuh.hhh se:z- ze- >i mean<

19 {

20 {what can you feel sortof around the back

21 (1.0)

22 {

23 Pete: {you gotta dig deep you gotta hurt him at least mildly

24 (0.8)

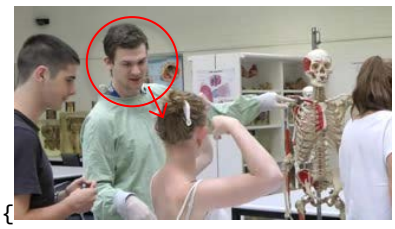
25 (S): ((inaudible))

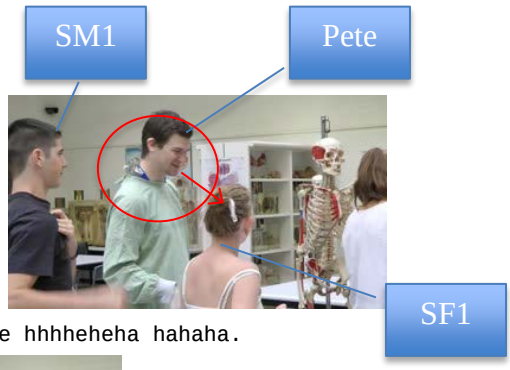
```
26          {
27    Pete:  {i thin- i think you (beating)yu good chances of
```

```
28          {
29          {feeling it (.) the spine (0.2) the scapula and then also this if he::-
            if he chicken wing::s=
```

This extract shows the amount of embodied preparation a demonstrator performs prior to his engagement with a group of students. As Pete and the pair of students close off their instructional interaction, they have a joke and laugh about the bicep muscle. As their laughter subsides, it is clear that Pete has already started to shift his gaze and attention away from this pair of students (lines 6 to 10).

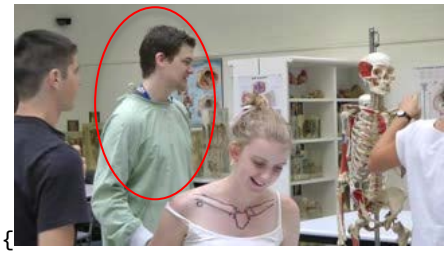
```
1     Pete:  >an' that's-< that's one of your biceps goes there. (.)
2     SM1:   aw:: sick (that's sweet)
3     Pete:  °ya° {[wut]
4     SM1:        [(that's sweet)   ]
5     SF1:        [>ay ay ay        ] ay<=
```






```
6                 {
7     Pete:  =wut {YA:::, exactly   yer strong one hhhheheha hahaha.
```

```
8                     {
9                     {hhhhhhh
10    ((end interaction with SM3 and SF9))
11    (1.0)
```

12 { 

13 Pete: {°uhkay?°

14 {

15 {(1.4)((Demonstrator begins to listen in to adjacent group))

16 Pete:

Pete's disengagement is very clear by lines 12 and 13 as he physically moves and begins to turn his body away from the pair of students. Pete is seen beginning to move towards the hanging skeleton (lines 12 and 14) where the next group of students he intends to interact with are gathered. As he moves away, he utters a soft, "°uhkay?°" (line 13). The prosody marks this as private speech and indeed there are no obvious signs of response from any of the students. A gap of (1.4) seconds ensues as he makes his way over to the next group (line 14). In line 16 Pete is looking at the student palpating the skeleton with her hands in the first frame-grab and then redirecting his gaze to look at the student in the second frame-grab (C. Goodwin, 1980; Mondada, 2013b). Once again before initiating interaction, Pete shows how he uses physical embodiment to signal his impending initiation of interaction with the students (Mortensen, 2009). The frame-grabs in lines 16 also show how he takes up a

position where he can be clearly seen as he uses his gaze to establish recipiency (C. Goodwin, 1980, 2013; Mortensen, 2009).

```
17          {
18    Pete:  {mtuh.hhh se:z- ze- >i mean<
19          {
20          {what can you feel sortof around the back
21    (1.0)
22              {
23    Pete:  {you gotta dig deep you gotta hurt him at least mildly
24    (0.8)
```

With this preparatory foundation laid down, Pete is ready to begin his interaction with the students. This begins in line 18 with a lip smack and an audible inhalation “mtuh .hhh” in addition to a series of restarts, “se:z- ze- >i mean<” to ensure recipiency is established (C. Goodwin, 1980; Mortensen, 2009). Pete’s utterance with many stops and restarts along with the suggestive grammatical structure “i mean” are characteristics of tutor openings (Benwell & Stokoe, 2002). Unlike the previous example where Nadia used a clearly formulated question, “how

you guys going", Pete assumes that the students require help, which is established through his earlier action of looking. Then Pete displays his expert knowledge and epistemic authority of body part landmarks through his offer of help. Having established recipiency, Pete directly asks the students, "what can you feel sortof [sic] around the back". The question sets up an epistemic gradient that requires a response. It is a display question (Mehan, 1979b) used in educational settings. These questions put the educator at a higher epistemic status and authority than the students because the teacher knows the answer. It is incumbent on the student to demonstrate their knowledge (Mehan, 1979b). Note, however, that in constructing "mtuh.hhh se:z- ze- >**i mean**< what can you feel **sortof** [sic] around the back" (lines 18 and 20), Pete, like Nadia, is using polite distancing interlocutor technique to deal with what can be perceived to be potentially face-threatening actions (Benwell & Stokoe, 2002). However, there is no response to Pete's question in the (1.0) gap (line 21), but the shared focal point of their gaze upon the student sitting down suggests that the student doing the palpation is altering her approach based on Pete's questioning (Mondada, 2007). This functions as an embodied turn response (Mondada, 2007, 2011; Nevile, 2015) to Pete's earlier comment, "mtuh.hhh se:z- ze- >**i mean**< what can you feel **sortof** [sic] around the back" (line 18 and 20).

The demonstrator continues to watch the students in line 22 following his question prompt, "what can you feel **sortof** [sic] around the back" (line 20), before he verbally brings attention to the trouble source in landmarking the bony structures, "you gotta dig deep you gotta hurt him at least mildly" (line 23). Formulated as a directive through the use of the imperative, it displays Pete's epistemic status and authority (Mondada, 2013a). However, Pete's line, "you gotta dig deep" is also an evaluation paired with a directive. Therefore, the above set of sequence is actually an

IRE sequence, initiated by Pete (lines 18–20), with the student using an embodied response (line 21) and completed by Pete's evaluation and imperative directive (line 23) (Koschmann & LeBaron, 2002; McHoul, 1978; Zemel & Koschmann, 2011).

The analysis so far provides support for claims in CA of the importance of the embodied turn and multimodal resources that participants regularly incorporate into their interaction (C. Goodwin, 2013; Koschmann & LeBaron, 2002; Mondada, 2007, 2011; Nevile, 2015; Nishizaka & Sunaga, 2015). Here Pete treats the student's actions as a sufficient turn, and he provides further feedback (line 23). Consequently, the (1.0) gap (line 21) was not deemed to be problematic by either Pete or his students. In Pete's evaluation (line 23) he displays his more knowledgeable status and stance (K+) (Heritage, 2012b, 2012c; Koole, 2010; Mondada, 2013a; Raymond & Heritage, 2006; Stivers et al., 2011), and by assuming that the students do not yet have the necessary knowledge to perform the task. This epistemic assumption enables Pete to assert his role as demonstrator.

```
25    (S):        ((inaudible))
26                {
27    Pete:       {i thin- i think you (beating)yu good chances of
28                {
29                {feeling it (.) the spine (0.2) the scapula and then also this if he::-
                  if he chicken wing::s=
```

The students do not contest or challenge Pete's epistemic claims, which are also embodied in his confident and assertive instruction giving (Koole, 2010; Mondada, 2013a; Roseano et al., 2014; Sert, 2013). The interaction unfolds in a pattern of giving instruction, feedback, and further suggestions while watching the students trying to feel and draw the structures (lines 25–29), "i thin- i think you (beating)yu good chances of feeling it (.) the spine (0.2) the scapula and then also this if he::- if he chicken wing::s=" (lines 27 and 29).

In summary, this second extract illustrates an alternative approach that the demonstrator adopts as a solution to the interactional problem of how and when to initiate interaction with students as they work at their tables. Pete fulfils the functions of checking on student learning through the act of 'looking' and giving direct feedback, rather than providing scaffolded hints as provided by Nadia. Both approaches, however, require that the demonstrator use additional interlocutor politeness techniques to save face for the students (Benwell & Stokoe, 2002). However, the more interventionist approach adopted by Pete creates a stronger asymmetry in the epistemic authority and status, constraining students' contributions in the knowledge co-construction process.

6.3.1.3 Summary

In comparing the two extracts, the first shows the demonstrator taking a student-centred approach in assisting students to display what they know. The demonstrator, who seeks a student account of their learning progress and status, offers the students higher epistemic status. In the second extract, the demonstrator uses his personal observation and analysis of how the students are performing the palpating procedure as his basis for initiating interaction to help students by offering corrective feedback and instruction. In this case, the demonstrator holds and displays higher epistemic

status and stance, and fosters a more “apprentice-disciple” approach (Hsu & Roth, 2009).

The diverse nature of the laboratory activities plays a part in the different demonstrator approaches observed. In the first extract, the activity is to complete a partially filled table categorising different anatomical joints with the correct answers in the laboratory manual, which is a more cognitive and conceptual task; albeit, the students in Extract 6-I demonstrated that they could use their own bodies to come up with the necessary answers. Nevertheless, Nadia labours trying to identify and ‘draw out’ the students’ conceptual problems, which are preventing them from coming up with the correct answer. Therefore, this necessitated Nadia displaying her orientation and understanding of the students’ conceptual challenge (i.e. naming a joint that has all five movements listed). Thus, she tries to ‘draw out what students’ hypotheses are. However, in the second extract, Pete and his students are doing a body-painting activity, which provides students with more opportunity to display and demonstrate their understanding by the way they are landmarking, identifying, and drawing on the student model (Hindmarsh et al., 2011). This makes relevant Pete’s ‘looking’ at what students are doing and allows him to interpret students’ anatomy knowledge that is being displayed. Therefore, the different laboratory activities provide different ways for anatomical knowledge to be displayed and interpreted by the participants, and partially explain the different approaches of the demonstrators.

While activities have bearing upon how knowledge may be displayed and demonstrated, the analysis of epistemics showed interesting similarities and differences that contribute to the profile of their instructional approach. Similarly, in both cases the demonstrators display their knowledgeable epistemic status through knowledge-displaying actions or questions. For example, Nadia who asks,

“absolutely, so what kindof [sic] joint do you think that is,” (line 25), and Pete who says, “mtuh.hhh se:z- ze- >i mean< what can you feel sortof around the back” (line 18 and 20). Both demonstrate a K+ epistemic stance relative to their students by being able to identify the problems that the students are having and asking a known information question.

The difference in epistemics that characterise a profile difference in their approach is the extent to which they consider and display their expected knowledge of students and how they enact this in their pedagogical actions. Nadia demonstrates that she expects the students to know more than they currently show, this is partly due to the nature of the activity. However, Nadia continues to work to ‘draw out’ more relevant information, which she expects the students to know from their earlier discussions in that laboratory session. Also, it would be reasonable for Nadia to expect her students to know this information from their lectures, given that she is aware that students have had anatomy lectures on these topics. In contrast, Pete demonstrates that he does not expect the students to necessarily have more knowledge needed to conduct the body-painting activity. In other words, Pete to some extent assumes what students know is what they show, and unlike Nadia, his instructional approach does not try very hard to ‘draw out’ more relevant knowledge the students may know already. Again, this is partly due to the nature of the activity. However, it might also be considered an appropriate assumption for Pete because students are likely to be performing many of the related skills (i.e. palpating and anatomical structure landmarking) for the first time; therefore, Pete more readily provides direct instruction and corrective feedback in his approach. Thus, the demonstrators’ instructional approaches reflect their assumptions regarding students’ epistemic status and their pedagogical actions also show their assumptions about the

alignment between epistemic status and stance. Nadia assumes that the epistemic stance displayed by the students does not necessarily align with their status, and Pete assumes that the students' displayed epistemic status more or less aligns with their epistemic status. Consequently, Nadia approaches her instruction by trying to draw more anatomical knowledge from her students, whereas Pete approached his instruction primarily by offering correctives, feedback, and informing.

Nadia's and Pete's pedagogical approaches provide a sharp contrast in how varying degrees of knowledge authority contributes to creating different student-demonstrator relationship in terms of the different epistemic stance and status that demonstrators and students may assume. Furthermore, in the first extract, the student suggests the agenda and purpose for their subsequent interaction, with the demonstrator functioning to facilitate and invite students' contribution. In the second example, the demonstrator acts as a guide, who works alongside the student, and treats his knowledge authority and his right to assess and give feedback as a natural part of institutional role and identity. There is no explicit discussion of the students' needs, which the demonstrator determines based on his observation of their performance.

In conclusion, these two extracts illustrate different demonstrator approaches (to offer help) that embody epistemics assumptions in their interaction, which drastically alters the student-demonstrator relationships, interaction dynamics, and trajectories of actions as they co-construct the table-talk openings and activities (Benwell & Stokoe, 2002, 2005; Ford, 1999; C. Goodwin, 2000, 2013; Hellermann, 2008; Heritage, 2012b, 2012c; Koschmann et al., 2011; Stokoe, 2000; Stokoe et al., 2013). This has implications for the subsequent knowledge construction process, because it impacts on the degree of learner agency and contribution to his/her own learning (C.

Goodwin, 2013; Hellermann, 2008; Koole, 2012a; Koschmann, 2011a, 2012, 2011b; Stivers et al., 2011). Next, the chapter examines a different function of demonstrator-initiated interaction in the table-talk phase, and illustrates how, by introducing a resource, the demonstrators instigate additional interaction and create new learning opportunities.

6.3.2 Function B-Demonstrator Delivering Resources to Students

The second function for demonstrator-initiated interaction is to deliver learning resources to the students. The analysis of the following two extracts will show how the demonstrators modify their approach to introduce learning resources for students. To reiterate, the analytical interest is to show how demonstrators establish interaction with their students using a multimodal approach, and to examine the relationships and dynamics that are established. The analysis aims to identify the social interactional layers that laboratory participants bring together and transform to reach and demonstrate inter-subjective understanding via mutually co-constructed collaborative actions.

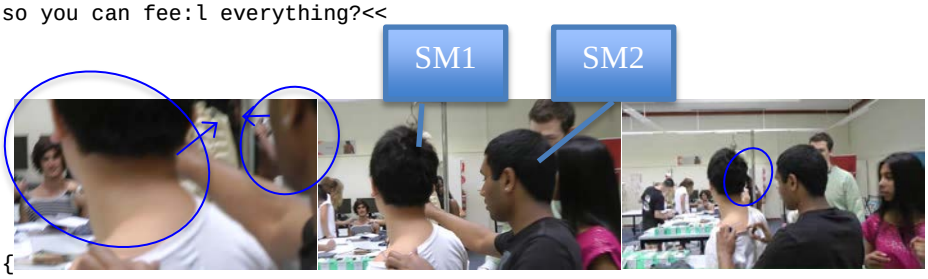
6.3.2.1 Extract 6–III S1W2L2 demonstrator Pete delivering resources

The first extract is once again from the second laboratory session with demonstrator Pete, and the extracts begins about five minutes into the laboratory session video recording. The camera is zoomed in on a group of students doing the body-painting activity at one of the large rectangular tables on one side of the laboratory. Pete is located on the opposite and far-side of the laboratory. In the video, a glimpse of him can be seen in the background as he picks up a hanging skeleton to wheel over to the students working in the foreground of the camera view. However, for the most part, the recording depicts the sound of rattling wheels as Pete brings the hanging skeleton model over to the students (Extract 6-III lines 1 and 2).

Extract 6-III (S1W2L2) [5:12] demonstrator Pete wheeling a skeleton over to introduce to students for their body-painting activity. Please watch the video file of this data segment available at https://dl.dropboxusercontent.com/u/88971137/Extract_6-III_S1W2L2_5-12_Demonstrator_Pete_DeliveringResources.mp4

```
1                {
2                {((Hear the clanking of wheels and something knocking on metal, that is
                 the tutor wheeling a skeleton over for the students in the camera))
```

```
3                {
4      Pete:     {here guys as your learning point jus so: you      know:? (0.5) >>jus
                 so you can fee:l everything?<<
5      (.)
```




```
6                {
7      SM1:      {°that's the spin:    [:e°= ]
8      Pete:                            [>yep<      ]
9      (0.2)
```

```
10               {
11     Pete:     {AN- >And feel fer ya-< feel free to dig in har::d
```

```
12               {
13               {because you will feel it better an' <<it >should<n't hurt him (.) too
                 much.<<
```

```
14     (0.5)
```

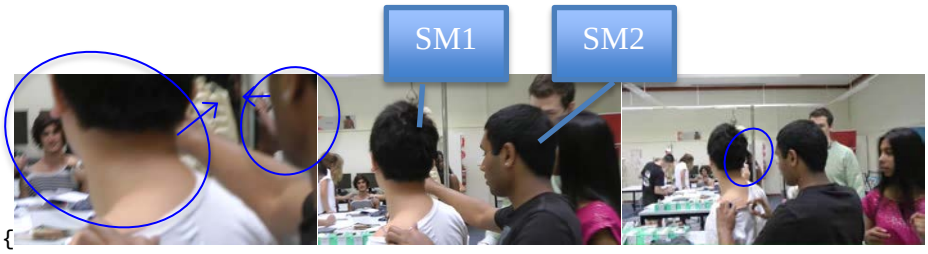
In the second frame-grab in line 1 (red circles), the rib cage of the hanging skeleton becomes visible, and the third frame-grab shows the sternum being visibly closer to the group of students working in the video.

```
1                {
2                {((Hear the clanking of wheels and something knocking on metal, that is
                 the tutor wheeling a skeleton over for the students in the camera))

3                {
4      Pete:     {here guys as your learning point jus so: you      know:? (0.5) >>jus
                 so you can fee:l everything?<<
5      (.)
```

Pete arrives at this group of students with the skeleton, and by doing so he establishes proximity and co-presence with these students. It is not clear how Pete has positioned himself to establish recipiency, however, he can be heard to initiate interaction by directing students' attention to the skeleton, "here guys as your learning point **jus so**: [sic] you know:? (0.5) >>**jus so** [sic] you can fee:l everything?<<" (line 4). Pete opens up with 'here guys' as a summons to solicit student attention (Benwell & Stokoe, 2002, 2005; Lerner, 1995; McHoul, 1978). The summons also sets up a participation framework that identifies the students as a group, which is further confirmed with Pete's use of the second person pronoun *you* to identify the students as a group. Furthermore, Pete's utterance also emphasises how the resource (i.e. the hanging skeleton) is meant to assist the students. Note once again the use of politeness devices "jus so [sic]" by Pete as he hedges for his suggestion of how the skeleton might help the students (Benwell & Stokoe, 2002, 2005). The hedging is

evidence for some background epistemic assumptions at work, which Pete demonstrates because of the potential threat to student face (Benwell & Stokoe, 2002, 2005). The assumptions or taken-for-granted knowledge is based on the content of Pete's instruction, which emphasises the skeleton as a "point of learning" (*i.e.* it is a useful resource) for the tactile feel of bony structures. In constructing this turn, Pete embodies a K+ epistemic status by being the one who introduces the skeleton, states its usefulness, and provides advice on how to use the resource. In doing so, Pete is treating the students as novices with a slight K- epistemic status, who may not know the usefulness of a skeleton for their exercise (Heritage, 2012b, 2012c). Pete does not ask whether students know what and how to use the skeleton for their task, he simply assumes their K- status and informs.




```
6            {
7     SM1:   {°that's the spin:    [:e°= ]
8     Pete:                        [>yep<      ]
```

In line 6, the frame-grabs show that the students respond immediately to this new learning resource. The student model (SM1), who is being drawn upon, turns his head right to look at the skeleton, the illustrator (SM2) immediately reaches out to palpate the bony structures with his right hand, while a third student standing behind the illustrator looks on. These series of action establishes the skeleton as a common focal point for the students as they orient their gaze to it (C. Goodwin, 2013; Mondada, 2007, 2013b). SM2 immediately begins using the skeleton to demonstrate his understanding of how the skeleton can be used (line 6), as well as demonstrating to his peers how the structure he is feeling and drawing on SM1 corresponds to a

point on the skeleton. In doing so, SM2 embodies his speaking rights through his gestural pointing[31] to the skeleton introduced by Pete, where students have focused their attention (Mondada, 2007; Streeck, 2009). As SM2 palpates the structure on the skeleton, SM1 also generates an embodied turn as he puts his right hand on the skeleton (line 6 third frame) while saying, "°that's the spin: [:e°=]" (line 7) (Streeck, 2009). Pete confirms the anatomical structure as indeed being the "spine of the scapula". The exchange between SM1 and Pete creates a small question and answer sequence to demonstrate and clarify knowledge communicated through gesturing using the hanging skeleton (Hsu & Roth, 2009; Streeck, 2009).

```
9     (0.2)
```

```
10            {(( Right hand digging))
11    Pete:   {AN- >And feel fer ya-< feel free to dig in har::d
```

```
12            {
13            {because you will feel it better an' <<it >should<n't hurt him (.) too
              much.<<
```

```
14    (0.5)
```

Following a brief pause (0.2) (line 9), Pete gives the students some further advice, "AN- >And feel fer ya-< feel free to dig in har::d because you will feel it better an' <<it >should<n't hurt him (.) too much.<<" (lines 11 and 13). As Pete

[31] Note due to the poor angle and quality of the shot, I deduced that SM2 is talking and pointing but there is no audio over the recording.

utters the line he is simultaneously beginning to do a poking gesture on the student model on the left of the frame-grabs with his right hand with all his fingers extended and together. Pete stutters and delays his speech so that he does not utter *dig* until his action is completed, giving primacy to his gesture (Streeck, 2009). Furthermore, Pete's palpation of SM1 (line 12 red circle) is timed with "because you will feel it better an'" (line 13), and it is only after he demonstrates his palpation that Pete utters "<<it >should<n't hurt him (.) too much.<<" (line 13), which is slowed down in rhythm to his palpations. Once again his gestural demonstrations are given primacy with his utterance as a secondary activity supporting his actions (Nishizaka & Sunaga, 2015; Streeck, 2009). Furthermore, Pete displays a K+ epistemic stance through his offering of guidance and advice as he moves confidently to show how palpation should be done, but in contrast his verbal utterance indicates hesitancies in terms of the level of pain the palpated student might feel (Roseano et al., 2014). In addition, the video records capture how the students move around to create space for Pete in their participation space showing their acceptance of his more authoritative epistemic status (Benwell & Stokoe, 2002; C. Goodwin, 2007; Mondada, 2013a, 2013b; Roseano et al., 2014; Stokoe et al., 2013), except SM1, who cannot move because he is the model.

This extract illustrates how a demonstrator introduces a learning resource such as the hanging skeleton, which is particularly useful for visualising the bony structures. As a learning object it immediately helps to establish recipiency and a focal point of interest where knowledge construction and sharing are featured, along with the body of SM1 for the unfolding discussion of the underlying bony structures. Opportunities for co-construction of knowledge and feedback have been created via the introduction of an additional learning resource. Once again, it is interesting to

note how the demonstrator-student dynamic and relationship are underpinned by membership categories and the asymmetry being displayed in epistemic status associated with “being a demonstrator” and “being a student” (Mondada, 2013a; Raymond & Heritage, 2006; Stivers et al., 2011). Furthermore, the extract shows how demonstrators talk their institutional role and identities into relevance through embodied displays of epistemic status through direct instruction, feedback, and advice.

6.3.2.2 Extract 6–IV S2W2L1 demonstrator Dan delivering resources

This following extract to be analysed comes from the recording of the first laboratory session of Semester Two. The laboratory sessions in the second semester are organised with students and their demonstrators located at large rectangular tables (table-distribution pattern), which are located along the periphery of the laboratory space. By this stage in the year, despite a new wave of laboratory demonstrators, the students have developed a community of practice in the anatomy learning laboratory with its own socio-cultural norms and practices. That is, students mostly complete the learning activities on their own or through peer discussions with occasional help and guidance from the demonstrator.

In this session the participants are learning about the human vertebrae. Two minutes prior to the beginning of the extract, Dan has been in a private consultation with the lecturer. Following the conversation Dan returns to the head of the table and starts picking out individual vertebrae in preparation for them to be handed out to the students. During the preparation, students interrupt Pete by asking him a question that subsequently develops into a discussion. The extract begins after this group discussion, at about six minutes into the laboratory recording. The extract begins as

Dan finishes selecting the first set of vertebrae and is getting ready to hand them out to students.

Extract 6-IV (S2W2L1) [6:39] demonstrator Dan selecting individual vertebrae to introduce to students at the table. Please watch the video file of this data segment available at https://dl.dropboxusercontent.com/u/88971137/Extract_6-IV_S2W2L1_6-39_Demonstrator_Dan_DeliveringResources.mp4

```
1              {
2     SF1:     {cuz i (ha:::nd) >not that i would do things that didn't (do ba[::d  ]<
3     SM:                                                                    [>hey<]=
4     SM1:     =>hey (sares) ((Sara)) are you'd< stay:: >in today:'s< class
```

```
5              {
6              {<six::: something six:::?>
7     SF2(Sara):  for   [°wha::t?°  ]
8     SM1:              [like       ] um::=
```

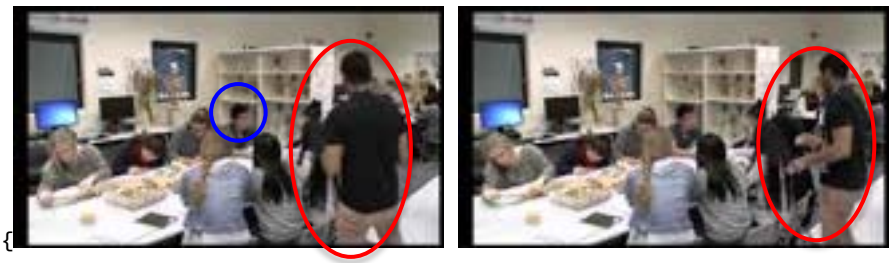
```
9              {
10    SF1:     {=>are you in lab tod [ay?  ]
11    SM1:                           [ya::] >>yu in the lab today<<
```

```
12             (.)
```

{

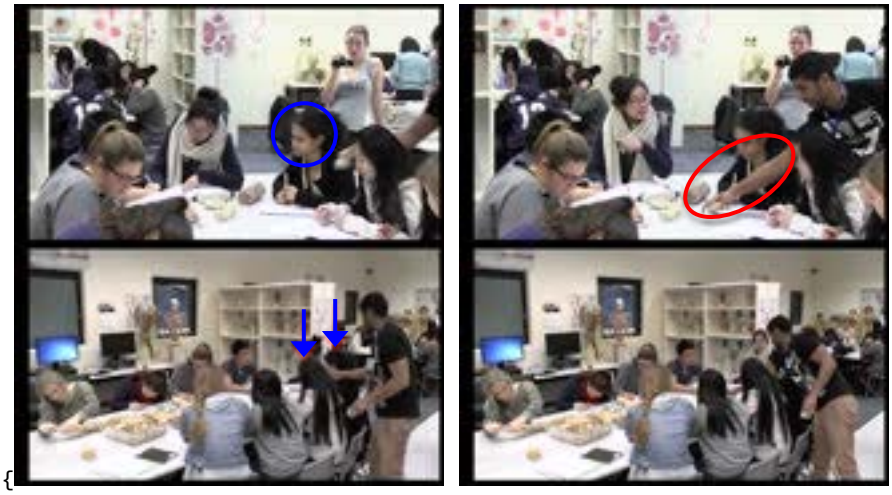
SF1: {who(hh) then really know(hh)s:=

SM1: =(i'll z::)=



{

Dan: ={hey guy::::s:: >have a-<



{

{(.) >have a look at the< individual

{

{one's as well:: (.) al::right,

22 (1.2) ((SM picks up bone handed out by Dan and blows dust off of it))

23 {

24 SM1: {.hhh ((sniffs bone?)) >can i touch it (.) can i lick it<

25 {

26 Dan: {see if yu can identify:: (0.2)((slides bone across the table))

27 {

28 {where from the body it's (comin) ((Said with a straining voice as he reaches across the table))

29 {

30 SF2: {<thi:s:: i:s::>from the <lum(hh)bar(hh) re(h)gi(h)on i think=

31 {

32 SM1: {<this is from> (.)

33 {

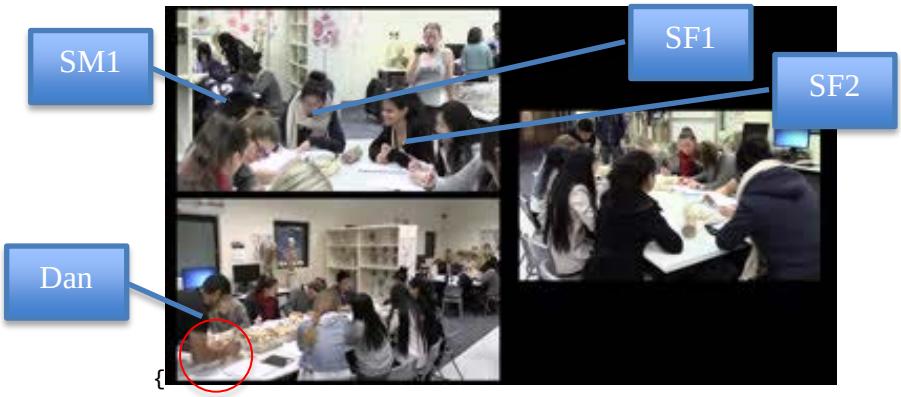
34 {thee:: um[: : ::]=

35 SF2: [>>(is this slot)<<]

```
            {
SM1:    ={  [t!   t!                ]
SF2:        [>>because look<< ]
```

```
            {
            {it's squa::re::
(0.2)
```

At the beginning of the extract, the students are engaged in a *side-conversation* (Stokoe, 2000), while Dan, who is wearing a black t-shirt, is located at the other end of the table selecting vertebrae for the students (Extract 6-IV lines 1, 5, and 9). The focus of the analysis is on Dan's preparatory actions, and the effect of his actions on the *side-conversation* between SM1 and SF2




```
            {
SF1:    {cuz i (ha:::nd) >not that i would do things that didn't (do ba[::d  ]<
SM1:                                                                   [>hey<]=
SM1:    =>hey (sares) ((Sara)) are you'd< stay:: >in today:'s< class
```

5 {

6 {<six::: something six:::?>

7 SF2(Sara): for [°wha::t?°]

8 SM1: [like] um::=

9 {

The audio of the recording comes from three students each wearing an individual microphone at the opposite end of the table to Dan. Dan can be seen being busily engaged in selecting vertebrae (red circle lines 1, 5, and 9), while SM1, SF1 and the student to the left of SF1 are busily engaged in their side-conversation (lines 2–8). By line 9, the frame-grab shows Dan having finished selecting all of the vertebrae, and picking up as many of the vertebrae as he can in preparation for delivery to the students.

10 SF1: {=>are you in lab tod [ay?]

11 SM1: [ya::] >>yu in the lab today<<

12 (.)

13 {

14 SF1: {who(hh) then really know(hh)s:=

In line 10 and 11, the students are finally sorting out their side-conversation and there is a brief pause (line 12) during which Dan can be seen moving around the right side of the table to deliver the vertebrae. The frame-grabs in lines 12 and 13 depict Dan on route to deliver the vertebrae. In a similar way to all other table-talk openings analysed thus far, Dan works to first close down the physical distance and barrier. In the second semester students are much more concentrated around one long table but, nevertheless, demonstrators must still manage their working space and their territory. In contrast to Nadia in Extract 5-I (p. 176), Dan takes up a position at the head of the table, which gives him easy command and a clear view down the length of the table without having to turn his head side to side, compared to if he had taken up a position in the middle of the long side of the table[32].

```
15    SM1:    =(i'll z::)=
```

```
16            {
17    Dan:    ={hey guy::::s:: >have a-<
```

```
18            {
19            {(.) >have a look at the< individual
```

[32] Note in Chapter 5 the analysis of demonstrator Nadia's extract shows her having taken up the middle spot on the long side of the table. The analysis showed her having to constantly turn her head from side-to-side to ensure that she is attending to all of her students. It was noted that this had an effect on the embodied interaction demands on Nadia and her students.

```
20          {
21          {one's as well:: (.) al::right,
```

Dan's action does not affect the unfolding side-conversation until line 15, when SM1 cuts off his line, "i'll z::" (line 15) as he notices Dan approaching. This illustrates students' awareness of the categorisation of their conversation as being either *on-topic* or *off-topic* (Stokoe, 2000). At this point, Dan is about a step away from SF1, whose back is towards him (line 16). Thus, between the three students, who are involved in the side conversation, only SM1 has a clear view of Dan approaching. SM1's action substantiates the previous finding that prior to the opening of interaction, physical embodied displays and orientations play a major role in establishing recipiency (C. Goodwin, 1980, 2000; Mortensen, 2009). Furthermore, this observation suggests that, institutionally, the *demonstrator* membership category is given higher social priority by the students, (i.e. they defer to his presence and stop their own off-topic talk), and that students also need to act to maintain face by behaving in an institutionally aligned manner, which in this case is learning anatomy and not engaging in off-topic talk (Benwell & Stokoe, 2002).

SM1's cut off line is immediately followed by Dan's first utterance, "hey guy::::s::" (line 17) and shows SM1's timely behaviour modification which, even if overheard by Dan, does not provide enough information regarding whether it is on-

or off-topic. It can be seen from the frame-grabs in lines 13 and 16 that Dan first establishes close proximity and presence before he delivers his first utterance. The design of Dan's utterance serves as a summons/attentional, and this function is accomplished by the stretched "guy::::s::" (Mortensen, 2009; Schegloff, 1968; Stivers & Rossano, 2010). Dan then provides an instruction, which is delivered as he is extending his right arm to dispense the vertebrae specimens for students to study. However, the beginning of this instruction is stopped and restarted, ">have a-< (.) >have a look at the< individual…"(lines 17 and 19). Dan's restarted instruction (i.e. "have a") not only functions to help establish recipiency, the restart is also timed so that the verbal utterance does not continue unless gaze between the participants is secured (C. Goodwin, 1980; Mortensen, 2009). In this case it also helps to synchronise the vocal utterance with the appearance of Dan's right hand into the student's peripheral view (Streeck, 2009). This observation aligns with Streeck's (2009) notion that in certain interactional ecologies gesture takes primacy over vocal utterances. By the time the word "individual" is uttered it can be seen in the last set of frame-grabs in line 18 that the two students, whose backs are to Dan, sandwich his right arm and fix their gaze upon the bony specimen. The priority of delivering the bony vertebrae has social ecological priority over the verbal utterance, and in this sense the verbal utterance yields its sequential priority to the gesture, which can be seen to be the key sequence organiser in Dan's resource delivery action (Streeck, 2009). Dan then continues to hand out the bony specimen (lines 20–23).

22 (1.2) ((SM1 picks up bone handed out by tutor and blows dust off of it))

23 {

24 SM1: {.hhh ((sniffs bone?)) >can i touch it (.) can i lick it<

25 {

26 Dan: {see if yu can identify:: (0.2)((slides bone across the table))

```
27          {
28          {where from the body it's (comin) ((Said with a straining voice as he
            reaches across the table))
```

The bony specimen immediately attracts SM1's attention and he picks it up (line 22–24), which co-occurs with Dan handing out the bone specimens. In the frame-grabs of line 23, Dan has shuffled one space to his left and is about to hand out the next set of specimens. As he does so, he produces his next segment of instruction, "see if yu can identify:: (0.2)((slides bone across the table)) where from the body it's (comin) ((Said with a straining voice as he reaches across the table))" (lines 26 and 28). This second part of Dan's instruction clearly sets a task for the students and instructs the students on what he expects. Dan breaks this instruction into two segments and only completes his instruction after he has completed delivering the second batch of bone specimens to the students. This helps to ensure that the second cluster of students knows what Dan is referring to by the indexical term, "where from the body **it's**…" (line 28) (Mondada, 2007, 2011). Prior to this, students at the far end have already started studying the bone, with SM1 first making a joke about what he can do with the bone (line 24). This use of humour amongst students has been previously observed by Benwell and Stokoe (2002), who argue that it is a form of student resisting identity. However, the joke-making instance might be better interpreted as students attempting to balance and display their personal and

institutional identities in a bid to form social relationships (Benwell & Stokoe, 2002; Stokoe, 2000; Stokoe et al., 2013).

```
29              {
30    SF2:      {<thi:s:: i:s::>from the <lum(hh)bar(hh) re(h)gi(h)on i think=
```

```
31              {
32    SM1:      {<this is from> (.)
```

```
33              {
34              {thee:: um[:    :     ::          ]=
35    SF2:                [>>(is this slot)<<]
```

```
36              {
37    SM1:      ={   [t!   t!                ]
38    SF2:           [>>because look<< ]
```

```
39            {
40            {it's squa::re::
41    (0.2)
```

Dan returns to selecting more vertebrae (line 29) to give to the students. From line 30 onwards, the remaining transcript shows the unfolding student-interactions that Dan has induced through his action of delivering the learning resource (vertebrae bone specimens) to students, along with his brief accompanying instruction.

In summary, the analyses clearly demonstrate the primacy of the physical environment when the openings during the laboratory activities are designed to draw attention to effective resources and to instruct students on how to employ the resources for their learning. The role of epistemics is not as obvious in this second extract, but Dan provides an ‘initiation’ question and impetus that creates an epistemic gradient for students to consider and produce a response. Even though Dan does not hold them accountable for a response and returns to selecting more vertebrae, students (SF1 and SM1) are seen and heard incorporating this epistemic gradient into their discussion as they return to on-task interaction (lines 30, 32, and 34) (Benwell & Stokoe, 2002; Heritage, 2012b, 2012c). The analyses show how resource delivery accompanied by demonstrator instruction can instigate student discussion and indirectly manage their on-task behaviour.

6.3.2.3 Summary

The analysis of these two extracts highlights how demonstrator-student interactions follow the general principles of:

(1) closing down physical distance and establishing co-presence,

(2) positioning themselves to be heard/seen, and

(3) creating verbal utterances to establish recipiency and (4) to communicate the purpose.

Furthermore, the demonstrators establish recipiency with the students' attention directed at the learning resources that are being introduced. It has been shown Streeck (2009) that in this interactional ecology it is the gesture of delivering and making available this learning object that takes sequential priority when establishing recipiency. Usually the objects are introduced in such a way that students' gaze naturally falls upon them instead of the demonstrators, which establishes the resources as common shared sites for knowledge displays, negotiation, and construction as well as assisting in *turn-organisation* (C. Goodwin, 2013; Hayashi, 2005; Mondada, 2007). Hence, the demonstrators modify the design and delivery of their utterances to synchronise with the visibility and availability of the learning resources. Furthermore, the demonstrators' utterances are focused on providing instruction and information on how the learning resources are meant to assist students with their learning.

In terms of epistemics, there is a departure from the soliciting of information or offering of their help that has been shown in Function A. In Function B it is the resource that is going to be assisting the students, and the demonstrators act primarily to introduce the resource and provide information on how the resources will help. More importantly, the second extract illustrates how the demonstrator can effectively use the instruction to suggest an epistemic gradient for students to take up independently without directly constructing a response for the demonstrator. This illustrates the role of epistemics in demonstrator "task setting". In contrast, the first

extract did not create as clear an epistemic gradient, and thus no task-setting was achieved by introducing the hanging skeleton. Having described two out of the three functions of demonstrator-initiated table-talk openings, the final function, managing students' on-task behaviour, will now be examined.

6.3.3 Function C-Demonstrator Managing Students' "On-Task" Behaviour

This next section of demonstrator-initiated interactions will examine how such interactions are co-constructed by the demonstrators and the students to achieve the function of "on-task" behaviour management. The analysis examines the embodied displays of participants and participants' orientations to an emergent shared understanding of "demonstrator doing managing" and "students being managed" by laboratory participants.

6.3.3.1 Extract 6–V S1W2L2 demonstrator Pete managing students' on-task behaviour

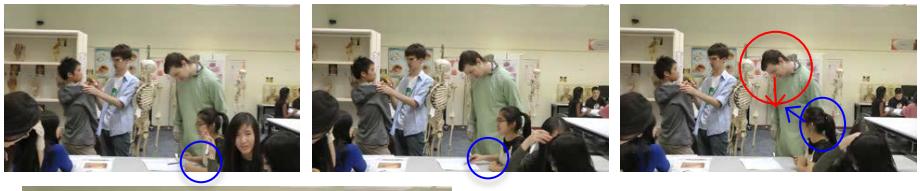
The first extract shows how a typical demonstrator-initiated interaction with a student is oriented to managing the student's on-task behaviour. The first extract is from the second laboratory session of Semester One with demonstrator Pete. The extract begins about 26 minutes into the laboratory recording.

Extract 6-V (S1W2L2) [26:57] demonstrator Pete attends to an off-task student. Please watch the video file of this data segment available at https://dl.dropboxusercontent.com/u/88971137/Extract_6-V_S1W2L2_26-57_Demonstrator_Pete_ManagingStudents.mp4

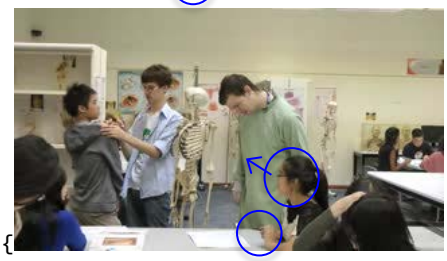
1 ((video recording cuts and resumes))

2 {

3 SF1: {(i LOOK REALLY DAZED) THAT's (why)



4 (0.5)



5 {

6 Pete: {>HOW YU DO:ING.<

7 {

8 SF1: {I AM DOING WELL I AM jus-

9 (0.2)

10 {

11 Pete: {where're yu up to?

12 SF1: WE are up to the tu- lesser tubercle of the

13 {

14 {°(glen:: [ohumeral joint)°

15 SM1: [(IT'S ACTUALLY)] ((student in blue shirt))=

16 {

17 SM1: ={[(Inaudible)]

18 Pete: [°mmhmm°]

19 {

20 SM2: {we know where is it on ((student in grey))

21 {

22 {this but we can't-

23 {

24 Pete: {>whey- where is it on

25 {

26 {this::?<

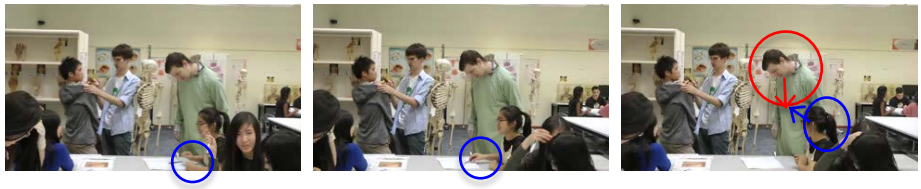
```
            {
SM2:        {isn't it the::se
```

```
            {
Pete:       {ya:::     [:: se its that   ]=
SM1:                   [that's     it          ]
Pete:       =one [there      ]
SM2:             [this is    ]
```

```
            {
            {the lesser and the greater
```

Pete has just finished helping a group of students at the far end of the laboratory, and is making his way over to one of the large rectangular tables along the periphery of the laboratory (Extract 6-V line 1). As the scene begins, Pete approaches from the rear right of the female student (SF1), who is having a casual chat with a student sitting opposite to her at the end of the table (frame-grab in line 1). The female student (SF1) is sitting at the right-hand side of the table (line 1). In the same frame-grab, her partners, two male students (SM1 and SM2) standing to the left of the skeleton, are engaged in the task of drawing the anatomical structures. SM1, in a blue shirt is doing the drawing, and SM2, who is wearing a grey hoodie, is the model.

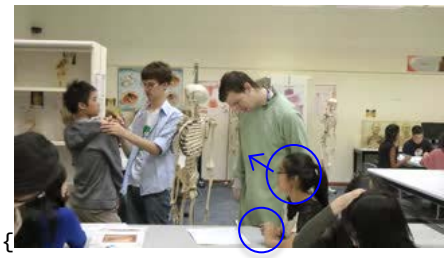
```
1     ((video recording cuts and resumes))
2             {
3     SF1:    {(I LOOK REALLY DAZED) THAT's (why)
4     (0.5)
```



SF1 is unaware of Pete, who is approaching from her rear right, until she says the word “DAZED” (second frame-grab in line 2). At this point she registers his presence of the demonstrator and turns her head slightly towards him, and demonstrates her attention and orientation towards him (C. Goodwin, 1980; Mortensen, 2009). SF1’s posture (slouching with folded arm in line), along with the pencil lying on her laboratory manual, appear to communicate her disengagement from the learning task (Stokoe et al., 2013). In addition, SF1 begins to sit up and change her initial slouched position as she finishes her utterance, “(I LOOK REALLY DAZED) THAT's (why)” (line 3). This postural adjustment follows SF1’s head turn to her right, and it can be seen that Pete is standing above her looking down at her laboratory manual. SF1’s postural adjustment creates room in front of her to form a mutual participatory space (C. Goodwin, 2013; Streeck, 2009), and it is a response to Pete’s embodied action. Her adjustment allows Pete to get a better look at her laboratory manual. Indeed, by the third frame-grab in line 2, Pete leans in closer to look at her laboratory manual, once SF1 sits more upright and creates that space. All of this has been accomplished non-verbally. It sets the stage for the

recipiency that is to come (Mortensen, 2009). Having adjusted her body stance, SF1 also moves quickly to pick up her pencil (line 4). Through these embodied actions she resumes her “learner” status as she attempts to recover from being caught in off-task talk by Pete. In doing so, she also demonstrates that she is aware of the distinction between on-task and off-task activities (Benwell & Stokoe, 2002; Stokoe, 2000) and understands that she has transgressed the expectations. Pete’s stature, and silent checking of her laboratory manual as he stands above SF1 are in turn embodied signs that he is holding her accountable for her off-task behaviour. SF1’s behaviour at this time is in conflict with her institutional role as an anatomy student, as well as with her non-participation with her group work (Stokoe, 2000), which constitutes her transgression. That is: SF1 sits idly by, chatting while her partners are diligently applying themselves to the learning activity.

Next, an analysis of how Pete verbally pursues SF1’s disengagement is presented.



```
5            {
6     Pete:  {>HOW YU DO:ING.<
```

```
7            {
8     SF1:   {I AM DOING WELL I AM jus-
```

Pete verbally holds SF1 accountable in line 6, “>HOW YU DO:ING<”. As previously discussed in Function A, status update requests such as “>HOW YU DO:ING<” or “how’s it going”, are produced and interpreted by students and demonstrators with a sensitivity to the institutional goal of learning (Sert, 2013).

Grammatically and institutionally, this form of questioning can be interpreted as the demonstrator's offer of assistance, as previously shown. Thus, the forthcoming response is expected to be aligned with the institutional goal of how their learning task activity is progressing. However, in this case the prosody of the demonstrator's utterance, ">HOW YU DO:ING<", which is spoken louder, more quickly, and sharply, projects an alternative function, that is, to manage the student's off-task behaviour. The demonstrator's question shows to the student that she is off-task. SF1's embodied and verbal responses in lines 4, 5, 7, and 8 indicate that she understands Pete's intended purpose to manage her off-task behaviour. As Pete produces his question in line 6, SF1's co-occurring action in the frame-grab (line 5) averts his gaze. This is unusual in the *pre-beginning* sequential position, where gaze is often used to establish recipiency (C. Goodwin, 1980; Mortensen, 2009). Arguably, the demonstrator's embodied position relative to SF makes it difficult for SF1 to make eye contact. However, SF1's self-consciousness of her off-task behaviour becomes observable in SF1's loud and cut-off verbal response, "I AM DOING WELL I AM jus-" (line 8). SF1's generic verbal response to Pete's question may be interpreted as being deviant from an institutional alignment or as trying to communicate that she is not experiencing any trouble with her learning. While her response answers Pete's question, as an adjacent pair response it might not fit the intention of his question, as we will see later. However, the *cut-off turn* in her response, "I AM DOING WELL I AM jus-" provides strong evidence of her awareness of needing to provide a justified account of her off-task behaviour. SF1 cuts her explanation because she recognises that she cannot provide an explanation of "what she is doing" which is aligned with the institutional goal of learning anatomy. At the same time as producing the *cut-off turn*, SF1 attempts to embody an

institutionally aligned and accountable response by redirecting Pete towards the learning activities that her partners are actually doing, using her pencil in her right hand (last frame-grab line 7). Pete then flips through SF1's laboratory manual to see what work she has completed.

```
9                (0.2)
10               {
11     Pete:     {where're yu up to?
12     SF1:      WE are up to the tu- lesser tubercle of the

13               {
14               {°(glen:: [ohumeral joint)°
15     SM1:                [(IT'S ACTUALLY)] ((student in blue shirt))=

16                {
17     SM1:      ={[(Inaudible)  ]
18     Pete:       [°mmhmm°      ]
```

Further evidence of SF1's understanding of transgression is found following her cut-off. There is a prolonged pause (0.2) (line 9), which is allowed by Pete as he waits for a forthcoming explanation while flipping through SF1's laboratory manual. In the absence of the forthcoming explanation, Pete further clarifies the intention of his initial question by asking SF1 to display her learning in line 11, "where're yu up to?".

This second question allows SF1 to demonstrate that she has been doing learning as she produces a more institutionally aligned answer, “WE are up to the tu- lesser tubercle of the {°(glen::[ohumeral joint)°” (line 12 and 14). At this point, her answer is interrupted by SM1, who looks to Pete and initiates a repair (line 15) which is followed by a question (line 17). As can be seen from the content of the interaction from line 19-35, SF1’s partners’ ensuing line of questioning (line 20–35) ‘saves’ SF1 from needing to supply further details as SM1 request topical assistance from Pete. The sequence (line 19-35) will not be analysed further, but it shows the change in interactional space and topic switch. The actions analysed above clearly indicate the participants’ mutual understanding and co-construction of the off-task behaviour management interaction.

19 {

20 SM2: {we know where is it on ((student in grey))

21 {

22 {this but we can't-

23 {

24 Pete: {>whey- where is it on

```
25              {
26              {this::?<
```

```
27              {
28      SM2:    {isn't it the::se
```

```
29                  {
30      Pete:   {ya:::     [:: se its that   ]=
31      SM1:               [that's     it          ]
32      Pete:   =one [there      ]
33      SM2:         [this is    ]
```

```
34              {
35              {the lesser and the greater
```

In summary, the analysis of this extract shows how a demonstrator might hold students accountable to their institutional role as a student, which is associated with the responsibility of engaging in behaviours related to learning anatomy. The end of the extract also illustrates how the demonstrator gives priority to students seeking topical help over student on-task management, but the return to task has been achieved. This exemplifies the order of responsibilities and the duties that this demonstrator assigns to his own institutional role as a demonstrator, and how the demonstrators act to renew and project their institutional role and identity.

6.3.3.2 Extract 6–VI S2W7L4 demonstrator Nancy managing student's on-task behaviour

We will now look at another example of how student's on-task behaviour is managed, and this time by the lecturer. This next extract for analysis has been abstracted from the last and final laboratory session of Semester Two. In this session, the lecturer, Nancy, has stepped in to cover for an absent demonstrator. The laboratory activities involve studying, drawing, and the dissection of fresh sheep hearts to understand the anatomy of the human heart (see Appendix B for the laboratory activities). This recording presents a rare opportunity to examine how the lecturer, who designed the laboratory activities and delivers most of the lectures, goes about conducting the teaching-learning interactions between herself and the students. It is also interesting to have the opportunity to document how the lecturer herself delivers and reifies the curriculum for this session, which she has designed.

The extract begins approximately eight minutes into the laboratory recording session. At the beginning of the recording, Nancy goes through an extended formal introduction by talking about the procedure of studying and cutting up the sheep hearts for this laboratory session. Nancy describes in detail how she would like each different group to cut the heart, and during the process she identifies and reviews the key anatomical structures from her lecture that she would like the students to examine, draw, and label before they cut open the heart. This creates a sense of continuity and curriculum alignment not previously seen in the sessions with other demonstrators. Nancy emphasises that it is important to study the surface anatomy of the heart before dissecting, because once dissected the heart is pretty much destroyed and the student can no longer study its surface anatomy. The extract focuses upon Nancy and her students at the point when the students have been working on the first task of drawing the heart for nearly 10 minutes.

Extract 6-VI (S2W7L4) [8:48] lecturer-demonstrator Nancy managing students' time on-task. Please watch the video file of this data segment available at https://dl.dropboxusercontent.com/u/88971137/Extract_6-VI_S2W7L4_8-48_Demonstrator_Nancy_ManagingStudents.mp4

```
1              {
2     SM1:     {A:: vee:: a:: vee::,
3              which is li::ke (.)
4              the left a::trium. (.) goes into °(whom my god)°
```

```
5     (1.2)
```

```
6     (0.8)
7     SM1:     mm::
8              (.)
```

```
9              {
10    SM1:     {>who's that<
```

11 {
12 {>who:s tha::t<?
13 SF1: (.) (a:) i am paying him [( )

14 {
15 Nancy: [{ALRIGHT

16 {
17 [{PEOPLE she:: SHOULD ONLY beat- THE (BIP)=
18 SM1: [ah::: its jus::t t!
19 Nancy: =[(.) TEN MINUTES=
20 SM1: [>i'll °take it°<

21 {
22 Nancy: =[TO DO YOUR {DRAW::ING↑]=
23 SF1: [he hh he hh .hh]
24 SM1: =(my gad [are yu hurling)]
25 SF1: [.hh hehe he he]=

{

=nohh {he [.hh]

SM1: [hh].hhh=

SF1: =i don::t [(guys but) (inaudible)

{

Nancy: [{DOESN"T HAVE TO BE YUR WORK OF AR::T

YU’VE ONLY GOT AN HOUR OR SO=

=TEN MINUTES TO DO YOUR

{

[DRAWING AND THEN get things (crack and {bean)]=

SF1: [(inaudible) i think this is a vein?]

SF1: =ya:::. this is a vein:::.

{

{(.) °oh ya:: (this is a)°

(1.2)

{

SM1: {>>(what is it?)<< ((high falseto voice)) (ishmale wha::::t?) what::::t?

(2.8)

{

SF1: {°she (have a) look like she does °°radiography°°

(0.4)

Nancy: if yur done your draw [ing and uh::m]

SF1: [hehe]he ˚he˚↑]

{

SM1: [{hem:]

(.)

52 {

53 SM1: {°hum::°how do you look like you do radiography?=

54 Nancy: { ((left hand scratch behind ear))

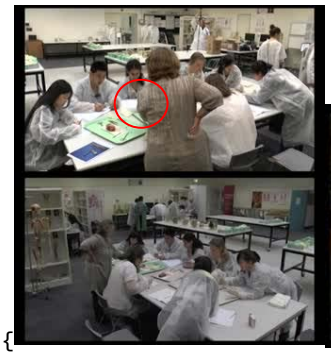
55 SF1: =.hhhe {um:: [we ( )-]

56 {

57 Nancy: [{Nathan]

58 {

59 {>if yu done your drawing you can<

60 { 

61 {<cut down the si::de>

```
62                  {
63                  {>of it<
```

```
64                  {
65      SM1:        {aw: okay  [ye:::s::          ]
66      Nancy:                 [(right si:de)     ]=
```

```
67                              {
68      SM1:        =>so th    [{at< ]
69      Nancy:                 [>(leh-)     ]
```

```
70                      {
71                      {>let's ave a look at yur draw:ing:<
```

```
            (0.8)
Nancy:  (band) and la:: [beled      ]
SF1:                    [woh::::.   ]
```

```
                   {
SM1:    {la::beled.=
Nancy:  =ya::      [(inaudible)     ]
SF1:               [thats amazing]
```

```
                    {
SM1:               [{(there we )     ]the righ- right
```

```
                   {
                 [{atrium::]
                  {((Sara shakes her head))
SF1:             [{(i can't  ] draw:::.
            (1.2)
Nancy:  doesn't have to be a work of ar::t=
```

The extract begins as a student (SM1), who is standing in the frame-grab (line 1), responds to his peer (SF1) to his left about how to remember the blood circulation pathway of the heart. Part way through his response, SM1 becomes distracted by something happening at the entry of the laboratory (lines 4–6). SM1's curiosity sparks a series of exchanges (lines 4–12).

```
1              {
2      SM1:    {A:: vee:: a:: vee::,
3              which is li::ke (.)
4              the left a::trium. (.) goes into °(whom my god)°
```

```
5      (1.2)
```

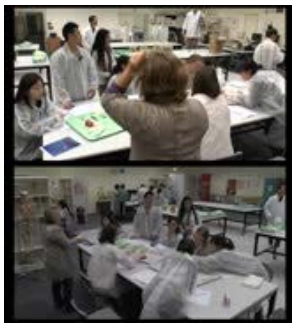
```
6      (0.8)
7      SM1:    mm::
8              (.)
```

```
9              {
10     SM1:    {>who's that<
```

```
11              {
12              {>who:s tha::t<?
13      SF1:    (.) (a:) i am paying him    [(     )
```

During these exchanges, Nancy can be seen to be located directly across from SM1 helping a student (frame-grabs in lines 1, 5, and 6). By the frame-grabs in line 9, Nancy can be seen to be finishing with the student as she begins to stand up. Based on the frame-grabs in line 11, it would appear that Nancy is surveying the scene.

```
14                                      {
15      Nancy:                          [{ALRIGHT
```



```
16              {
17              [{PEOPLE she:: SHOULD ONLY beat- THE (BIP)=
18      SM1:    [ah::: its jus::t t!
19      Nancy:  =[(.) TEN MINUTES=
20      SM1:     [>i'll °take it°<
```

```
21                              {
```

```
22    Nancy:  =[TO DO YOUR    {DRAW::ING↑]=
23    SF1:     [he hh he hh          .hh]
24    SM1:    =(my gad  [are yu hurling)  ]
25    SF1:              [.hh hehe he he   ]=
```

Nancy produces her first utterance just as the student begins to answer SM1's question, "ALRIGHT PEOPLE she:: SHOULD ONLY beat- THE (BIP) (.) TEN MINUTES TO DO YOUR DRAW::ING↑" (lines 15, 17, 19, and 22). It is not clear whether Nancy's utterance has been designed as a result of her noticing the off-task behaviour of SM1. In addition, the projection and loudness of Nancy's instruction indicates that her instruction is not targeted at SM1 specifically but directed at her entire group of students at the table. Nancy's instruction also approximately coincides with the elapsed 10 minutes of laboratory running time, and this demonstrates Nancy's awareness of the elapsed time during the progression of an activity, which has not been observed in other demonstrators' management of the activity phase. It is evidence for Nancy's different student management approach by assisting with students' activity time management, and ushers activity progression for her group of students in this table-distribution configuration. This is so that they can move on to dissecting the sheep heart after students have finished drawing it.

In initiating her instruction to deliver student time management instruction, Nancy has made some alterations in the three steps that are normally used in initiating interaction[33], which have previously been observed in earlier extracts. First, she is not seen developing further physical proximity with her group of students in this table distribution because her student managing instruction is directed at her whole group of students; thus, she demonstrates that she considers herself to be in close enough proximity. This contrasts with other extracts where the demonstrators are selectively interacting with an individual or a small group of students, and it is

[33] The stages are 1) *developing physical proximity*; 2) *positioning to be heard/seen*; 3) *establishing recipiency*; and 4) *communicating/negotiating purpose*.

also unlike demonstrator Dan's instructing in Extract 6-IV (page 303), who was giving instruction to the whole group of students but his instruction accompanied resource delivery. Second, like Dan, Nancy is addressing the whole group at the table, as distinct from a smaller group of students seen in other previous extracts. Unlike Dan, Nancy embodies her student management instruction by positioning herself to be taller (lines 11 and 14) as she begins to project her louder utterance. She lifts her reading glasses during her instructing, which also signals her shift of participation framework from reading/assisting with the previous individual student to her table instruction to the group (line 16). Finally, Nancy's multi-functional utterance is designed as an attention eliciting device with a projected voice to establish recipiency, "ALRIGHT PEOPLE" (lines 15 and 17). The purpose of her initiating interaction immediately follows, "she:: SHOULD ONLY beat- THE (BIP) (.) TEN MINUTES TO DO YOUR DRAW::ING↑" (lines 17, 19 and 22). Despite these initiating elements being present and Nancy clearly exhibiting her demonstrator role through her instructing actions, students do not appear to demonstrate their recipiency, and the students engaged in the off-task behaviour (SM1 and SF1) do not appear to immediately get back on task as they continue to engage in their side-talk (lines 18, 20, and 23–25). However, as the analysis of the next segment will show, SM1 and SF1 returns to their learning task following Nancy's second segment of instruction (lines 31–35).

```
26                    {
27                =nohh {he         [.hh]
```

```
28    SM1:                          [hh ].hhh=
29    SF2:    =i don::t [(guys but) (inaudible)
```

```
30                      {
31    Nancy:            [{DOESN"T HAVE TO BE YUR WORK OF AR::T
32            YU'VE ONLY GOT AN HOUR OR SO=
33            =TEN MINUTES TO DO YOUR
```

```
34                                                  {
35            [DRAWING AND THEN get things (crack and {bean)      ]=
36    SF2:    [(inaudible) i think this is a vein?                ]
37    SF2:    =ya:::. This is a vein:::.
```

It is not until Nancy's second set of instructions, "DOESN"T HAVE TO BE YUR WORK OF AR::T YU'VE ONLY GOT AN HOUR OR SO TEN MINUTES TO DO YOUR DRAWING AND THEN get things (crack and {bean)" (lines 31–35), that the students appear to demonstrate their return to the task. SM1 leans down to study SF1's work (line 34), and SF1 says, "[(inaudible) i think this is a vein? =ya:::. this is a vein:::.". SF1's line is audible as she goes about returning to the topic that she and SM1 were discussing at the beginning of the extract. Although no obvious signs of recipiency have been seen during Nancy's instruction in terms of students' gaze being oriented towards Nancy, SF2 re-engages with the task, which shows that she has been listening. Similarly SM1 re-engages with the task and he can

be seen to return to a sitting position to continue his work in his laboratory manual (line 37 below). The above analyses follow Nancy's reminder to students about the need for time management. The next segment will analyse how Nancy monitors SM1's activity progression. The extract continues from line 37, where SM1 and SF2 can be seen returning to their task of learning about the veins of the heart (lines 37–43).

```
37    SF1:    =ya:::. this is a vein:::.
```

```
38            {
39            {(.) °oh ya:: (this is a)°
```

```
40            (1.2)
```

```
41            {
42    SM1:    {>>(what is it?)<< ((high falseto voice)) (ishmale wha:::t?) what::::t?
43            (2.8)
```

The long pauses (1.2) and (2.8) in lines 40 and 43 respectively, illustrate the students' focus on their own individual task; especially the (2.8) pause following

SM1's utterance, "{>>(what is it?)<< ((high falseto voice)) (ishmale wha::::t?) what::::t?" (line 42). SM1's utterance and SF1's utterance, "ya:::. this is a vein:::. (.) °oh ya:: (this is a)°" (lines 37 and 39). Both are examples of students' self-talk (Filipi, 2009) conducted during their own learning, which in this instance is characterised by their softer delivery (line 39) and the non-engaging body postures, with gaze oriented towards their own work (lines 38 and 42).

```
44          {
45    SF2:  {°she (have a) look like she does °°radiography°°
46    (0.4)
47    Nancy: if yur done your draw [ing and uh::m    ]
48    SF2:                         [hehe]he °he°↑    ]
```

```
49                                 {
50    SM1:                         [{hem:]
51          (.)
```

```
52          {
53    SM1:  {°hum::°how do you look like you do radiography?=
```

```
54    Nancy:            {                    ((left hand scratch behind ear))
55    SF1:    =.hhhe    {um:: [we ( )-    ]
```

In this segment of the extract, Nancy only begins to attempt to manage students' off-task behaviour in line 47, "if yur done your draw [ing and uh::m]", following SF1's soft off-task talk to SM1, "{°she (have a) look like she does °°radiography°°" (line 45). Nancy times her attempted student management instruction following a gap in SF1's utterance (lines 45–46). The softer volume and less projected tone of her voice suggest that, unlike the previous table instruction for the group, Nancy's instruction is directed at SF1 and SM1 in front of her. Her gaze also seems to be directed in their general direction (frame-grab not available here). Later in the analysis it will be shown that Nancy's instruction is indeed directed at the pair of students, however, for now her instruction does not receive any attention or recipiency from either SF1, whose laughter, "[hehe]he °he°↑]" (line 48) overlaps with the termination of Nancy's instruction, nor from SM1, who makes a move to speak, "[{hem:]" (line 50). Following a brief pause (line 51), SM1 turns his gaze to SF1 (line 52) and continues their previous discussion topic, "°hum::°how do you look like you do radiography?=" (line 53). Since, Nancy does not display any additional physical embodied action that further indicates her targeted recipient, SM1 and SF1 have likely assumed that Nancy is simply continuing with her instructional delivery. Thus, her actions do not necessarily require them to demonstrate individual recipiency to her. However, Nancy's instruction is incomplete, "if yur done your draw [ing and uh::m]" (line 47), which is evidence that she recognises the lack of recipiency

between herself and the intended participant. This non-engagement between the students and Nancy would require further pursuit by Nancy or the attempted interaction will have to be abandoned.

Before continuing the analysis, the frame-grabs in lines 44, 49 and 52 reveal Nancy to be holding a pose with her elbows out and hands on her hips. In the second frame-grab of 52, following non-recipiency, Nancy makes a shift to her posture bringing her left hand up and scratches behind her left ear (line 54). This postural shift precedes her recycled utterance at the beginning of the next segment, “Nathan >if yu done your drawing you can<” (lines 57 and 59), which marks her second attempt to establish recipiency to manage the students, which disrupts SF2’s imminent speech, “=.hhhe {um:: [we ( )-]” (line 55). In addition, in the next segment, Nancy’s left hand gesture to her ear also sets her up to produce a downward subsequent gesture (line 58) that accompanies her verbal instruction.

```
56                                  {
57    Nancy:                       [{Nathan          ]
```

```
58                {
59                {>if yu done your drawing you can<
```

60 {

61 {<cut down the si::de>

62 {

63 {>of it<

64 {

65 SM1: {aw: okay [ye:::s::]

66 Nancy: [(right si:de)]=

67 {

68 SM1: =>so th [{at<]

In Nancy's recycled instruction she designs and directs her instruction specifically towards addressing SM1, "[{Nathan] {>if yu done your drawing you can< {<cut down the si::de> {>of it<" (lines 57–63). This recycled turn-beginning has previously been observed as a repair mechanism for overlapping talk where, it is believed, that the speaker gaining the turn recycles her/his overlapped turn-beginning to achieve a neatly sequenced exchange and to ensure that the utterance has been heard and understood (Schegloff, 1987). However, the reinitiated action can also be created to pursue an absent response (Forrester, 2008), which in this case more accurately portrays Nancy's pursuit of recipiency and response from SM1. Thus, Nancy's restarts her instruction but this time targeting SM1 by explicitly using his name and, interestingly, this is one of the few occasions where names are actually used in a demonstrator-student interaction. In doing so, Nancy establishes recipiency with SM1. However, SM1 does not demonstrate recipiency through orienting his gaze to Nancy when his name is called, but rather he demonstrates his recipiency by looking at Nancy's accompanied hand gestures, visible in the frame-grabs in lines 58 and 60. Her left-handed gesture flows from her earlier scratching behind the ear, which creates a large visible movement and thus establishes the joint attention with SM1 on the sheep heart (Mondada, 2007). Nancy's verbal utterance is accompanied by a cutting gesture that is made with her left hand and arm (lines 58, 60 and 62), and the gesture is completed (line 64) as SM1 responds to her instruction, "{aw: okay[ye:::s::]" (lines 65). Nancy's instruction also demonstrates her epistemic authority regarding SM1's progress status. Nancy does not ask SM1 for his progress status update, instead she shows that by her observation of their "off-task" talk that SM1 should be ready to move on to the next stage of their learning activity (i.e. to begin dissecting the sheep heart). SM1's response with the stretched syllables, "{aw:

okay[ye:::s::] =>so th[{at<]" (lines 65 and 68), which overlaps the Nancy's clarification on which side to cut, "[(right si:de)]" (line 66), accepts Nancy's epistemic authority but indicate hesitancy and seeks further clarification (Mondada, 2013a).

```
68    SM1:    =>so th    [{at< ]
69    Nancy:             [>(leh-)    ]
```

```
70                  {
71                  {>let's ave a look at yur draw:ing:<
```

```
72            (0.8)
73    Nancy:  (band) and la:: [beled      ]
74    SF1:                    [woh::::.   ]
```

```
75                  {
76    SM1:    {la::beled.=
77    Nancy:  =ya::      [(inaudible)      ]
```

At the same time, Nancy requests to have a look at SM1's work in his laboratory manual before letting him go ahead to the next stage of the activity, "[>(leh-)]={let's

ave a look at yur draw:ing:<” (line 69–71). In the frame-grab in line 70, SM1 can be seen to be complying and leans back slightly to make his laboratory manual more visible and begins to flip the page. SM1 completes flipping his page in line 72, audibly places his hand on the drawing that he has completed, and looks up to establish gaze with Nancy (line 72). In the subsequent exchanges, Nancy assesses the drawing saying that it needs to be labelled (line 73). SM1’s repeats of Nancy’s assessment, “la::beled.=” (line 76). Such repeats may be pointing to a potential source of troubled hearing and understanding, as in an *other-initiated repair request* pointing out a repairable, but they may also be used to indicate a point of disagreement in the previous utterance, and in doing so project a forthcoming *disaligning* action (Filipi, 2015; Schegloff, 2007a; Svennevig, 2008). Based on Nancy’s response, she has understood SM1’s repeat to be a request for clarification and confirms that labels are indeed required, “=ya::[(inaudible)]” (line 77). However, following this, SM1 also begins to protest that he has done the labels by pointing at his labels while saying, “[{(there we)]the righ- right [{atrium::]” (lines 79–82). This suggests that his repeat might have also been foreshadowing his *disalignment*.

While the conversation between Nancy and SM1 is taking place SF1 leans over and shows that she is impressed by SM1’s drawing, “woh::::.” (line 74) and “that’s amazing” (line 78).

```
78    SF1:              [thats amazing]
```

```
79                       {
80    SM1:              [{(there we )     ]the righ- right
```

```
                 {
               [{atrium::]
                {((SF1-Sara shakes her head))
SF2:           [{(i can't  ] draw:::.
        (1.2)
Nancy:  doesn't have to be a work of ar::t=
```

The student management exchange between SM1 and Nancy is subsequently interrupted by SF2. The interruption changes the trajectory of their conversation and they briefly begin talking about what kind of drawing is expected. The management of SM1's off-task behaviour is thus completed and Nancy returns to giving group instruction about labelling of their drawing before they progress to the subsequent stage of the activity, dissecting the sheep heart.

In summary, the analysis of Nancy's student management interaction once again demonstrates how participants differentially enact their institutional membership. Nancy does the demonstrator role by managing her students' time on task, task progression, and off-task behaviour. Her students respond to her management by returning to their learning tasks and activities. Furthermore, the above extract showed how Nancy prosodically differentiates her management of the whole group, as opposed to managing the individual student, and how Nancy embodies the demonstrator authority (hands on her hip and standing tall) as she manages students, as opposed to moving down to the student when providing assistance (beginning of the extract). Nancy also uses her gestures effectively to establish joint attention and recipiency. The students in the extract were often observed to be embodying their off-task talk (e.g. slouching without holding a pencil, talking and looking away from

their laboratory manual) as well as their compliance to Nancy's epistemic authority by returning to their task (e.g. sitting down and working in their laboratory manual). Overall, the analysis illustrates how individual student management and group management are different in terms of the level of recipiency expected by the demonstrator.

6.3.3.3 Summary

The above extracts have illustrated how demonstrators alter their verbal utterances and their embodied actions to communicate their intention to manage students' "off-task" behaviour. The analysis has contrasted how two demonstrators have differentially managed students' progression through the learning tasks and their off-task behaviour. It was shown that demonstrators prosodically marked the difference between managing students as a group or as individuals. Furthermore, the analysis has shown two different demonstrator approaches to managing individual students. Pete used a status request to signal a student's off-task behaviour, whereas Nancy used a conditional sentence to suggest that the student progress to the next task if he is done, which then makes relevant a status request from Nancy. Similarly, the use of face-saving strategies and conditionals in the demonstrators' management of student progression and off-task behaviour reflects the university education cultural expectations for learners to be mature young adults capable of independent and self-guided learning. Thus, the demonstrators' managements are structured as gentle reminders, as opposed to being commands or reprimands, using imperative sentence structures. In addition, analyses of Nancy instructing her students showed that, when managing the behaviour of the student group as a whole, she used a projected voice while standing in physical proximity to the group and at the same time reserving a degree of distance from any particular set of students. In this way she can avoid

embodying the management towards any particular individual student. The extracts also demonstrate how physical embodiment and the way that demonstrators position themselves to be seen or heard by the students are important elements of initiating interaction and may serve to communicate from whom recipiency is being sought, whether from individual students or the entire group. The analysis of Extract 6-VII showed that when there was ambiguity the combined use of the student's name and recycling the beginning of the turn was a powerful means to establish the necessary co-constructed understanding in order to successfully manage individual student behaviour. Furthermore, demonstrators display social acuity in their task management approaches, which recognise their instructing behaviour as being potentially face-threatening to student by employing face-saving strategies such as requesting activity status, directing instruction for the entire group, and using conditional sentence structures.

This section has examined the different functions of demonstrator-initiated interactions with students and how they are sequentially organised. In the next section, the primary function of student-initiated interactions with the demonstrators will be presented in the form of a single case analysis to examine how the sequential organisation and structure of student-initiated interaction exhibit differences that reflect its singular functional purpose and asymmetry in the institutional membership category of its initiator, the student.

6.4 A Single Case Analysis of Student-Initiated Interaction

In the laboratory activity phases of the present data corpus, students have been observed to initiate interactions with demonstrators primarily to seek expert help/guidance. This help-seeking behaviour may also be present in the form of seeking confirmation of some piece of information that the demonstrators might have

previously provided in earlier parts of the ongoing laboratory session (as in the above extract), or in earlier laboratory sessions. While students have also been observed to seek help from their peers, the present analysis will focus on student interactions with the demonstrator due to limitations of space. It is important to note that this limited analytical focus does not intend to place student-peer interactions as being any less important than student-demonstrator interactions. Rather the decision ensures that the chapter remains analytically aligned with the aim of the thesis, which is to analyse and understand the socio-cultural principles that underpin anatomy laboratory pedagogy during the openings of the formal laboratory introductory and table-talk phases.

At first glance, students' methods of soliciting help from the demonstrator appear to take on a variety of forms. However, closer inspection of how students initiate help-seeking behaviour shows that students follow similar interactional steps as the demonstrator-initiated interaction. That is, students will act to (1) close down the physical distance in preparation for recipiency, (2) position themselves to be seen by establishing physical co-presence, and (3) establish recipiency and (4) negotiate the purpose in initiating their interaction. The following extract has been selected to illustrate how a student makes modifications in these three steps to establish his help-seeking interactions with the demonstrator. The extract exemplifies the most common form of student-initiated interaction with the demonstrator using a ‘queuing’ approach.

6.4.1 Extract 6–VII S1W2L2 A Single Case Analysis of Student-Initiated Interaction with Demonstrator Pete

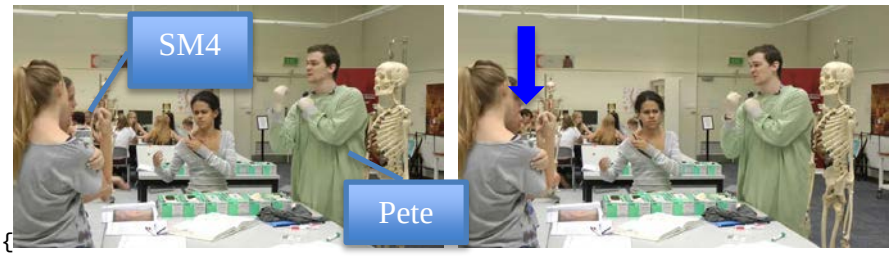
This extract comes from the second laboratory session of Semester 1 supervised by a single demonstrator, Pete. The extract illustrates the sequential organisation of

actions that a student takes to initiate interaction in order to obtain the demonstrator's help.

The extract begins with demonstrator Pete engaged with a group of four students talking about how to locate the greater and lesser tubercle of the humerus.

Extract 6-VII (S1W2L2) [22:17] demonstrator Pete managing the closing of his interaction with four student while attending to a queuing student. Please watch the video file of this data segment available at https://dl.dropboxusercontent.com/u/88971137/Extract_6-VII_S1W2L2_22-17_Demonstrator_Pete_ManagingQueuingStudent.mp4

```
1     Pete:   will be:: °ne-°ni::cely in the:re: (.) okay:: but this lesser tubercle
              is at the front of this bone (.) of-
2     (0.8)
3     Pete:   That bone::(Hhhh) know that bone::(Hhh)
4                              (0.5)
5     Pete:   >what's this bone.<
6     SF:     °thee humerus°=
7     Pete:   okay ya:: so
8     (0.2)
9     Pete:   it's- it's harder and yu gonna have to push harder
10    (0.2)
11    Pete:   cuz theyz muscles coming over the top
12    (0.2)
13    Pete:   but there's a bump (.) sort of on the front
14    (0.2)
15    Pete:   and if it's on a spot where yu can muu:ve your ar:m::: okay::, so it's
              not up high::,
16    Pete:   (.) [where if yu muve your arm=
```




```
17              {
18    SM4:    [{Spins right on chair
19    Pete:   =it doesn't moo::ve
20            [it's down low but if you move your ar:m::=
```

```
21                  {
22    SM4:          [{gets up to look at skeleton
23    Pete:   =(.) [yu can't feel it (.) okay
```

{
SM4: [{looks at right humerus of skeleton
Pete: [so maybe bring yur arm back a little bit

{
SM4: [{Starts moving to left around the table towards the tutor
(0.2)
Pete: kay::, [(.) an' then yu fee::ling for har::d bumps on the front.

{
SM4: [{goes around corner of laboratory table
Pete: uh:kay:::?=

{
[{=cuz that's where we are:: =
SM4: [{arrives behind tutor and slows down

{
Pete: [{=we are on the har:::d bump on °the front°
SM4: [((arrives behind tutor and slows down and then moves to the demonstrator's right))

{
Pete: {>>and it's<<tougher
(0.2)

43 {

44 Pete: {it's it's not as easy as thee::se ones::

45 (.)

46 {

47 Pete: {°okay?°

48 (0.2)

49 {

50 Pete: [{looks away from the skeleton; notices SM4;

51 SM4: [((makes eye contact with tutor and raises eye brows and lifts head as if to speak))

52 { ((looks at the approached student waiting on the side))

53 Pete: {°ya°?

54 {

55 SM4: {with the::: um::=

56 {

57 Pete: {=so- BACK an' forth.

58 (0.2)

59 {

60 Pete: {si:de to si:de (.) BUMPs on °the front°

61 (0.4)

62 Pete: yep=

63 {

64 SM4: {=um:: (.)

65 {

66 {with (.)

67 {

68 {abduction=

69 {((demonstrator quick head nod))

70 Pete: {=>>mmhm<<=

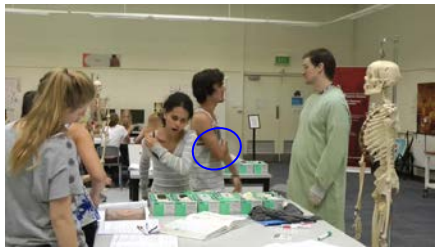
71 {

72 SM4: {=of the humerus

{
{um::: (.) when:::mm::: like the SCAP >is it<

{
{(.) every two degrees

{
{(.) of this is one degree of rotation



{
{°on the scap°?=
{((demonstrator drops hand to side before utterance))
Pete: {=so it's different for

{
{everyone unfortuna [tely]
{SM4 nods head
SM4: [{O::kay]::
YA: [::::]

{
Pete: [ya{::]=

```
90              {
91      Pete:   {so i >(oh:)< know that's one of your activiti::es=
92      SM4:    =[>yep<]
```

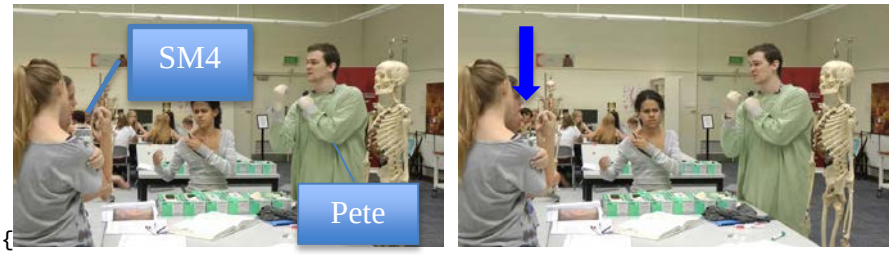
```
93                      {
94      Pete:    [>what    ] {have you found so far=
```

```
95               {
96              ={>(we)< might {go over an-=
97      SM4:    =WELL ((Recording cuts out))
```

An extended section of the interaction between Pete and his group of students (in the foreground of the frame-grab in line 17) has been provided to reveal the context of their conversation, and to offer insights into the behaviour of the student (SM4) when he arrives to seek Pete's help. There are a number of obstacles for SM4 to negotiate prior to initiating the interaction with the demonstrator. SM4 must first find and locate the demonstrator, before he can initiate the sequential stages to (1) close the physical distance between himself and the demonstrator; (2) position himself in a way to show that he is queuing up for a turn with the demonstrator while not interrupting the ongoing conversation; (3) establish recipiency with the demonstrator; and (4) communicate the purpose for initiating interaction.

```
1       Pete:   will be:: °ne-°ni::cely in the:re: (.) okay:: but this lesser tubercle
                is at the front of this bone (.) of-
2        (0.8)
3       Pete:   That bone::(Hhhh) know that bone::(Hhh)
4       (0.5)
5       Pete:   >what's this bone.<
6       SF:     °thee humerus°=
7       Pete:   okay ya:: so
8       (0.2)
```

```
9     Pete:   it's- it's harder and yu gonna have to push harder
10    (0.2)
11    Pete:   cuz theyz muscles coming over the top
12    (0.2)
13    Pete:   but there's a bump (.) sort of on the front
14    (0.2)
15    Pete:   and if it's on a spot where yu can muu:ve your ar:m::: okay::, so it's
              not up high::,
16    Pete:   (.) [where if yu muve your arm=
```




```
17            {
18    SM4:    [{Spins right on chair
19    Pete:   =it doesn't moo::ve
20            [it's down low but if you move your ar:m::=
```

```
21                {
22    SM4:        [{gets up to look at skeleton

23    Pete:   =(.) [yu can't feel it (.) okay
```

```
24            {
25    SM4:    [{looks at right humerus of skeleton
26    Pete:   [so maybe bring yur arm back a little bit
```

```
27            {
28    SM4:    [{Starts moving to left around the table towards the tutor
29    (0.2)
```

As the instructional conversation between Pete and the group of four students (line 1–26) continue in the foreground, SM4 can be seen in the background of the frame-grabs (lines 17, 21 and 24). SM4 who is seeking Pete's help is located at a large rectangular table in the background as indicated by the red arrow in the first frame-grab of line 17. SM4 gets up to study the hanging skeleton briefly and, as will

become evident, he realises that his problem cannot be solved using the skeleton (lines 21 and 24). SM4 starts to move towards Pete (line 27). Apart from Pete's tall stature and the green scrubs he is wearing, Pete happens to be in the direct line of sight of SM4 as he looks at the skeleton, so he is easily locatable. Hence, SM4 does not need to scan the laboratory to look for him.

```
30    Pete:   kay::,     [ (.) an' then yu fee::ling for har::d bumps on the front.
```

```
31                       {
32    SM4:               [{goes around corner of laboratory table
33    Pete:   uh:kay:::?=
```

```
34             {
35             [{=cuz that's where we are:: =
36    SM4:     [{arrives behind tutor and slows down
```

```
37             {
38    Pete:    [{=we are on the har:::d bump on °the front°
39    SM4:     [((arrives behind tutor and slows down and then moves to the
               demonstrator's right))
```

```
40             {
41    Pete:    {>>and it's<<tougher
```

SM4 navigates around the large rectangular table and approaches Pete from his rear right (lines 27 and 31). At this point, Pete happens to be near the closing of his instruction with his four students, "kay::, [(.) an' then yu fee::ling for har::d bumps

on the front. uh:kay:::?= [{=cuz that's where we are:: [{=we are on the har:::d bump on °the front°" (lines 30, 33, 35, and 38). SM4 arrives at the rear right of Pete (lines 34 and 36) as he says, "[{=cuz that's where we are::" (line 35), but SM4 remains out of Pete's sight. At this point SM4 can easily monitor the ongoing conversation between Pete and his students, looking for an appropriate transition space. Pete continues without taking notice of SM4, "[{=cuz that's where we are:: = [{=we are on the har:::d bump on °the front°" (line 35 and 38). During this, SM4 slows down his approach and repositions himself into a position in Pete's right periphery of vision (line 39). As SM4 slows down and moves into this position, he brings his hands to the front of his abdomen (second frame-grab in line 34), and then he begins to touch his face with his left hand.

SM4's face-touching and nose-rubbing gestures continue until Pete begins to close his instruction and a transition space is created, "cuz that's where we are:: = [{=we are on the har:::d bump on °the front° {>>and it's<<tougher" (line 35, 38 and 41) which is followed by a brief pause (0.2). Pete marks the imminent closure of his speech with a noticeable decrease in volume, "=we are on the har:::d bump on °the front°" (line 38) and a faster speech pace, ">>and it's<<tougher" (line 41) all features consistent with closing of a sequence of talk (Rendle-Short, 2006).

```
42    (0.2)
```

```
43            {
44    Pete:   {it's it's not as easy as thee::se ones::
45    (.)
```

```
46            {
```

```
47    Pete:   {°okay?°
48    (0.2)
```

During the brief pause in line 42, SM4 drops his hands and switches to an embodied position where he places both hands on his hips with elbows sticking out showing his readiness to interact (frame-grabs of line 43) (C. Goodwin, 2000, 2007, 2013). This makes SM4 appear more visible as Pete enters a *transition space* in his speech (Ford, 2012; Levinson & Torreira, 2015). At the same time, SM4 turns his gaze up towards the general direction of Pete, and looks intently upon the unfolding moments of interaction as Pete utters, “it's it's [sic] not as easy as thee::se ones::” (line 44). In the pre-beginning position, these carefully coordinated and orchestrated physical body shifts are SM4’s silent embodied bids for a turn. They mark him as a new visible peripheral participant who is queuing for the demonstrator (C. Goodwin, 2000, 2007, 2013; Mortensen, 2009; Stivers & Rossano, 2010). Furthermore, we note how SM4 does not interrupt or vocally jump in at Pete’s various transition relevant places in lines 42, 45, and 48.

```
49            {
50    Pete:   [{looks away from the skeleton; notices SM4;
51    SM4:    [((makes eye contact with tutor and raises eye brows and lifts head as
              if to speak))
```

```
52            {                                    ((looks at the approached student
              waiting on the side))
53    Pete:   {°ya°?
```

```
54          {
55    SM4:  {with the::: um::=
```

Instead, SM4 waits for physically embodied signs of possible recipiency from Pete (see lines 49–51); there are Pete's vocal summoning, "°ya°?", and established gaze (line 52–53) (C. Goodwin, 1980, 2000, 2007, 2013; Mortensen, 2009). Only following these actions from Pete does SM4 produce his first vocal utterance that establishes the reason for his talk, "{with the::: um::=" (line 55). This series of actions recurs in almost all instances of student-initiated queuing for demonstrator's help[34]. The students establish close physical proximity, position themselves to be seen, and then instead of producing a vocal utterance to establish recipiency they wait for the demonstrator to call upon them. Thus, these situations illustrate the asymmetry of turn-allocation rights, and how students orient to the demonstrator's right to allocate the speaking right to the queuing student.

```
56          {
57    Pete: {=so- BACK an' forth.
58    (0.2)
```

```
59          {
60    Pete: {si:de to si:de (.) BUMPs on °the front°
```

[34] There have been instances where queuing fails to get the students seen by the demonstrators to establish the necessary recipiency. Furthermore, there were some instances where the students jump in and hitch on another groups talk and "steals" the demonstrator.

61 (0.4)
62 Pete: yep=

The extract from line 56 also demonstrates the asymmetry of speaking rights as Pete cuts off SM4's initial question formulation, which is accompanied by a left arm abduction movement, and momentarily suspends the activity to return to the previous group. Despite this being a face-threatening move, there are no obvious signs or apologies from Pete, which further illustrates asymmetry in *turn-taking organisation* rights (Chevalley & Bangerter, 2010). Pete returns to instruct the other group, "=so-BACK an' forth." (line 57). As Pete does so, he turns his gaze away from SM4 (line 56), and SM4 responds by halting the production of his question. SM4 can be seen to enter a holding waiting position with his right hand at his left chest and left arm dropped back to his side (lines 56 and 59). SM4 is waiting for Pete to resume their joint activity (Chevalley & Bangerter, 2010). While waiting, SM4 also turns his gaze towards the student recipients of Pete's instruction (lines 56 and 59). Through these actions, SM4 shows embodied alignment with the demonstrator's switch to re-engage his interaction with the four students to give final instructions, "=so- BACK an' forth. si:de to si:de (.) BUMPs on °the front°" (lines 57 and 60). Again, we note how SM4 does not re-engage with Pete, even in the (0.2) and (0.4) pauses in lines 58 and 61, which demonstrates his understanding of the suspension in the context of his interaction with Pete. Furthermore, SM4's withholding of interaction shows his orientation to the demonstrator's *speakership allocation rights* (Benwell & Stokoe, 2002, 2005; Lerner, 1995; McHoul, 1978; Stivers et al., 2009). SM4 only resumes, when Pete vocally summons him, "yep=" (line 62), and SM4 only turns his head

back towards Pete (lines 63 and 65) as he responds and begins to produce his question, “{=um:: (.) with (.) {abduction=” (line 64 and 66).

63 {

64 SM4: {=um:: (.)

65

66 {with (.)

67 {

68 {abduction=

69 {((demonstrator quick head nod))

70 Pete: {=>>mmhm<<=

71 {

72 SM4: {=of the humerus

73 {

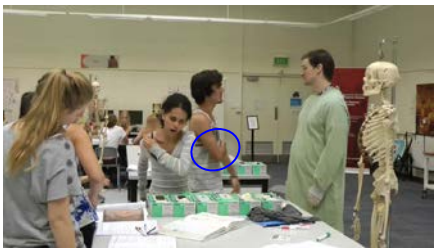
74 {um::: (.) when:::mm::: like the SCAP >is it<

75 {

76 {(.) every two degrees

77 {

78 {(.) of this is one degree of rotation



79 {

80 {°on the scap°?=

SM4 shows some disfluency in formulating his question, and as he does so Pete encourages SM4 and shows signs of active listening with a quick head nod (line 69) and continuers “{=>>mmhm<<=” (line 70); such features are consistent with listenership characterised in the literature (Danby et al., 2009; Gardner, 2001; Levinson et al., 2015). As SM4 formulates his question he also produces accompanying body gestures; “{abduction=” (line 68) is accompanied by him abducting his left arm (line 67). Thus, the speech disfluency might also be created in order to synchronise his gesturing with his speech (Streeck, 2009). Following Pete’s prompting, SM4 continues, “{=of the humerus {um::: (.) when:::mm::: like the SCAP >is it< {(.) every two degrees {(.) of this is one degree of rotation {°on the scap°?=” (lines 72, 74, 76, 78 and 80). The extract shows how SM4 uses his body to illustrate the content of what he is asking. For example, as he says, “{(.) every two degrees {(.) of this is one degree of rotation” (lines 76 and 78) he abducts his left arm to clarify his use of the indexical term, “this” (Mondada, 2007, 2011; Streeck, 2009).

SM4 also puts his right hand on his left arm to indicate the movement of his arm, and then as he says, “is one degree of rotation {°on the scap°?” (line 78 and 81), he drops his right hand to his left arm pit to indicate the scapula. Besides SM4’s use of his body to illustrate his question, Pete can also be seen to show his attentiveness, as in the frame-grabs in lines 73, 75, and 77. Pete has his body and head both turned towards SM4, and it can be seen from the frame-grabs starting in line 63 how the pair gradually migrates away from the previous four students working at the table. They also begin to turn more towards each other to demonstrate their embodied affiliations with one another creating a shared joint space (C. Goodwin, 1986, 2007; Mondada, 2013b; Stokoe et al., 2013).

```
81              {((demonstrator drops hand to side before utterance))
82      Pete:   {=so it's different for
```

```
83              {
84              {everyone unfortuna   [tely ]
85                                     {SM4 nods head
86      SM4:                          [{O::kay    ]::
87              YA:  [::::]
```

```
88                      {
89      Pete:       [ya{::]=
```

```
90              {
91      Pete:   {so i >(oh:)< know that's one of your activiti::es=
92      SM4:    =[>yep<]
```

```
93                          {
94    Pete:    [>what    ] {have you found so far=
```

```
95              {
96             ={>(we)< might {go over an-=
97    SM4:     =WELL ((Recording cuts out))
```

Prior to responding to SM4, Pete drops his hand to his side (lines 77, 79, and 81), “{=so it's different for everyone unfortuna [tely]” (lines 82 and 84). Pete takes a step back (line 83) as he prepares to relocate their discussion, which is accomplished later (lines 88–97). More importantly, in contrast to Koole’s (2012) findings of teachers answering questions based on epistemic assumptions, Pete’s verbal response not only claims understanding but demonstrates that he has fully understood SM4’s question and is epistemically aligned with SM4 by the preliminary answer to his question (Heritage, 2012b). This demonstrates how Pete employs a student-centred approach and positions himself to understand the needs and problems from the students’ perspectives. SM4 acknowledges the demonstrator’s epistemic alignment in lines 86 and 87, “[{O::kay]:: YA: [::::]”. The alignment and the successful negotiation of the purpose of SM4 seeking Pete’s help is confirmed as Pete shows further epistemic alignment, “ya{::]= so i >(oh:)< know that's one of your activiti::es=” (lines 89 and 91). The efficiency of meaning is also displayed through mutual orientation to the ‘anatomy laboratory activities’ indicating a commonly shared culture of practice (C. Goodwin, 2013). Their synchrony continues to be exhibited as SM4 confirms that his question indeed stems from one of the laboratory

activities, “=[>yep<]” (line 92), which is overlapped by Pete’s epistemic status check, “[>what] {have you found so far=” (line 94) (Sert, 2013). Following this information request, Pete latches a suggestion to relocate their discussion to where SM4 is working, “>(we)< might {go over an-=” (line 96). The verbal suggestion was actually preceded by Pete’s embodied display to move by a right-hand pointing gesture (line 88) and the turning of his body to the right (line 90). Thus, his suggestion in line 96 coincides with them moving off towards where SM4 is working. Once again, evidence support the theory of gesture taking primacy but this works conjointly with verbal utterances in people’s face-to-face encounters (C. Goodwin, 2000, 2007, 2013; Nevile, 2015; Streeck, 2009).

6.4.2 Discussion and Summary of Student-Initiated Interaction

The analysis of Extract 6-VII shows the student (SM4) successfully initiating and accomplishing his help request with the demonstrator (Pete). The analysis demonstrates the student performing similar steps as demonstrators when seeking to initiate interaction with students. That is, physical proximity with the recipient must be first established and then followed by effective positioning to be seen or heard by the targeted recipients. This is all accomplished through physical embodied actions before any vocal utterances are made.

In the present corpus, all student-initiated interactions with the demonstrator that require students to queue up are thus accomplished. The queuing approach is by far the most frequently found type of student-initiated interaction with the demonstrator during the table-talk phase when students and demonstrator are working in the laboratory-distribution pattern. Queuing was rarely observed in the table-distribution pattern where students are congregated around the large tables, and more readily in laboratory distributed patterns where students are just spread out everywhere in the

laboratory. However, “queuing up” is not the only approach that students use to solicit the demonstrator’s help. In the present corpus, students have also been observed to use a “shout-out” approach and the “hand-raising” approach, the latter of which have been previously observed and studied in classrooms using CA (Lerner, 1995; McHoul, 1978; Mehan, 1979b; Sahlström, 2002). In the anatomy laboratory, these approaches are generally used when the students are in closer proximity to the demonstrators than the “queuing” approach (i.e. no more than a table length or width away).

It was initially expected that students would be observed to use the “hand raising” approach more frequently to solicit demonstrator help as in classroom settings (Lerner, 1995; McHoul, 1978; Mehan, 1979b; Sahlström, 2002). However, in the present data set there have been only two observed instances of students using the “hand-raising” approach to engage with the demonstrator. It is postulated that perhaps as a physical embodied display of request for help, “hand-raising”, in the anatomy laboratory space may have many limitations due to the spatial configurations of demonstrator to students. Furthermore, it might be deemed unnecessary since students are free to move around and therefore are free to move to the demonstrators, which makes hand-raising redundant. There are often times where such signals do not suffice to create opportunities to establish recipiency due to the physical distance between demonstrator and student, or if the intended recipient of the hand-raising is oriented in such a way as to render the action ineffective. In other words, the recipient may have their body or gaze turned away from the producer, thus rendering the action inadequate in drawing attention to establish recipiency. This perhaps explains why students in this data set have been predominantly observed to use the “queuing” approach, and “hand-raising” as an attention drawing tends to

occur when participants are already in closer proximity to one another and within each other's visual field. In the present corpus, only two instances of "hand-raising" approach have been observed, and in both situations the students were no more than a table length or width away from the demonstrator and within the visual field of the demonstrator. In both instances, the students used the "hand-raising" approach because it was simply more convenient and efficient than having to get up from their seat to further close the physical proximity. The demonstrators in these instances also responded readily to these signals demonstrating the accepted socio-cultural norms of the anatomy learning laboratory. Other approaches have been observed and noted in the present data set, but due to limitations of time and space they have not been analysed.

6.5 Conclusion

In this chapter, the aim was to examine how students and demonstrators conduct the openings of their interaction in the table-talk phase and to examine how participants reach an inter-subjective understanding of the purpose and function for establishing interaction. We saw from the above analyses that demonstrator-initiated interaction served three functions:

- Function A-Demonstrator Offering Help (the most common function)
- Function B-Demonstrator Delivering Resources to Students
- Function C-Demonstrator Managing Students' "On-Task" Behaviour

In contrast, student-initiated beginnings served a single purpose and that was to seek demonstrator assistance, which resembles talk in other education settings (Benwell & Stokoe, 2002; Gardner, 2012; Mehan, 1980, 1998; Zemel & Koschmann, 2011). The extracts also repeatedly demonstrated that the openings followed similar sequential organisation patterns that consisted of four stages:

(1) close down the physical distance and develop close proximity with their intended target recipient(s)

(2) position themselves to be heard or seen by the intended target recipient(s)

(3) produce a multi-functional utterance that establish recipiency, and

(4) to communicate the intended purpose

These stages echo previous CA findings that indicate that participants non-verbally engage with one another prior to their verbal openings using a variety of embodied approaches that signal their imminent forthcoming initiation of interaction (C. Goodwin, 1980; Hellermann, 2007; Mondada, 2007; Mortensen, 2009). However, analysis of demonstrator- and student-initiated interaction has also identified an example of a deviation from this model. That is when the interaction is initiated by the student, as analysed in Extract 6-VII; there is an extra stage between (2) and (3) as the student must wait for the demonstrator to first show his/her readiness to interact. Thus the student's stages were:

(1) close down the physical distance and develop close proximity to the demonstrator

(2) position themselves to be heard or seen by the demonstrator

(3) wait for the demonstrator to display their readiness to interact, and

(4) produce a multi-functional utterance that establishes recipiency and

(5) to communicate the intended purpose

This extra step is an example of turn-taking asymmetry affiliated with different membership categories, whereby demonstrators have more control of turn-taking in their interaction with students and are also readily given speaking rights by the students if the demonstrators seek to initiate interaction (e.g. Extract 6-II and Extract 6-IV).

Besides the sequential organisation of demonstrator-student interaction openings, analyses of the extracts have also yielded the following additional findings. First, the non-verbal and embodied displays of recipiency and understanding are essential features of both demonstrator- and student-initiated interaction in the table-talk phase. The observations (e.g. Extract 6-III and Extract 6-IV) align with previous research where participants mutually orient to these displays to determine the trajectory of forthcoming interaction beginnings, and in some cases the non-verbals are oriented to as the primary interaction organisation complemented by the verbals (C. Goodwin, 2007; Christian Heath & Luff, 2012; Mondada, 2007, 2011; Nevile, 2015; Streeck, 2009). Interestingly, analyses of Extract 6-VI (demonstrator Nancy) challenge the expectation that participants display recipiency (e.g. using gaze) because students showed no recipiency to the demonstrator who initiated group management instructional interaction. However, students embodied their understanding of the demonstrator's time management instruction by returning to their academic tasks. Therefore, there are interactional contexts and circumstances where the stages of the sequential model may be locally altered and adapted by participants, but remain socially acceptable.

Second, studying the openings of pedagogical interaction in the anatomy laboratory activities context within the university institutional setting is significant because the data mitigates existing gaps of CA interaction studies in this context (Benwell & Stokoe, 2002, 2005; Stokoe et al., 2013). Unlike previous research of university pedagogical interaction that have focused on instructional settings that are typically educator-fronted and educator centric (Benwell, 1999; Benwell & Stokoe, 2002; Christodoulidou, 2011; Lindwall & Lymer, 2014; Rendle-Short, 2006; Walsh & O'Keeffe, 2010), the extracts in this chapter have illustrated an anatomy laboratory

instructional context that is learner-centred, as evidenced by the primarily supportive functions of demonstrator-initiated interaction. In other words, students' activities are the central phenomenon of interest from the demonstrators' perspective. For example, extracts show how demonstrators initiate interaction to support and facilitate students' learning by offering help (e.g. Extract 6-I and Extract 6-II), providing additional resources (Extract 6-III and Extract 6-IV), and managing their off-task activities (Extract 6-V and Extract 6-VI). These actions are all premised on the demonstrators' understanding and awareness of students' learning activities.

This leads to the third findings regarding how demonstrators and students understand and exhibit their understanding of one another's social actions, such as the off-task behaviour in Extract 6-V and Extract 6-VI, which lead to student management. The analyses of these extracts (on p. 318 and p. 328 respectively) illustrated that in each instance of interaction participants make relevant and orient to a set of micro-cultures, which are drawn from the culture and practices of the university and the laboratory community of practice, which become relevant as a resource to understanding the interactions and also inform participants' demonstration of such understandings. To achieve this, demonstrators and students talked and acted their institutional roles into being. For the demonstrator this involves looking and assessing student progress, offering help, providing resources, and managing students (i.e. doing "being a demonstrator"). For the student this involves engaging with the learning activities, displaying and demonstrating their understanding, seeking demonstrator help, and responding to instruction from the demonstrators. However, as has been shown, students also engage in non-academic related tasks which may also arguably be a part of how they do "being a student" by resisting their academic identities (Benwell & Stokoe, 2005; Stokoe et al., 2013).

Regardless, laboratory participants demonstrated their understanding of the meaning of one another's actions, and they have shown how they orient to and make relevant institutional membership categories of "student" and "demonstrator". In all the extracts participants show in different ways how they embody their institutional roles through engagement with the affiliated teaching-learning activities. For example, extracts have shown demonstrators embodying managing (e.g. Extract 6-VI) and offering help (e.g. Extract 6-I and Extract 6-II), or students embodying learning, off-task and being managed (e.g. Extract 6-V and Extract 6-VII). Such institutional roles, identities, and affiliated activities contribute to the institutional nature of participants' talk, which is no different from other education institutional contexts. The way participants embody their roles has implications for the degree to which demonstrator-student relationships are hierarchical and institutionally based.

The fourth and final finding of this chapter showed that demonstrators and students can collaboratively act either to make relevant or renew the hierarchical relationships, but alternatively demonstrators may employ different instructional approaches that seek to establish less hierarchical and more democratic relationships. For example, in the analysis of Extract 6-II and Extract 6-III, the demonstrators frequently used politeness devices and conditional sentence structures in interaction where they perceive their action to be potentially face-threatening, which echo previous findings in UK university tutorial contexts (Benwell & Stokoe, 2002, 2005). This may be considered evidence for demonstrators attempting to downplay and decrease their institutional hierarchical authority traditionally associated with teachers, and suggests that to some extent the demonstrator role may be considered by participants to be different from that of the teacher. It is also a reflection of the difference between pre-tertiary education and the university education culture, where

the latter sees and treats students as young adults who are autonomous and individuals responsible for their own learning. This notion is supported by the finding that demonstrators only initiated interaction to offer help, deliver resources, and on rare occasions to manage students' off-task behaviour. Demonstrators were never observed doing extended direct instructional talk to the whole group, but instead they offered feedback and advice based on their observations or the information provided by the students regarding their progress. Most of the time, students sought the demonstrator's help. This showed that in the anatomy laboratory community of practice demonstrators treated students as independent and self-guided learners. In a slightly different vein, the analyses of the extracts (e.g. Extract 6-I and Extract 6-II) also showed how learning activities and the demonstrators' instruction provided opportunities for students to demonstrate and display their anatomical knowledge and understanding, which aligned with previous observation where clinical dental demonstrators oriented to dental students physically demonstrating their understanding in clinical apprenticeship scenarios (Hindmarsh et al., 2011). This asymmetry in the authority of knowledge is commonly observed in education institutional settings, such as asking known information questions and teacher initiated IRE (McHoul, 1978; Mehan, 1979b; Zemel & Koschmann, 2011).

Some of the findings are shared with talk that occurs in other education contexts while some are unique to this laboratory setting. In particular, the anatomy laboratory provides an interactional environment that is unlike the PBL interaction context where students must work in a large group configuration (Glenn et al., 1999; Koschmann & LeBaron, 2002; Zemel & Koschmann, 2011). The anatomy laboratory context allows for more flexible group work arrangements that more closely resembles day-to-day conversation, as is evident throughout the extracts (no more

than 3-4 people in a conversation). The lower number of participants in the conversation causes less strain on the turn-taking mechanism, and is therefore less likely to lead to *schisming*[35] of the conversations which are prone to occur in larger group configurations (Egbert, 1997; Ford, 2012). For example, Extract 6-I (p. 269) illustrates how turn-taking becomes an issue when Nadia offers her help to an existing group of three students, which was not an issue in other extracts where there are fewer students (e.g. Extract 6-II p. 285 and Extract 6-III p. 297). In addition, the data show that the anatomy laboratory community of practice prefer and have an expectation for students to be self-directed and independent learners. This expectation is not necessarily unique to the anatomy laboratory context, but in this community it has become such an integral part of their routine that it imparts an economy and efficiency of meaning when demonstrators and students interact in the table-talk phase.

This chapter has examined how demonstrators and students establish their interaction in the table-talk phase, why they establish that interaction, what kind of relationships are created and negotiated, and how they draw upon cultural resources from the institution and their community of practice to make sense of one another's social actions and demonstrate that understanding. More importantly, the analyses of students and demonstrators initiating interactions generate a preliminary profile for the different functions and types of interaction that demonstrator and student co-create and manage in the anatomy laboratory. The analyses reveal the asymmetry in the reasons for initiating interactions that reflect the institutional roles and responsibilities of the student and the demonstrator. Sequentially analysing demonstrators and students conducting the beginnings of their interaction reveals on

[35] As mentioned earlier in Chapter 3, schisming refers to the splitting up of a single interaction involving many participants (usually more than 3) into two or more interactions involving lesser number of participants per group.

a turn-to-turn basis the emergence of their inter-subjective understanding of the function, purpose, and agenda for their unfolding talk. Studying how anatomy instructional interactions are initiated gives insight into participants' implicit assumptions of membership categories, their roles, and how these roles characterise and project authority. The demonstrators have the right to, and do, exercise their authority by monitoring and requesting student progress status, and in the management of students' performance and learning behaviours. This traditional hierarchical classroom authority associated with the role of the demonstrator may be up-played, down-played, or even re-negotiated between the demonstrator and the students. This reinforces the notion that interaction practices are highly flexible and adaptive to the local moment-to-moment contextual needs of its participants (C. Goodwin, 2013; Levinson & Torreira, 2015; Stivers et al., 2009).

The next chapter will synthesise the findings from Chapters 5 and 6. The discussion will focus on how the research questions have been addressed. It will consider how the use of CA can extend the existing body of research in anatomy laboratory pedagogy and provide valuable insights into the teaching-learning processes from a social interaction perspective. A set of tentative recommendations based on the findings and conclusions will be made regarding anatomy laboratory activity design, demonstrator training, student grouping, and the physical configurations of the laboratory space. The limitations of the present study will also be considered and recommendations for future investigations and potential new avenues of research will be suggested.

Chapter 7 The End of the Journey: Findings, Recommendations, and Reflections

7.1 Preamble

This study demonstrates the value in using a non-positivist research methodology to empirically and systematically study the social interaction in an anatomy-teaching laboratory, which has received little attention in the past. It argues in favour of the importance of unpacking the social teaching-learning processes if university educators are to further their understanding as to *how* and *what* students learn and teachers do to facilitate student learning in a variety of anatomy teaching-and-learning-interaction contexts and situations. The empirical data presented and analysed in this thesis overcomes the limitations of current anatomy laboratory teaching-learning studies that report student and teacher practices. Through the use of CA the video sequences provide direct access to these practices and reveal how they are collaboratively constructed and re-constructed through social interaction.

This chapter begins by summarising the research findings in terms of how they relate to the aims of the study and the research questions. It will then provide a set of recommendations in relation to anatomy laboratory instruction in the university context. These recommendations will be followed by further discussion of the significance and implications of the findings in relation to the field of CA and anatomy education more generally. The chapter will conclude with an acknowledgement of the limitations of the current investigation and recommendations for future research in the field of anatomy laboratory education.

7.2 The Social and Cultural Principles Guiding Anatomy Laboratory Pedagogical Interaction Practices

Hitherto, pedagogical interaction in the anatomy laboratory setting, together with an analysis of the behaviours of students and demonstrators in this setting, have at best

been studied indirectly from participant accounts using either quantitative survey instruments or qualitative interview and focus group methods (Winkelmann & Guldner, 2004; Winkelmann et al., 2007). In contrast, this investigation demonstrates the importance of using CA, if educators are to fully understand how learning is enacted in the real time teaching situation. This thesis has begun to unpack the anatomy laboratory pedagogical 'black box' and to reveal the social and cultural principles that guide participants' interactional practices. To the best of this researcher's knowledge, this is the first time that video-recorded data of laboratory activities and interaction has been used to study and analyse the minutiae of demonstrator-student pedagogical interaction in anatomy education.

To achieve the research aim of unpacking the 'black box', four research questions were developed in light of the interactional data made available through the recordings:

1. What are the key phases in the laboratory, and how and by whom is each initiated and closed?
2. How is interaction sequentially organised in the anatomy education laboratory?
3. How do anatomy laboratory participants locally manage and flexibly adapt practices to suit their immediate interactional needs and to achieve shared understanding?
4. How does asymmetry, affiliated with institutional membership and identities, emerge through epistemic practices and turn-taking, and how is it managed?

The CA data analyses and findings from this investigation addressed each of these questions. First, the analyses identified that the anatomy laboratory sessions could be

functionally divided into three phases based upon participants' activities (See Table 7-1 p. 382 for summary of findings). Furthermore, it was found that participants had different responsibilities for initiating interaction in the different phases, which showed membership-affiliated asymmetry that favoured demonstrators to initiate interaction in the introductory phase. However, in the table-talk phase, membership-affiliated asymmetry was not represented by who initiated interaction, instead it was represented by the different functions for which interaction was sought (See Table 7-1 p. 382 for summary of findings). In other words, demonstrator-initiated interaction performs different functions (e.g. offering help, delivering resources, and managing student off-task behaviours), in contrast to student-initiated interaction, which, in this study, only functions to seek help. These findings support previous CA research within the university tutorial setting that indicates asymmetry in regards to the organisation of interaction affiliated with membership categories and which the participants make relevant and orient towards (Benwell & Stokoe, 2002, 2005; Stokoe et al., 2013).

More importantly, the findings from the present investigation support that social interaction principles are inseparably intertwined with local institutional culture, and that participants draw upon and demonstrate their knowledge and common sense understanding of these relevant cultural resources, as demonstrated in the emergent asymmetry (Drew & Heritage, 1993; C. Goodwin, 2013; Vine, 2008).

Table 7-1 Summary of the three key phases of the anatomy laboratory session and the sequential organisation of interaction identified in each phase. The summary/concluding phase has been excluded.

Anatomy Laboratory Session Phases	**1. Introductory**	**2. Table-talk**	
Who Initiated Interaction?	Demonstrator-Initiated	Demonstrator-Initiated Openings	Student-Initiated Openings
Sequential Organisation-Stages of Interaction	i. getting ready and demonstrating readiness to begin ii. establishing recipiency (demonstrator-initiated) iii. instructing iv. instruction wrap-up/closing (may be delayed by student for further clarification)	i. close down the physical distance and develop close proximity to the demonstrator ii. position themselves to be heard or seen by the demonstrator iii. and iv. produce a multi-functional utterance that establishes recipiency and communicates the intended purpose	i. close down the physical distance and develop close proximity to the demonstrator ii. position themselves to be heard or seen by the demonstrator iii. wait for the demonstrator to display their readiness to interact (present only if demonstrator already previously engaged) iv. and v. produce a multi-functional utterance that establishes recipiency and communicates the intended purpose
Functions	1) rapport-building 2) laboratory session overview 3) materials preparation and facilitation of student transition to activities	1) offering help 2) delivering resources 3) managing student off-task behavior	1) seeking demonstrator help

However, the intertwined social and cultural norms should not be interpreted as laws governing human interaction (this would make interaction mechanistic). Instead,

there is interactional flexibility, which was evident in all of the abstracts analysed. For example, in Lucy's introduction interaction with her students (Chapter 5), where a developing cultural norm (i.e. for students to be self-guided and independent learners) was made relevant and embodied in Lucy's brief instructions, and it acted as a contextual resource for participants to understand what is expected and of whom. This kind of cultural resource draws upon participants' previous experiences in other similar contexts, but it is also evolving as an emerging framework of norms as the laboratory community of practice develops over time, which is evidenced by the changing practices of demonstrator laboratory introductions (as demonstrated throughout Chapter 5).

The second and third research questions will now be addressed together because they are both tightly interrelated to the phenomenon of sequential organisation. As the summary in Table 7-1 (p. 382) has shown, within each phase of the laboratory session participants' interaction followed regular patterns of sequential organisation. However, detailed interaction analysis on a turn-to-turn basis also revealed the extent to which participants locally managed and flexibly adapted their interactional practices to suit their immediate interactional needs and their desire and intent to achieve shared understanding. In the present study the sequential organisation of instructional talk during the introductory phase reflects the characteristics of institutional talk with the students giving speakership preferences to demonstrators, who are expected to initiate interaction and set the purpose and agenda for their instruction (e.g. rapport-building, laboratory session overview, or materials preparation and facilitation of student transition to activities). However, the laboratory introduction interaction is unlike academic seminar monologues because, depending upon the context, there are variably more opportunities for students to

contribute. Nonetheless, laboratory introduction interaction reflects asymmetry in the negotiation of an agenda and purpose of the introductory talk, which in some cases is similar to other instructional or seminar talk (Benwell & Stokoe, 2002, 2005; Lindwall & Lymer, 2014; Rendle-Short, 2006; Walsh & O'Keeffe, 2010).

With regard to the sequential organisation of laboratory introductions, the analyses have demonstrated significant variability in terms of their function and approaches, but more importantly they have shown 'how' function and approaches are inseparably intertwined. In the introductory phase, demonstrators were shown to modify the *instructing* stage by altering participating framework and displays of epistemic status and authority to facilitate a conversational approach (Nadia's rapport-building), a seminar-like instruction approach (Pete's session overview), or direct instructing approach (Lucy's facilitation of students to transition into doing the activities). In each case, the demonstrator was the primary moderator who altered their approach to fit her/his needs. Nevertheless, in order to achieve this, the students also exhibited compliance with and demonstrated understandings of the demonstrator's intentions in all cases. Furthermore, unlike the UK university tutorial context previously investigated using a CA approach (Benwell & Stokoe, 2002, 2005), the present study did not find evidence of student resistance which were usually linked to non-preparation. This finding is educationally important for anatomy laboratory class because by this stage students are expected to have foundational anatomical knowledge. The teaching-learning activities of the anatomy laboratory are designed to review, consolidate, and encourage the application of student knowledge. Thus, the general lack of evidence of student accountability and minimal pre-laboratory preparation required calls to question whether the introductory phase should involve activities that require students to show

preparation. In light of personal observation and communication with demonstrators and lecturers, who have repeatedly communicated their frustration with students' lack of pre-laboratory preparatation and fundamental anatomy knowledge, the above findings suggest that it would be worthwhile to consider designing activities that increase students' preparation accountability. In implementing the activity, it is important to acknowledge the co-constructed instructional context and instructional organisation of laboratory introductions. An awareness of the inherent turn-taking asymmetry present in many educational talk-in interaction provides opportunity to re-imagine pedagogical practice that invites and empowers students to be more active in shaping the laboratory educational context.

Different to the sequential organisation of interaction in the introductory phase, the sequential organisation of interaction openings in the table-talk phase displayed different patterns that addressed the needs to provide a current status of progress and to negotiate an agenda, purpose, and need for the interaction. In keeping with the precepts of social interaction, it was necessary for the participants to communicate the purpose for the interaction. However, because students progress through their activities at different rates and are likely to have different questions, the openings must also establish a mutual understanding of activity progression. This is reflected in the sequential structure, where either demonstrator- or student-initiated interaction quickly establishes recipiency and communicates the purpose in a single verbal utterance. It should also be noted that the sequential organisation of openings in the table-talk phase continued to reflect membership category asymmetry, not in terms of who initiates interaction, but in the different functional purposes that interaction achieves (Refer to "Functions" under "Table-talk" in Table 7-1). Besides the typical educator functions of offering help and delivering resources to student, notably the

demonstrators also initiated interaction to manage student on-task behaviour. This observation suggests that the laboratory demonstrators have embodied more of a teacher role than might have been previously believed. This is also further evidence for the re-creation of a classroom education culture, and as such the laboratory demonstrators may require further and appropriate training and support to assist them excel in that role and capacity. Presently within the institutional context where the investigation has been conduction, the educational training and support to the anatomy laboratory demonstrators are minimal[36].

In summary, the empirical components of this thesis have confirmed the existence of general interactional principles that guide laboratory participants in their interaction. Furthermore, they have shown that participants' common sense understanding as competent social members works jointly with the institutional context and culture as important interactional resources for participants to achieve shared understanding. The guiding interactional principles are made relevant locally by the participants themselves, and draw upon the contexts, culture, and practices of the university institution and the immediate laboratory community of practice. Consequently, interactional practices evolve within a developing community of practice, and this evolutionary process provides opportunities for change and development.

The above summary has alluded to how asymmetry affiliated with institutional membership identities emerges through interaction. However, in relation to the final question, the discussion thus far has not extended the findings to an examination of epistemic practices, turn-taking, and how the participants manage asymmetries in

[36] The anatomy laboratory demonstrators are given a one day orientation day prior to their teaching to go over the anatomy laboratory curriculum for medical students and radiography students. Their formal pedagogical training is a 1.5-2 hour training in a program called "Teaching on the Run" developed by the University of Western Australia located at Perth, Australia.

these aspects of interaction. In laboratory pedagogical interaction, participation, relationships, membership identities, and epistemic status are inseparably interwoven in their social actions and how they understand those actions. Yet as Chapter 5 and 6 analyses have shown, these asymmetries can be significantly transformed and altered by the demonstrators through their use of politeness devices, sentence structures, and, even more subtly, pronouns. The analysis in both chapters revealed that demonstrators play a significant moderator role in making relevant membership identities, establishing and positioning the relationships, and attributing the affiliated responsibilities and duties in their pedagogical interaction with students. This was particularly relevant in the introduction phase where turn-asymmetry was extremely pronounced during demonstrator instruction (e.g. Extract 5-I p. 176 and Extract 5-II p. 198). Consistently, data has shown that students readily oriented to demonstrators' speaking rights and rights to delegate speakership (e.g. Extract 5-II p. 198 – the introduction initiated by Pete, Extract 6-IV p. 303 – the handing out of resources and instruction by Dan, and Extract 6-VII p. 352 – the case analysis of student-initiated interaction with Pete). This asymmetry is co-constructed and, in the introductory phase, facilitates laboratory management and delivery of instruction. The data also showed that students complied with the demonstrator's institutionally given authority to assign work, establish roles and responsibilities, and arrange participation. Through the use of personal pronouns, demonstrators were able to create a sense of cohesion and joint attention (e.g. *we* and *they*). At the same time, pronouns were also used to differentiate between the roles and responsibilities in terms of teaching and learning (See Extract 5-II p. 176 – Pete's use of we and you in Chapter 5).

Furthermore, despite adopting different pedagogical approaches (See Chapter 6 Extract 6-I p. 269 – Nadia and Extract 6-II p. 176 – Pete) demonstrators continued to

assume higher epistemic authority in their interaction with students by initiating IRE sequences and asking questions to which they already know the answers. As the evidence has shown, demonstrators have sought to manage the hierarchical demonstrator-student relationship by the frequent use of politeness devices and conditional sentence structures. These approaches align with previous CA research of UK university tutors (Benwell & Stokoe, 2002, 2005). Furthermore, it was illuminating, from a social relationship and pedagogical perspective, to find that anatomy laboratory demonstrators in their pedagogical interaction intuitively orient to these potentially face-threatening actions when they are providing feedback and evaluation of students' demonstration of knowledge and understanding. Similarly, the anatomy demonstrators showed this sensitivity in managing students' off-task behaviour (e.g. Extract 6-V p.318 – Pete; Extract 6-VI p. 328 – Nancy). More importantly, the above observation illustrates that in the anatomy laboratory context the demonstrators have to work with a tension between the authority that they inherit throught the education institutional context while working towards a more democratic platform of interaction with their students. Understanding how demonstrators manage the implicit co-constructed epistemic and turn-taking authority status gives educators insights into how students are active contributors in the educational institutional interaction (See extracts of laboratory opening in Chapter 5). This finding should enable educators and researchers to theorise and investigate alternative pedagogical approaches that empower different members to contribute and validate their contributions in the teaching-learning process.

In summary, the empirical data shows how demonstrators enact the process of "being a demonstrator" and how students enact their role of "being a student" in their various interactions. These embodied institutional roles are evident in the asymmetry

of talking rights as illustrated by who initiates interaction, how interaction is initiated, and for what purposes the interaction is initiated. Furthermore, as asserted in previous CA research, participants talk and act their identities into being (Benwell & Stokoe, 2002; Stokoe, 2010; Stokoe et al., 2013), but interestingly this data also reveals that participants not only make relevant different identity categories but their actions may also impose identity categories and attribute responsibilities on others. Having summarised how the empirical findings have addressed the research aim and the associated research questions, the chapter will now present a series of recommendations for the conduct of anatomy laboratory instruction in the university context

7.2.1 Recommendations for Anatomy Laboratory Instruction in the University Context

CA methodology has proven itself to be a promising approach for educators to gain insights into how interactional structures contribute to processes of knowledge transference and creation, and which social and cultural factors influence and shape these unfolding interactions and their organisation (Clift, 2012; Gardner, 2008; Heritage, 2012b; Koole, 2010, 2012a; Koole & Elbers, 2014; Koschmann, 2011a, 2012, 2011b; Lindwall & Lymer, 2011; Macbeth, 2011; Mondada, 2011; Sahlström, 2009). As illustrated in Chapter 5 and 6, the CA paradigm does not intend to be critical of the interaction under its investigation. Nevertheless, it is possible to make recommendations based on existing practise that has been revealed through a more detailed examination. The thesis argues that this kind of *in-situ micro-analysis* not only advances current understanding of anatomy laboratory teaching and learning, but it can also be used to support the future development of laboratory resources, curricula, and demonstrator training strategies. The present findings lend weight to

the argument that anatomy and university education practitioners and researchers need to acknowledge the social and emic perspectives, which are being displayed and oriented to at the frontline interface of teaching and learning, to improve understanding of pedagogical processes. Most critically, the social interaction that happens at the 'coal face' of teaching and learning is a phenomenon worthy of study because it is the site where knowledge and understanding are collaboratively created and inter-subjectively understood. Social interaction and language are not merely vehicles or vague representations that communicate some deeper and abstract internal cognitive construct, but they are the vivid transformation and lamination of various social and cultural substrates and resources (C. Goodwin, 2013).

This thesis has led to development of a series of recommendations. The first set of recommendations concerns laboratory curriculum and activities design:

- The analysis have shown the laboratory demonstrator-student interaction in this dataset serve a specific set of roles and functions, and that the demonstrators embody expectations for student autonomy. This may be a phenomenon of this local community of practise. Nonetheless, the findings suggest that structured laboratory sessions using student activity manuals and demonstrators' embodied expectations help encourage students to become independent and self-guided learners.
- It was observed that students naturally defaulted into smaller and more manageable group sizes that more closely reflect and resemble natural conversation (e.g. 2–4 students per group), and that larger group (15 students) discussion needed to be presided over by a demonstrator without spontaneous schisming. This observation suggest that when organising groups for activities laboratory session designers might

consider placing students into. the smaller group size which creates less strain on interaction and turn-taking machinery. This is likely to lead to more frequent and regular conversation contributions from all participants. Furthermore, laboratory demonstrators need to be made aware of where and when it becomes necessary to use the large group discussion format, and how to manage such a discussion.

- The effective ways that the demonstrators created and managed epistemic gradients that invited students to contribute suggest that laboratory activities may be designed to empower students with regular opportunities to create, demonstrate and display knowledge more readily (e.g. body-painting, jig-saw).
- Design interactional contexts that will manage the demonstrator-student interactional asymmetry and empower student contributions as well as to allow for the building and demonstrating of self-guided learning capacit.
- The analysis of how demonstrators delivered instructional resources to students and the effect of those resources to stimulate interest and discussion amongst students suggest that where possible, appropriate physical materials and resources should be frequently used to stimulate interaction and discussion.

The second set of recommendations is related to the laboratory curriculum delivery and implementation:

- When implementing a laboratory curriculum the educator should consider the significance of relationships in the teaching-learning process so that participants have opportunities to foster a more consistent demonstrator-student relationship. This encourages participants to

personalise the relationship so that they are not just institutionally based and will encourage a shared sense of mutual engagement and commitment, accountability, and responsibility for teaching and learning.

- Provide more consistency in student and demonstrator rosters to help deepen student-demonstrator relationship and foster a deeper sense of community.
- Encourage the use of names when instructing, but this is difficult without consistency in the demonstrators over a longer period of time
- Consider providing a formal laboratory introduction delivered by the demonstrator at the beginning of each laboratory session to facilitate transition into the activity task. More importantly, it may be structured to develop a deeper sense of purpose for teaching and learning by linking contents, topics, and reinforcing learning objectives.
- Provide ample resources to facilitate individual and self-guided learning, but consider what physical configuration, resource layout may encourage more productive sharing of resources and create laboratory environments and contexts that encourage and facilitate interaction.
- Students working in closer physical proximity are also likely to overhear relevant conversation, which may or may not lead to initiation of interaction, but at least students are within the same interactional space and the conversations are more readily accessible.

The third set of recommendations addresses laboratory demonstrator preparation:

- Provide initial and ongoing opportunities for demonstrator pedagogical training and developments in instruction giving and student management.
- Provide opportunities for demonstrators to train and practice the skills in delivering laboratory session introductions that clearly provide the aims of the laboratory session and the links to lectures and previous sessions
- Provide opportunities for demonstrators to be trained in different instructional approaches and practise how to differentially manage epistemic authority and gradients that alter and create different types of student-demonstrator relationships (e.g. more democratic and less hierarchical or the reverse, depending on their individual needs and style).
- Physical materials and resources are great ways to stimulate pedagogical interaction between demonstrators and students but also amongst students, so training may be provided for demonstrators to develop a framework for how instructional resources and tools might be used and deployed to foster and stimulate particular types of interaction.
- Support opportunities for demonstrators to observe self or others in instructing, and ideally use CA inspired methodologies to examine different aspects of their interactional behaviour.

The final set of recommendations is related to how universities assess the quality of teaching and learning:

- **This study suggests that the exclusive use of subject evaluation surveys to appraise students' learning experiences and the instructional environment may be enlarging a gap between the actual experiences and the perceived experiences that lead to the evaluative survey results**. Thus, it is important that observations be conducted to understand the actual experiences and to inform and guide subject enhancements and decisions.
- **Evaluations of the quality of teaching need to recognise the co-constructed nature of interaction and the evolving nature of context and community of practice.** As such, evaluation should also obtain the educators' experience of teaching a particular subject. Furthermore, the interpretation of the survey evaluation of a subject or program needs to recognise that the survey represents only a snapshot of opinions at that point in time. This is not sensitive enough to account for the actual experiences that inform the opinions identified by survey results.
- **Evaluation should consider teaching and learning to be an ongoing evolution and development that is influenced by institutional contexts and cultural practices of a constantly changing community of practice.** A survey collected at the end of a subject does not improve or feed back into the ongoing teaching-learning experiences of those who are surveyed. Therefore, the quality assessment process needs to not only have summative components but to be integrated into the progression of a subject so that the responses may also feed back into the evolving

processes and practices of the community of practice. This may be in the form of providing or supporting additional feedback avenues and pathways to influence the cultural evolution and development of a subject or program. These pathways should provide more regular and timely feedback for both learners and educators so that there is an increased sense of ownership and of the responsiveness of the subject/program to the teaching and learning needs of those involved. The emphasis is on providing useful and timely information to the educator so that they may act to change the teaching-learning culture and practice before the subject or program is over and nothing more may be done to alter the experiences.

7.3 Significance and Implications

This thesis contributes to the field of anatomy education research in several ways: First, unlike the hypothesis testing research designs that dominate anatomy education literature, this project was inductive by design. This meant the research was data-driven, where nothing could be established as interesting or dismissed *a priori*. To the best of this researcher's knowledge, this is the first study to adopt CA micro-analysis methods to investigate the social organisation of the anatomy laboratory pedagogical processes. It is also the first time that longitudinal video data has been collected to document the lived laboratory experience of novice anatomy laboratory demonstrators and learners in their first year of teaching and learning in the university anatomy laboratory setting. Whilst the findings are based on talk-in-interaction data of a radiography anatomy laboratory context, the investigation reinforce the CA findins that the principle mechanisms of talk persist and exist beyond the immediate local institutional context; albeit, in some circumstance they

are modified. Nonetheless, participants make relevant and orient to a social order which transcends the subject and disciplinary boundaries, but different disciplinary contexts may also have their own order as Benwell (1999) has previously shown.

Second, this study contributes to programmatic research in both the CA literature on the study of university social interaction and the anatomy laboratory pedagogy literature. By investigating a novel university institutional context, this study adds to the accumulating corpus of CA data that is needed to ensure theories of teaching and learning are grounded in the real world within which students learn and teachers teach (Gage, 2009; Koschmann, 2012). It accomplishes this by providing an account of the pedagogical practices in the first-year anatomy learning laboratory, which has distinctive disciplinary practices, even within the university institutional context. In regards to anatomy laboratory pedagogy research that is dominated by quantitative approaches, the most effective and efficient instructional methods have remained elusive (Bergman et al., 2011; Bergman et al., 2014; Winkelmann, 2007). The data presented in this thesis demonstrates how CA alone can contribute valuable understandings about the social processes. When used as an adjunct to other research methods, it is a promising methodology for building a robust research program that balances the macro- and micro-perspectives to investigate what makes for effective anatomy teaching and learning . Through a CA-driven lens the analyst is able to go beyond a view of pedagogy as (mainly) a cognitive and psychological product to a view of pedagogy as co-constructed, negotiated and intertwined through laboratory interaction.

Third, this thesis provides an empirical account of the collections of socio-cultural, linguistic, physically embodied, and environmental resources that anatomy educators and learners make use of in the anatomy laboratory setting and how these

resources are being used to achieve pedagogical ends. This account provides a real world understanding of what resources support teaching and learning interaction, and how they provide support. Armed with this awareness, it should be possible to develop novel instructional designs and educational resources that can either support current learning interaction or alter the course of real-time teaching and learning interactions in meaningful and significant ways.

Finally, in terms of theory development, these findings should expand educators' awareness of how social perspectives of learning may be applied to the anatomy learning laboratory context, and, critically, how institutional social identities and relationships are embodied, displayed, and negotiated during such pedagogical interaction. Furthermore, the data gives insights into how knowledge (epistemic) status and stance are socially attributed and re-negotiated by participants in their interaction with one another. This has the potential to encourage the current debate concerning the most effective anatomy laboratory pedagogy to re-consider the epistemic and ontological nature of knowledge and to re-frame existing pedagogical frameworks to consider a more socially collaborative approach. More importantly, by studying anatomy laboratory pedagogy from the perspective of a community of practice and a socially collaborative achievement between its participants, this thesis finds evidence to support conceptualising anatomy laboratory learning as a natural longitudinal extension for students to enter their destined professional communities. The findings suggest an alternative social and cultural view of "learning", one that broadens its definition to take into consideration the notion of "becoming a member of a community of practice". This alternative definition should recognise the longitudinal and gradual process for learners to embody and demonstrate their respective member identities. Mindful of these developments and influences,

educators may begin to consider how and what observable interaction behaviours would be embodied by learners as they advance but, more importantly, what context could they create to encourage such interaction behaviours. The CA methodology allows for the careful study of socially embodied and demonstrated displays of attitudinal concepts (e.g. *self-directed learning*, *learner centred instruction*, *equality*, or *respect for team members*) that are valued by professional bodies, industries, and society at large. Understanding the finely nuanced social actions that go into constructing and enabling the displays of these concepts provides educational opportunities to create the context within which they might become more readily and regularly embodied and demonstrated in people's interaction with one another.

7.4 Limitations and Directions for Future Research

The CA analyses in this thesis represent a small beginning in disciplined exploration of the social organisation practices and the shared knowledge structures and domains mutual to participants in the university anatomy learning laboratory context. For example, in this research the sequential organisation of talk between demonstrator and student(s) following the opening and initiation of their interaction in the table-talk phase, have remained largely uncharacterised. Furthermore, the embodied interaction and the resources that anatomy laboratory participants systematically and intentionally draw upon in such interaction needs to be studied more precisely to gain a better understanding of exactly when and how different instructional tools and artefacts are incorporated to facilitate and demonstrate inter-subjective understanding and collaborative knowledge construction. In addition, due to the data collection approach, the present corpus of data does not allow for a sufficiently thorough investigation of student learning behaviours and their interaction with their peers.

The effect of social relationships on the improvement of teaching and learning has also remained unexplored in this present investigation.

It should also be noted that this is but one profile of how anatomy laboratory curriculum and pedagogy may be delivered, and it was far from being complete. It is very likely that in a different curricular or institutional context we will find other pedagogical approaches and different profiles of interaction. Nevertheless, as the application of CA in this thesis has shown, there are indeed universal social and cultural principles to interaction that are applicable to laboratory teaching settings, yet this remains to be validated by further research. Furthermore, while the general social and cultural principles may remain, they may be applied differently in other instructional contexts in the university laboratory setting. Therefore, it is important to conduct further research on interaction in different university settings so that a more complete picture of the lived experiences of this community can eventually emerge. The CA methodology may also be applied to better understand how differences in educational outcome between different groups of students taught by different demonstrators may be related to the different instructional approaches and student learning styles.

In light of the disciplinary preferences in structuring knowledge noted by Benwell (1999), the discipline of anatomy, which is increasingly involved in the education of various health science disciplines, owes it to the many stakeholders dependent on the quality of its instruction (e.g. learners, professionals, patients dependent on those professionals) to carefully study and understand its disciplinary pedagogical practices. More in-depth empirical investigations are needed to study anatomy teaching and learning as a complex integrated system, which may include the anatomy laboratory environmental setting, artefacts and the various relevant

socio-cultural resources that participants draw upon and transform in the process of constructing and maintaining these knowledge and practices. Better understanding of anatomy laboratory teaching and learning as a complex system will enable the design of pedagogical interventions that intentionally target the social and cultural resources, as well as the physical materials and environmental factors that are influential on their pedagogical interaction. CA provides a powerful methodology and a socially sensitive and empirically grounded analytical tool and perspective for studying the organisation of social encounters, but to study and understand anatomy teaching and learning as a complex system it needs to be combined with other ethnographic methodologies and research techniques in particular, if the intentions are to understand the process-product relationship within anatomy education.

In closing, perhaps given time, anatomy educators and researchers might come around to the view that there is something more important than just defining the pinnacles of success in education. This investigation illuminates an alternative philosophy and paradigm of teaching and learning. It encourages understanding and respect of the individual journeys in the moments of pedagogical interaction where journeys intersect, collide, and then morph visibly into the social practices and culture for their shared community of practice. In these pedagogical situations, what matters is to understand how people establish mutual understanding, co-construct their interaction, and learn from one another. More importantly, this alternative philosophy and paradigm supports the examination of how participants' respective accumulated know-hows are made relevant, demonstrated and contribute to the present point of co-constructed intersection, so that their shared lived experiences may be subsequently enriched and informed. CA methodology helps to define and give voice to these participant perspectives at these junctions where they draw upon

and make relevant experiences from their previous journeys. Thus, whether it is the journey of a novice anatomy educator or a novice anatomy learner, over time it becomes possible to recognise and embrace the near wins and successes in the incremental steps (S. Lewis, 2014) made visible in their moment-by-moment of interaction. Presently, much of the incremental success that contributes to the tenacity of researchers, educators, and students to continuously pursue the ever elusive perfection goes unnoticed, but the CA methodology holds promise to more finely capture and make visible this progress.

References

Ackerman, M. J. (1999). The visible human project: A resource for education. *Academic Medicine, 74*(6), 667-670.

Altbach, P. G., Reisberg, L., & Rumbley, L. E. (2009). *Trends in global higher education: Tracking an academic revolution.* Retrieved March 16, 2016, from http://unesdoc.unesco.org/images/0018/001832/183219e.pdf

Antaki, C., & Widdicombe, S. (1998). *Identities in talk.* London: SAGE Publications.

Are, C., Stoddard, H. A., Thompson, J. S., & Todd, G. L. (2010). The influence of surgical demonstrations during an anatomy course on the perceptions of first-year medical students toward surgeons and a surgical career. *Journal of Surgical Education, 67*(5), 320-324.

Auer, P. (2005). Projection in interaction and projection in grammar. *Text, 25*(1), 7-36.

Auer, P. (2014). There's no harm in glossing (but a need for a better understanding of the status of transcripts). *Research on Language and Social Interaction, 47*(1), 17-22.

Aversi-Ferreira, T. A., Nascimento, G. N. L. d., Vera, I., & Lucchese, R. (2010). The practice of dissection as teaching methodology in anatomy applied to medical education. *International Journal of Morphology, 28*(1), 265-272.

Azer, S. A., & Eizenberg, N. (2007). Do we need dissection in an integrated problem-based learning medical course? Perceptions of first- and second-year students. *Surgical and Radiologic Anatomy, 29*(2), 173-180.

Aziz, M. A., McKenzie, J. C., Wilson, J. S., Cowie, R. J., Ayeni, S. A., & Dunn, B. K. (2002). The human cadaver in the age of biomedical informatics. *The Anatomical Record, 269*(1), 20-32.

Bacro, T. R. H., Gebregziabher, M., & Ariail, J. (2013). Lecture recording system in anatomy: possible benefit to auditory learners. *Anatomical Sciences Education, 6*(6), 376-384.

Bacro, T. R. H., Gebregziabher, M., & Fitzharris, T. P. (2010). Evaluation of a lecture recording system in a medical curriculum. *Anatomical Sciences Education, 3*(6), 300-308.

Basmajian, J. V. (1971). Trends in teaching anatomy in American medical colleges. *Kobe Journal of Medical Sciences, 17*(4), 207-209.

Beahrs, O. H., Chase, R. A., & Ger, R. (1986). Gross anatomy in medical education. *American Surgeon, 52*(5), 227-232.

Beeke, S., Johnson, F., Beckley, F., Heilemann, C., Edwards, S., Maxim, J., & Best, W. (2014). Enabling better conversations between a man with aphasia and his conversation partner: Incorporating writing into turn taking. *Research on Language and Social Interaction, 47*(3), 292-305.

Belhiah, H. (2009). Tutoring as an embodied activity: How speech, gaze and body orientation are coordinated to conduct ESL tutorial business. *Journal of Pragmatics, 41*(4), 829-841.

Benwell, B. (1999). The organisation of knowledge in British University tutorial discourse: Issues, pedagogic discourse strategies and disciplinary identity. *Pragmatics, 9(4),* 535-65.

Benwell, B., & Stokoe, E. H. (2002). Constructing discussion tasks in university tutorials: shifting dynamics and identities. *Discourse Studies, 4*(4), 429-453.

Benwell, B., & Stokoe, E. H. (2005). University students resisting academic identity. In K. Richards & P. Seedhouse (Eds.), *Applying conversation analysis* (pp. 124-139). Houndmills, Basingstoke, Hampshire, New York: Palgrave Macmillan.

Bergman, E. M., de Bruin, A. B., Herrler, A., Verheijen, I. W., Scherpbier, A. J., & Van Der Vleuten, C. P. M. (2013). Students' perceptions of anatomy across the undergraduate problem-based learning medical curriculum: a phenomenographical study. *BMC Medical Education, 13*, 152.

Bergman, E. M., Prince, K. J. A. H., Drukker, J., van der Vleuten, C. P. M., & Scherpbier, A. J. J. A. (2008). How much anatomy is enough? *Anatomical Sciences Education, 1*(4), 184-188.

Bergman, E. M., Van Der Vleuten, C. P. M., & Scherpbier, A. J. (2011). Why don't they know enough about anatomy? A narrative review. *Medical Teacher, 33*(5), 403-409.

Bergman, E. M., Verheijen, I. W., Scherpbier, A. J., Van Der Vleuten, C. P. M., & De Bruin, A. B. (2014). Influences on anatomical knowledge: The complete arguments. *Clinical Anatomy, 27*(3), 296-303.

Bernhard, J. (2011). Learning in the laboratory through technology and variation: A microanalysis of instructions and engineering students' practical achievement. Paper presented at the SEFI/WEE 2011, Lissabon.

Biasutto, S. N., Caussa, L. I., & Criado del Rio, L. E. (2006). Teaching anatomy: cadavers vs. computers? *Annals of Anatomy, 188*(2), 187-190.

Biggs, J. B. (1979). Individual differences in study processes and the quality of learning outcomes. *Higher Education, 8*(4), 381-394.

Boblett, N. (2012). Negotiating participant status in participation frameworks. *Columbia University Working Papers in TESOL and Applied Linguistics, 12*(1), 45-47.

Boden, D. (1994). *The business of talk: Organizations in action*. London: Polity Press.

Bohl, M., Francois, W., & Gest, T. (2011). Self-guided clinical cases for medical students based on postmortem CT scans of cadavers. *Clinical Anatomy, 24*(5), 655-663.

Bolden, G. B. (2011). On the organisation of repair in multiperson conversation: The case of "other"-selection in other-initiated repair sequences. *Research on Language and Social Interaction, 44*(3), 237-262.

Brody, G. H., Stoneman, Z., & Wheatley, P. (1984). Peer interaction in the presence and absence of observers. *Child Development, 55*(4), 1425-1428.

Brooks, W. S., Woodley, K. T. C. P., Jackson, J. R., & Hoesley, C. J. (2015). Integration of gross anatomy in an organ system-based medical curriculum: Strategies and challenges. *Anatomical Sciences Education, 8*(3), 266-274.

Brown, B., Adhikari, S., Marx, J., Lander, L., & Todd, G. L. (2012). Introduction of ultrasound into gross anatomy curriculum: perceptions of medical students. *Journal of Emergency Medicine, 43*(6), 1098-1102.

Brown, P., & Levinson, S. C. (1987). *Politeness: Some universals in language usage*. Cambridge: Cambridge University Press.

Buchanan, K., & Middleton, D. (1995). Voices of experience: Talk, identity and membership in reminiscence groups. *Ageing & Society, 15*(04), 457-491.

Burgess, A. W., Ramsey-Stewart, G., May, J., & Mellis, C. (2012). Team-based learning methods in teaching topographical anatomy by dissection. *ANZ Journal of Surgery, 82*(6), 457-460.

Canty, D. J., Hayes, J. A., Story, D. A., & Royse, C. F. (2015). Ultrasound simulator-assisted teaching of cardiac anatomy to preclinical anatomy students: A pilot randomised trial of a three-hour learning exposure. *Anatomical Sciences Education, 8*(1), 21-30.

Casado, M. I., Castano, G., & Arraez-Aybar, L. A. (2012). Audiovisual material as educational innovation strategy to reduce anxiety response in students of human anatomy. *Advances in Health Sciences Education, 17*(3), 431-440.

Castelló, M., & Botella, L. (2007). Constructivism and educational psychology. In J. L. Kincheloe & R. A. Horn (Eds.), *The Praeger handbook of education and psychology* (Vol. 2, pp. 263-270): Praeger.

Cekaite, A. (2015). The coordination of talk and touch in adults' directives to children: Touch and social control. *Research on Language and Social Interaction, 48*(2), 152-175.

Chan, L. K., & Sharma, N. (2014). Effects of training experienced teachers in the use of the one-minute preceptor technique in the gross anatomy laboratory. *Anatomical Sciences Education, 7*(2), 124-129.

Chan, L. K., & Wiseman, J. (2011). Use of the one-minute preceptor as a teaching tool in the gross anatomy laboratory. *Anatomical Sciences Education, 4*(4), 235-238.

Chatterjee, A. K. (2011). *The importance of spatial ability and mental models in learning anatomy.* (Doctoral dissertation, Purdue University, 2011). ERIC database.

Chen, K. C., Glicksman, J. T., Haase, P., Johnson, M., Wilson, T., & Fung, K. (2010). Introduction of a novel teaching paradigm for head and neck anatomy. *Journal of Otolaryngololgy - Head & Neck Surgery, 39*(4), 349-355.

Chevalley, E., & Bangerter, A. (2010). Suspending and reinstating joint activities with dialogue. *Discourse Processes, 47*(4), 263-291.

Jacknick, C. M. (2011). "But this is writing": Post-expansion in student-initiated sequences. *Novitas-ROYAL (Research on Youth and Language), 5*(1), 39-54.

Christodoulidou, M. (2011). Lexical markers within the university lecture. *Novitas-ROYAL (Research on Youth and Language), 5*(1), 143-160.

Chuang, M.-S. K. (2007). *A study evaluating the effects of employing team-based learning strategies in an upper year anatomy course centered on laboratory learning.* Unpublished master's thesis, Queen's University, Kingston, Ontario, Canada.

Clayman, S. (2002). Sequence and solidarity. *Group cohesion, trust and solidarity, 19*, 229-253.

Clift, R. (2012). Who knew?: A view from linguistics. *Research on Language and Social Interaction, 45*(1), 69-75.

Clift, R. (2014). Visible deflation: Embodiment and emotion in interaction. *Research on Language and Social Interaction, 47*(4), 380-403.

Collett, T. J., & McLachlan, J. C. (2005). Does 'doing art' inform students' learning of anatomy? *Medical Education, 39*(5), 521.

Collins, T. J., Given, R. L., Hulsebosch, C. E., & Miller, B. T. (1994). Status of gross anatomy in the U.S. and Canada: Dilemma for the 21st century. *Clinical Anatomy, 7*(5), 275-296.

Cottam, W. W. (1999). Adequacy of medical school gross anatomy education as perceived by certain postgraduate residency programs and anatomy course directors. *Clinical Anatomy, 12*(1), 55-65.

Craig, S., Tait, N., Boers, D., & McAndrew, D. (2010). Review of anatomy education in Australian and New Zealand medical schools. *ANZ Journal of Surgery, 80*(4), 212-216.

Cresswell, A. (2006, May 6). Doctors fail basic anatomy. *The Weekend Australian*, pp. 1-2. Retrieved November 11, 2010, from http://infoweb.newsbank.com.ezproxy.lib.monash.edu.au/resources/doc/nb/news/1116DFCD9FFA3FB0?p=AWNB

Cresswell, A., & Franklin, M. (2010, February 1). Training fails to prepare new doctors. *The Australian*. Retrieved November 11, 2010, from http://www.theaustralian.com.au/news/training-fails-to-prepare-new-doctors/story-e6frg6n6-1225825257620

Creswell, J. W., & Plano Clark, V. L. (2011). *Designing and conducting mixed methods research* (2nd ed.). Los Angeles: SAGE Publications.

Crossingham, J. L., Jenkinson, J., Woolridge, N., Gallinger, S., Tait, G. A., & Moulton, C. A. (2009). Interpreting three-dimensional structures from two-dimensional images: a web-based interactive 3D teaching model of surgical liver anatomy. *HPB (Oxford), 11*(6), 523-528.

Cuddy, M. M., Swanson, D. B., Drake, R. L., & Pawlina, W. (2013). Changes in anatomy instruction and USMLE performance: Empirical evidence on the absence of a relationship. *Anatomical Sciences Education, 6*(1), 3-10.

Dahlgren, L. O. (1984). Outcomes of learning. In F. Marton, D. Hounsell, & N. J. Entwistle (Eds.), *The experience of learning*. Edinburgh: Scottish Academic Press.

Dalton-Puffer, C. (2007). *Discourse in content and language integrated learning (CLIL) classrooms.* Amsterdam: John Benjamins.

Danby, S., Butler, C. W., & Emmison, M. (2009). When 'listeners can't talk': comparing active listening in opening sequences of telephone and online counselling [Paper in special issue: Ethnological Approaches to Communication. Butler, C. W., Fitzgerald, R. and Gardner, R (eds).]. *Australian Journal of Communication, 36*(3), 91-113.

Davis, C. R., Bates, A. S., Ellis, H., & Roberts, A. M. (2014). Human anatomy: Let the students tell us how to teach. *Anatomical Sciences Education, 7*(4), 262-272.

Davis, K. M., Hayward, N., Hunter, K. R., & Wallace, D. L. (2010). The function of talk in the writing conference: A study of tutorial conversation. *The Writing Center Journal, 30*(1), 27-35.

Dawson, A. G., Bruce, S. A. M., Heys, S. D., & Stewart, I. J. (2009). Student views on the introduction of anatomy teaching packages into clinical attachments. *Clinical Anatomy, 22*(2), 267-272.

De Horne, L. D. J., Tiller, J. W. G., Eizenberg, N., Tashevska, M., & Biddle, N. (1990). Reactions of first-year medical students to their initial encounter with a cadaver in the dissecting room. *Academic Medicine, 65*(10), 645-646.

DeHoff, M. E., Clark, K. L., & Meganathan, K. (2011). Learning outcomes and student-perceived value of clay modeling and cat dissection in undergraduate human anatomy and physiology. *Advances in Physiology Education, 35*(1), 68-75.

Dev, P., Friedman, C., Dafoe, B., & Felciano, R. (1992). Testing spatial understanding of anatomy. *Proceedings of the Annual Symposium on Computer Applications in Medical Care*, Baltimore, MD, 804-805.

Dinsmore, C. E., Daugherty, S., & Zeitz, H. J. (1999). Teaching and learning gross anatomy: dissection, prosection, or "both of the above?". *Clinical Anatomy, 12*(2), 110-114.

Donnelly, L., Patten, D., White, P., & Finn, G. (2009). Virtual human dissector as a learning tool for studying cross-sectional anatomy. *Medical Teacher, 31*(6), 553-555.

Drake, R. L. (2014). A retrospective and prospective look at medical education in the United States: trends shaping anatomical sciences education. *Journal of Anatomy, 224*(3), 256-260.

Drake, R. L., Lowrie, D. J., Jr., & Prewitt, C. M. (2002). Survey of gross anatomy, microscopic anatomy, neuroscience, and embryology courses in medical school curricula in the United States. *Anatomical Record, 269*(2), 118-122.

Drake, R. L., McBride, J. M., Lachman, N., & Pawlina, W. (2009). Medical education in the anatomical sciences: the winds of change continue to blow. *Anatomical Sciences Education, 2*(6), 253-259.

Dreher, S. M., DePhilip, R., & Bahner, D. (2014). Ultrasound exposure during gross anatomy. *Journal of Emergency Medicine, 46*(2), 231-240.

Drew, P. (1989). Recalling someone from the past. In D. Roger & P. Bull (Eds.), *Conversation: An interdisciplinary perspective*. Clevedon, England: Multilingual Matters.

Drew, P. (2012a). Turn design. In J. Sidnell & T. Stivers (Eds.), *The handbook of conversation analysis* (pp. 131-149). Chichester, West Sussex, United Kingdom: John Wiley & Sons.

Drew, P. (2012b). What drives sequences? *Research on Language and Social Interaction, 45*(1), 61-68.

Drew, P. & Heritage, J. (1993). *Talk at work: Interaction in institutional settings*: Cambridge, United Kingdom: Cambridge University Press.

Drew, P., Toerien, M., Irvine, A., & Sainsbury, R. (2014). Personal adviser interviews with benefits claimants in UK jobcentres. *Research on Language and Social Interaction, 47*(3), 306-316.

Drummond, K. & Hopper, R. (1993). Back channels revisited: Acknowledgment tokens and speakership incipiency. *Research on Language and Social Interaction, 26*(2), 157-177.

Duffin, J. (2010). *History of medicine : a scandalously short introduction* (2nd ed.). Toronto, Ontario, Canada: University of Toronto Press.

Dyer, G. S. M., & Thorndike, M. E. L. (2000). Quidne mortui vivos docent? The evolving purpose of human dissection in medical education. *Academic Medicine, 75*(10), 969-979.

Edwards, D., & Mercer, N. (1987). *Common knowledge: the development of understanding in the classroom*. London & New York: Methuen.

Egbert, M. M. (1997). Schisming: The collaborative transformation from a single conversation to multiple conversations. *Research on Language and Social Interaction, 30*(1), 1-51.

Eiseman, B., Spencer, F. C., Menguy, R., Rush, B., & Bryant, L. (1965). The changing role of surgery in anatomy instruction for medical students. *Journal of Medical Education, 40*, 393-395.

Eizenberg, N. (1988). Approaches to learning anatomy: Developing a programme for preclinical medical students. In P. Ramsden (Ed.), *Improving learning: New perspectives* (pp. 178-198). London, United Kingdom: Kogan Page.

Elizondo-Omaña, R. E., Guzmán-López, S., & García-Rodríguez, M. d. L. A. (2005). Dissection as a teaching tool: Past, present, and future. *Anatomical Record - Part B New Anatomist, 285*(1), 11-15.

Emanuelsson, J., & Sahlström, F. (2008). The price of participation: Teacher control versus student participation in classroom interaction. *Scandinavian Journal of Educational Research, 52*(2), 205-223.

Entwistle, N. J., & Ramsden, P. (1982). *Understanding student learning.* Provident House, Burrell Row, Beckenham, Kent, United Kingdom: Croom Helm.

Erkonen, W. E., Albanese, M. A., Smith, W. L., & Pantazis, N. J. (1992). Effectiveness of teaching radiologic image interpretation in gross anatomy. A long-term follow-up. *Investigative Radiology, 27*(3), 264-266.

Fakoya, F. A. (2013). Integrating ultrasound technology into teaching gross anatomy: point of order! *Medical Education Online, 18*, 20888.

Fernandez, R., Dror, I. E., & Smith, C. F. (2011). Spatial abilities of expert clinical anatomists: Comparison of abilities between novices, intermediates, and experts in anatomy. *Anatomical Sciences Education, 4*(1), 1-8.

Filipi, A. (2001). *The organisation of pointing sequences in parent-toddler interaction.* (Doctoral dissertation, Monash University, 2002).

Filipi, A. (2009). *Toddler and parent interaction: the organisation of gaze, pointing and vocalisation*. Amsterdam: John Benjamins.

Filipi, A. (2014). Speakers' orientations to directional terms in a map task. *Discourse Studies, 16*(3), 365-384.

Filipi, A. (2015). The development of recipient design in bilingual child-parent interaction. *Research on Language and Social Interaction, 48*(1), 100-119.

Fine, G. A., & Manning, P. (2007). Erving Goffman. In G. Ritzer (Ed.) *The blackwell companion to major contemporary social theorists* (pp. 34-62): Oxford, United Kingdom: Blackwell.

Finn, G. M., & McLachlan, J. C. (2010). A qualitative study of student responses to body painting. *Anatomical Sciences Education, 3*(1), 33-38.

Finn, G. M., White, P. M., & Abdelbagi, I. (2011). The impact of color and role on retention of knowledge: A body-painting study within undergraduate medicine. *Anatomical Sciences Education, 4*(6), 311-317.

Firth, A., & Wagner, J. (1997). On discourse, communication, and (some) fundamental concepts in SLA research. *The Modern Language Journal, 81*(3), 285-300.

Firth, A., & Wagner, J. (2007). Second/foreign language learning as a social accomplishment: Elaborations on a reconceptualizsed SLA. *The Modern Language Journal, 91*, 800-819.

Fitzgerald, J. E. F., White, M. J., Tang, S. W., Maxwell-Armstrong, C. A., & James, D. K. (2008). Are we teaching sufficient anatomy at medical school? The opinions of newly qualified doctors. *Clinical Anatomy, 21*(7), 718-724.

Fitzgerald, M. J. T. (1992). Undergraduate medical anatomy teaching. *Journal of Anatomy*, *180*(Pt 1), 203-209.

Fitzharris, T. P. (1998). Survey of gross anatomy courses in the United States and Canada. *The Anatomical Record, 253*(6), 162-166.

Fitzpatrick, C. M., Kolesari, G. L., & Brasel, K. J. (2001). Teaching anatomy with surgeons' tools: use of the laparoscope in clinical anatomy. *Clinical Anatomy, 14*(5), 349-353.

Flexner, A. (1910). Medical education in the United States and Canada. *Science, 32*(810), 41-50.

Ford, C. E. (1999). Collaborative construction of task activity: Coordinating multiple resources in a high school physics lab. *Research on Language and Social Interaction, 32*(4), 369-408.

Ford, C. E. (2012). Conversation analysis and turn taking. *The encyclopedia of applied linguistics.* Chichester, West Sussex, United Kingdom: Wiley-Blackwell.

Ford, C. E., & Thompson, S. A. (1996). Interactional units in conversation: Syntactic, intonational, and pragmatic resources for the projection of turn completion. In E. Ochs, S. A. Thompson, & E. A. Schegloff (Eds.), *Interaction and grammar* (pp. 135-184). New York, NY, USA: Cambridge University Press.

Forrester, M. A. (2008). The emergence of self-repair: A case study of one child during the early preschool years. *Research on Language and Social Interaction, 41*(1), 99-128.

Fox, B. A., & Thompson, S. A. (2010). Responses to wh-questions in English conversation. *Research on Language and Social Interaction, 43*(2), 133-156.

Friedman, C. P., Dev, P., Dafoe, B., Murphy, G., & Felciano, R. (1993). Initial validation of a test of spatial knowledge in anatomy. *Proceedings of the Annual Symposium on Computer Applications in Medical Care*, Washington, DC, 791-795.

Gage, N. L. (2009). *A conception of teaching*. New York, NY: Springer.

Garcia, A. C. (2013). Mediation talk in cross cultural perspective: The contribution of conversation nalysis. *China Media Research, 9*(4), 85-101.

Gardner, R. (2001). *When listeners talk: Response tokens and listener stance*. Amsterdam: John Benjamin.

Gardner, R. (2008). Conversation analysis and orientation to learning. *Journal of Applied Linguistics, 5*(3), 229-244.

Gardner, R. (2012). Conversation analysis in the classroom. In J. Sidnell & T. Stivers (Eds.), *The handbook of conversation analysis* (pp. 593-611). Chichester, West Sussex, United Kingdom: John Wiley & Sons.

Garg, A. X., Norman, G., & Sperotable, L. (2001). How medical students learn spatial anatomy. *Lancet, 357*(9253), 363-364.

Garg, A. X., Norman, G. R., Eva, K. W., Spero, L., & Sharan, S. (2002). Is there any real virtue of virtual reality?: The minor role of multiple orientations in learning anatomy from computers. *Academic Medicine, 77*(10 Suppl), S97-99.

Garg, A. X., Norman, G. R., Spero, L., & Maheshwari, P. (1999). Do virtual computer models hinder anatomy learning? *Academic Medicine, 74*(10 Suppl), S87-89.

Ghosh, S. (2007). Combination of didactic lectures and case-oriented problem-solving tutorials toward better learning: Perceptions of students from a conventional medical curriculum. *Advances in Physiology Education, 31*(2), 193-197.

Ghosh, S. K. (2015). Human cadaveric dissection: A historical account from ancient Greece to the modern era. *Anatomy & Cell Biology, 48*(3), 153-169.

Glenn, P. J., Koschmann, T. D., & Conlee, M. (1999). Theory presentation and assessment in a problem-based learning group. *Discourse Processes, 27*(2), 119-133.

Goffman, E. (1983). The Interaction Order: American Sociological Association, 1982 presidential address. *American Sociological Review, 48*(1), 1-17.

Goffman, E. (1990). *The presentation of self in everyday life*. Harmondsworth, United Kingdom: Penguin.

Goodwin, C. (1979). The interactive construction of a sentence in natural conversation. In G. Psathas (Ed.), *Everyday language: Studies in ethnomethodology* (pp. 97-121). New York: Irvington Publishers.

Goodwin, C. (1980). Restarts, pauses, and the achievement of a state of mutual gaze at turn-beginning. *Sociological Inquiry, 50*(3-4), 272-302.

Goodwin, C. (1981). *Conversational organization: Interaction between speakers and hearers*. New York, NY: Academic Press.

Goodwin, C. (1986). Gestures as a resource for the organization of mutual orientation. *Semiotica, 62*(1-2), 29-50.

Goodwin, C. (1994). Professional vision. *American Anthropologist, 96*(3), 606-606.

Goodwin, C. (1995). Seeing in Depth. *Social Studies of Science, 25*(2), 237-274.

Goodwin, C. (2000). Action and embodiment within situated human interaction. *Journal of Pragmatics, 32*(10), 1489-1522.

Goodwin, C. (2007). Participation, stance and affect in the organization of activities. *Discourse & Society, 18*(1), 53-73.

Goodwin, C. (2013). The co-operative, transformative organization of human action and knowledge. *Journal of Pragmatics, 46*(1), 8-23.

Goodwin, C., & Goodwin, M. H. (1987). Concurrent operations on talk: Notes on the interactive organization of assessments. *IPRA Papers in Pragmatics, 1*(1), 1-54.

Goodwin, C., & Heritage, J. (1990). Conversation analysis. *Annual Review of Anthropology, 19*, 283-307.

Goodwin, M. H. (1990). Tactical uses of stories: Participation frameworks within girls' and boys' disputes. *Discourse Processes, 13*(1), 33-71.

Gossage, J. A., Horner, B., & Ellis, H. (2003). The anatomy demonstrator has an important role in medical student education. *Medical Education, 37*(11), 1056.

Griksaitis, M. J., Sawdon, M. A., & Finn, G. M. (2012). Ultrasound and cadaveric prosections as methods for teaching cardiac anatomy: A comparative study. *Anatomical Sciences Education, 5*(1), 20-26.

Grossman, P. (2014). *Collecting evidence of instruction with video and observation data in NCES surveys*. Washington, DC: National Academy of Education.

Guba, E. E., & Lincoln, Y. S. (1994). Competing paradigms in qualitative research in *Handbook of qualitative research*. Thousand Oaks, CA: SAGE Publications.

Guillot, A., Champely, S., Batier, C., Thiriet, P., & Collet, C. (2007). Relationship between spatial abilities, mental rotation and functional anatomy learning. *Advances in Health Sciences Education, 12*(4), 491-507.

Guy, R., Pisani, H. R., Rich, P., Leahy, C., Mandarano, G., & Molyneux, T. (2015). Less is more: Development and evaluation of an interactive e-atlas to support anatomy learning. *Anatomical Sciences Education, 8*(2), 126-132.

Hafferty, F. W., Castellani, B., Hafferty, P. K., & Pawlina, W. (2013). Anatomy and histology as socially networked learning environments: Some preliminary findings. *Academic Medicine, 88*(9), 1315-1323.

Hall, S., Stephens, J., Andrade, T., Davids, J., Powell, M., & Border, S. (2014). Perceptions of junior doctors and undergraduate medical students as anatomy teachers: Investigating distance along the near-peer teaching spectrum. *Anatomical Sciences Education, 7*(3), 242-247.

Hammoudi, N., Arangalage, D., Boubrit, L., Renaud, M. C., Isnard, R., Collet, J. P., et al. (2013). Ultrasound-based teaching of cardiac anatomy and physiology to undergraduate medical students. *Archives of Cardiovascular Diseases, 106*(10), 487-491.

Hattie, J. (2003). *Teachers make a difference: What is the research evidence?* Paper presented at the Australian Council for Educational Research Annual Conference, Melbourne.

Hattie, J. (2008). *Visible learning : A synthesis of over 800 meta-analyses Relating to Achievement*. Retrieved from http://www.eblib.com.au

Hattie, J., & Yates, G. (2014). *Visible learning and the science of how we learn*. New York, NY : Routledge.

Hayashi, M. (2005). Joint turn construction through language and the body: Notes on embodiment in coordinated participation in situated activities. *Semiotica, 2005*(156), 21-53.

Heath, C. (1984). Talk and recipiency: Sequential organization in speech and body movement. In J. M. Atkinson & J. Heritage (Eds.), *Structures of social action* (pp. 247-265). Cambridge, United Kingdom: Cambridge University Press.

Heath, C., & Luff, P. (2012). Embodied action and organizational activity. In J. Sidnell & T. Stivers (Eds.), *The handbook of conversation analysis* (pp. 281-307). Chichester, West Sussex, United Kingdom: John Wiley & Sons.

Hein, G. E. (1991). *The museum and the needs of people.* Paper presented at the CECA (International committee of museum educators) Conference, Jerusalem, Israel.

Hellermann, J. (2003). The interactive work of prosody in the IRF exchange: Teacher repetition in feedback moves. *Language in Society, 32*(1), 79-104.

Hellermann, J. (2005). The sequential and prosodic co-construction of a 'quiz game' activity in classroom talk. *Journal of Pragmatics, 37*(6), 919-944.

Hellermann, J. (2007). The development of practices for action in classroom dyadic interaction: Focus on task openings. *The Modern Language Journal, 91*(1), 83-96.

Hellermann, J. (2008). *Social actions for classroom language learning*. Clevedon, United Kingdom: Multilingual Matter.

Hellermann, J. (2012). Conversation analysis and language acquisition. *The encyclopedia of applied linguistics.* Chichester, West Sussex, United Kingdom: Wiley-Blackwell.

Hepburn, A., & Bolden, G. B. (2012). The conversation analytic approach to transcription. In J. Sidnell & T. Stivers (Eds.), *The handbook of conversation analysis* (pp. 57-76). Chichester, West Sussex, United Kingdom: John Wiley & Sons.

Hepburn, A., Wilkinson, S., & Butler, C. W. (2014). Intervening with conversation analysis in telephone helpline services: Strategies to improve effectiveness. *Research on Language and Social Interaction, 47*(3), 239-254.

Hepburn, A., Wilkinson, S., & Shaw, R. (2012). Repairing self- and recipient reference. *Research on Language and Social Interaction, 45*(2), 175-190.

Heritage, J. (1984a). A change-of-state token and aspects of its sequential placement. In J. M. Atkinson & J. Heritage (Eds.), *Structures of social action: Studies in conversation analysis* (pp. 299-345). Cambridge, United Kingdom: Cambridge University Press.

Heritage, J. (1984b). *Garfinkel and ethnomethodology*. Cambridge, United Kindom: Polity Press.

Heritage, J. (2010). Questioning in medicine. In A. F. Freed & S. Ehrlich (Eds.), *"Why do you ask?" : The function of questions in institutional discourse* (pp. 356). Oxford, United Kingdom: Oxford University Press.

Heritage, J. (2012a). Beyond and behind the words: Some reactions to my commentators. *Research on Language and Social Interaction, 45*(1), 76-81.

Heritage, J. (2012b). The epistemic engine: Sequence organization and territories of knowledge. *Research on Language and Social Interaction, 45*(1), 30-52.

Heritage, J. (2012c). Epistemics in action: Action ormation and territories of knowledge. *Research on Language and Social Interaction, 45*(1), 1-29.

Heritage, J. (2013). Action formation and its epistemic (and other) backgrounds. *Discourse Studies, 15*(5), 551-578.

Hester, S., & Eglin, P. (1997). *Culture in action: Studies in membership categorization analysis*. Washington, DC: International Institute for Ethnomethodology and Conversation Analysis & University Press of America.

Heylings, D. J. (2002). Anatomy 1999-2000: The curriculum, who teaches it and how? *Medical Education, 36*(8), 702-710.

Heyman, R. D. (1986). Formulating topic in the classroom. *Discourse Processes, 9*(1), 37-55.

Hindmarsh, J., Reynolds, P., & Dunne, S. (2011). Exhibiting understanding: The body in apprenticeship. *Journal of Pragmatics, 43*(2), 489-503.

Höffler, T. N. (2010). Spatial ability: Its influence on learning with visualizations-a meta-analytic review. *Educational Psychology Review, 22*(3), 245-269.

Holm, P., Goodsite, M. E., Cloetingh, S., Agnoletti, M., Moldan, B., Lang, D. J., et al. (2013). Collaboration between the natural, social and human sciences in global change research. *Environmental science & policy, 28*, 25-35.

Holubar, S. D., Hassinger, J. P., Dozois, E. J., Camp, J. C., Farley, D. R., Fidler, J. L., et al. (2009). Virtual pelvic anatomy and surgery simulator: An innovative tool for teaching pelvic surgical anatomy. *Studies in Health Technology and Informatics, 142*, 122-124.

Hopkins, R., Regehr, G., & Wilson, T. D. (2011). Exploring the changing learning environment of the gross anatomy lab. *Academic Medicine, 86*(7), 883-888.

Hornsby, D. J., & Osman, R. (2014). Massification in higher education: Large classes and student learning. *Higher Education, 67*(6), 711-719.

Horton-Salway, M., Montague, J., Wiggins, S., & Seymour-Smith, S. (2008). Mapping the components of the telephone conference: An analysis of tutorial talk at a distance learning institution. *Discourse Studies, 10*(6), 737-758.

Housley, W., & Fitzgerald, R. (2009). Membership categorization, culture and norms in action. *Discourse & Society, 20*(3), 345-362.

Hsu, P.-L., & Roth, W.-M. (2009). Lab technicians and high school student interns - Who is scaffolding whom?: On forms of emergent expertise. *Science Education, 93*(1), 1-25.

Hsu, P.-L., Roth, W.-M., & Mazumder, A. (2009). Natural pedagogical conversations in high school students' internship. *Journal of Research in Science Teaching, 46*(5), 481-505.

Huh, Y. J. (2014). Pedagogical Process in Sequence Organisation - Teacher's Reaction to Student's Non-response in One-on-one sessions. 담화와인지, *21*(3), 281-310.

Hutchby, I. (1996). Power in discourse: the case of arguments on a British talk radio show. *Discourse & Society, 7*(4), 481-497.

Hutchby, I., & Wooffitt, R. (1998). *Conversation analysis: Principles, practices and applications*. Cambridge, United Kingdom: Polity Press.

Hutchby, I., & Wooffitt, R. (2008). *Conversation analysis* (2nd ed.). Cambridge, United Kingdom: Polity Press.

Hutchins, E. (1995). *Cognition in the wild*. Cambridge, MA: Massacusetts Institute of Technology.

Jacobson, S., Epstein, S. K., Albright, S., Ochieng, J., Griffiths, J., Coppersmith, V., & Polak, J. F. (2009). Creation of virtual patients from CT images of cadavers to enhance integration of clinical and basic science student learning in anatomy. *Medical Teacher, 31*(8), 749-751.

Jamero, D. J., Borghol, A., & Mihm, L. (2009). Comparison of computer-mediated learning and lecture-mediated learning for teaching pain management to pharmacy students. *American Journal of Pharmaceutical Education, 73*(1), 5.

Jefferson, G. (1984). Transcript Notation. In J. M. Atkinson & J. Heritage (Eds.), *Structures of social action: studies in conversation analysis*. Cambridge, United Kingdom: Cambridge University Press.

Jefferson, G. (2004). Glossary of transcript symbols with an introduction. In G. H. Lerner (Ed.), *Conversation analysis studies from the first generation* (pp. 13-31). Amsterdam: John Benjamin.

Jenkins, L., & Reuber, M. (2014). A conversation analytic intervention to help neurologists identify diagnostically relevant linguistic features in seizure patients' talk. *Research on Language and Social Interaction, 47*(3), 266-279.

Jerolmack, C., & Khan, S. (2014). Talk is cheap: Ethnography and the attitudinal fallacy. *Sociological Methods & Research, 43*(2), 178-209.

Jones, D. G. (1997). Anatomy departments and anatomy education: Reflections and myths. *Clinical Anatomy, 10*(1), 34-40.

Jones, D. G., & Harris, R. J. (1998). Curriculum developments in Australasian anatomy departments. *Clinical Anatomy, 11*(6), 401-409.

Jones, L. S., Paulman, L. E., Thadani, R., & Terracio, L. (2001). Medical student dissection of cadavers improves performance on practical exams but not on the NBME anatomy subject exam. *Medical Education Online, 6.* doi:http://dx.doi.org/10.3402/meo.v6i.4522

Jones, N. A., Olafson, R. P., & Sutin, J. (1978). Evaluation of a gross anatomy program without dissection. *Journal of Medical Education, 53*(3), 198-205.

Jordan, B., & Henderson, A. (1995). Interaction analysis: Foundations and practice. *The Journal of the Learning Sciences, 4*(1), 39-103.

Joslin, S. (2008). Perceptions of anatomy education: A student's view. *Anatomical Sciences Education, 1*(3), 133-134.

Frenk, J., Chen, L., Bhutta, Z. A., Cohen, J., Crisp, N., Evans, T., et al. (2010). Health professionals for a new century: Transforming education to strengthen health systems in an interdependent world. *The Lancet, 376*(9756), 1923-1958.

Keedy, A. W., Durack, J. C., Sandhu, P., Chen, E. M., O'Sullivan, P. S., & Breiman, R. S. (2011). Comparison of traditional methods with 3D computer models in the instruction of hepatobiliary anatomy. *Anatomical Sciences Education, 4*(2), 84-91.

Kelly, G. J., & Brown, C. (2002). Communicative demands of learning science through technological design: Third grade students' construction of solar energy devices. *Linguistics and Education, 13*(4), 483-532.

Kendon, A. (1979). Some emerging features of face-to-face interaction. *Sign Language Studies, 22*, 7-22.

Kendrick, K. H., & Torreira, F. (2015). The timing and construction of preference: A quantitative study. *Discourse Processes, 52*(4), 255-289.

Kerby, J., Shukur, Z. N., & Shalhoub, J. (2011). The relationships between learning outcomes and methods of teaching anatomy as perceived by medical students. *Clinical Anatomy, 24*(4), 489-497.

Kirchner, S. G., & Kaye, J. J. (1979). Radiolographic exhibits in gross anatomy. *Journal of the Canadian Association of Radiologists, 30*(4), 247-248.

Kitzinger, C. (2012). Repair. In J. Sidnell & T. Stivers (Eds.), *The handbook of conversation analysis* (pp. 229-256). Chichester, West Sussex, United Kingdom: John Wiley & Sons.

Knobe, M., Carow, J. B., Ruesseler, M., Leu, B. M., Simon, M., Beckers, S. K., et al. (2012). Arthroscopy or ultrasound in undergraduate anatomy education: A randomized cross-over controlled trial. *BMC Medical Education, 12*, 85-92.

Koole, T. (2010). Displays of epistemic access: Student responses to teacher explanations. *Research on Language and Social Interaction, 43*(2), 183-209.

Koole, T. (2012a). Conversation analysis and education. *The encyclopedia of applied linguistics.* Chichester, West Sussex, United Kingdom: Wiley-Blackwell.

Koole, T. (2012b). The epistemics of student problems: Explaining mathematics in a multi-lingual class. *Journal of Pragmatics, 44*(13), 1902-1916.

Koole, T., & Elbers, E. (2014). Responsiveness in teacher explanations: A conversation analytical perspective on scaffolding. *Linguistics and Education, 26*(0), 57-69.

Koole, T., & Mak, P. (2014). Using conversation analysis to improve an augmented communication tool. *Research on Language and Social Interaction, 47*(3), 280-291.

Kooloos, J. G. M., de Waal Malefijt, M. C., Ruiter, D. J., & Vorstenbosch, M. A. T. M. (2012). Loosely-guided, self-directed learning versus strictly-guided, station-based learning in gross anatomy laboratory sessions. *Anatomical Sciences Education, 5*(6), 340-346.

Koschmann, T. D. (2011a). Understanding understanding in action. *Journal of Pragmatics, 43*(2), 435-437.

Koschmann, T. D. (2012). Conversation analysis and learning in interaction. *The encyclopedia of applied linguistics.* Chichester, West Sussex, United Kingdom: Wiley-Blackwell.

Koschmann, T. D. (Ed.) (2011b). *Theories of learning and studies of instructional practice*. New York, NY: Springer.

Koschmann, T. D., & LeBaron, C. (2002). Learner articulation as interactional achievement: Studying the conversation of gesture. *Cognition and Instruction, 20*(2), 249-282.

Koschmann, T. D., LeBaron, C., Goodwin, C., & Feltovich, P. (2011). "Can you see the cystic artery yet?" A simple matter of trust. *Journal of Pragmatics, 43*(2), 521-541.

Kotzé, S. H., Mole, C. G., & Greyling, L. M. (2012). The translucent cadaver: An evaluation of the use of full body digital x-ray images and drawings in surface anatomy education. *Anatomical Sciences Education, 5*(5), 287-294.

Kramer, B., Pather, N., & Ihunwo, A. O. (2008). Anatomy: Spotlight on Africa. *Anatomical Sciences Education, 1*(3), 111-118.

Krontiris-Litowitz, J. (2008). Using truncated lectures, conceptual exercises, and manipulatives to improve learning in the neuroanatomy classroom. *Advances in Physiology Education, 32*(2), 152-156.

Kudlien, F. (1970). Medical education in classical antiquity. In C. D. O'Malley (Ed.), *The History of Medical Education* (pp. 3-37). Los Angeles, CA: University of California Press.

Kumpulainen, K., & Mutanen, M. (1999). The situated dynamics of peer group interaction: An introduction to an analytic framework. *Learning and Instruction, 9*(5), 449-473.

Kupetz, M. (2011). Multimodal resources in students' explanations in CLIL interaction. *Novitas-ROYAL, 5*(1), 121-142.

Kushida, S. (2015). Using names for referring without claiming shared knowledge: Name-quoting descriptors in Japanese. *Research on Language and Social Interaction, 48*(2), 230-251.

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge, United Kingdom: Cambridge University Press.

Lazarus, M. D., Chinchilli, V. M., Leong, S. L., & Kauffman, G. L. (2012). Perceptions of anatomy: Critical components in the clinical setting. *Anatomical Sciences Education, 5*(4), 187-199.

Lecca, P. J., Lyons, K. J., & Valentine, P. (Eds.). (2003). *Allied health: Practice issues and trends in the new millennium*. New York, NY : Haworth Press.

Lee, Y.-A. (2007). Third turn position in teacher talk: Contingency and the work of teaching. *Journal of Pragmatics, 39*(1), 180-206.

Lee, Y.-A. (2008). Yes–no questions in the yhird-turn position: Pedagogical discourse processes. *Discourse Processes, 45*(3), 237-262.

Lepper, G. (2000). *Categories in text and talk: A practical introduction to categorization analysis*. London, United Kingdom: Sage.

Lerner, G. H. (1991). On the syntax of sentences-in-progress. *Language in Society, 20*(3), 441-458.

Lerner, G. H. (1995). Turn design and the organization of participation in instructional activities. *Discourse Processes, 19*(1), 111-131.

Lerner, G. H. (2003). Selecting next speaker: The context-sensitive operation of a context-ree organization. *Language in Society, 32*(2), 177-201.

Lerner, G. H., & Kitzinger, C. (2015). Or-prefacing in the organization of self-initiated repair. *Research on Language and Social Interaction, 48*(1), 58-78.

Levelt, W. J. M., Roelofs, A., & Meyer, A. S. (1999). A theory of lexical access in speech production. *Behavioral and Brain Sciences, 22*(01), 1-38.

Levinson, S. C. (2012). Action formation and ascription. In J. Sidnell & T. Stivers (Eds.), *The handbook of conversation analysis* (pp. 101-130). Chichester, West Sussex, United Kingdom: John Wiley & Sons.

Levinson, S. C., Holler, J., Kendrick, K. H., & Casillas, M. (2015). Turn-taking in human communicative interaction. *Frontiers in Psychology Research Topic*. Retrieved March 23, 2016 from http://journal.frontiersin.org/researchtopic/turn-taking-in-human-communicative-interaction-2845

Levinson, S. C., & Torreira, F. (2015). Timing in turn-taking and its implications for processing models of language. *Frontiers in Psychology, 6*, 731.

Lewis, M. J. (2003). Computer-assisted learning for teaching anatomy and physiology in subjects allied to medicine. *Medical Teacher, 25*(2), 204-206.

Lewis, S. (2014, March). Sara Lewis: Embrace the near win. [Video file]. Retrieved from https://www.ted.com/talks/sarah_lewis_embrace_the_near_win?language=en.

Liddicoat, A. (2007). *An introduction to conversation analysis*. London: Continuum.

Lim, K. H. A., Loo, Z. Y., Goldie, S. J., Adams, J. W., & McMenamin, P. G. (2015). Use of 3D printed models in medical education: A randomized control trial comparing 3D prints versus cadaveric materials for learning external cardiac anatomy. *Anatomical Sciences Education*, Retrieved January 16, 2016, from http://onlinelibrary.wiley.com/doi/10.1002/ase.1573/full

Linacre, J. (2005). Whither anatomy teaching?: A student perspective. *ANZ Journal of Surgery, 75*(3), 96-97.

Lindholm, C. (2015). Parallel realities: The interactional management of confabulation in dementia care encounters. *Research on Language and Social Interaction, 48*(2), 176-199.

Lindwall, O., & Lymer, G. (2011). Uses of “understand” in science education. *Journal of Pragmatics, 43*(2), 452-474.

Lindwall, O., & Lymer, G. (2014). Inquiries of the body: Novice questions and the instructable observability of endodontic scenes. *Discourse Studies, 16*(2), 271-294.

Local, J. (1996). Conversational phonetics: Some aspects of news receipts in everyday talk. *Studies in Interactional Sociolinguistics, 12*, 177-230.

Lockwood, A. M., & Roberts, A. M. (2007). The anatomy demonstrator of the future: An examination of the role of the medically-qualified anatomy demonstrator in the context of tomorrow's doctors and modernizing medical careers. *Clinical Anatomy, 20*(4), 455-459.

Lombardi, S. A., Hicks, R. E., Thompson, K. V., & Marbach-Ad, G. (2014). Are all hands-on activities equally effective? Effect of using plastic models, organ dissections, and virtual dissections on student learning and perceptions. *Advances in Physiology Education, 38*(1), 80-86.

Losco, C. D., Meyer, A., Armson, A., Walker, B., & Grant, W. (2013). Effective methods of teaching and learning in anatomy as a basic science: A systematic review. *BEME*, 9. Retrieved October 15, 2015, from http://bemecollaboration.org/Reviews+In+Progress/Effectiveteaching/

Lufler, R. S., Zumwalt, A. C., Romney, C. A., & Hoagland, T. M. (2012). Effect of visual–spatial ability on medical students' performance in a gross anatomy course. *Anatomical Sciences Education, 5*(1), 3-9.

Lyall, C., Bruce, A., Marsden, W., & Meagher, L. (2013). The role of funding agencies in creating interdisciplinary knowledge. *Science and Public Policy*, scs121.Retrieved March 16, 2016, from http://spp.oxfordjournals.org/content/early/2013/01/15/scipol.scs121

Macbeth, D. (2004). The relevance of repair for classroom correction. *Language in Society, 33*(5), 703-736.

Macbeth, D. (2011). Understanding understanding as an instructional matter. *Journal of Pragmatics, 43*(2), 438-451.

Maheux-Pelletier, G., & Golato, A. (2008). Repair in membership categorization in French. *Language in Society, 37*(5), 689-712.

Markee, N. (2005). The organization of off-task talk in second language classrooms. In K. Richards & P. Seedhouse (Eds.), *Applying conversation analysis*. Houndmills, Basingstoke, Hampshire: Palgrave Macmillan.

Marks, S. C., Jr., Bertman, S. L., & Penney, J. C. (1997). Human anatomy: A foundation for education about death and dying in medicine. *Clinical Anatomy, 10*(2), 118-122.

Martínez, E. G., & Tuesca, R. (2014). Modified team-based learning strategy to improve human anatomy learning: A pilot study at the Universidad del Norte in Barranquilla, Colombia. *Anatomical Sciences Education, 7*(5), 399-405.

Marton, F., & Säljö , R. (1976). On qualitative differences in learning: I--Outcome and process. *British Journal of Educational Psychology*, 46, 4-11.

Mattingly, G. E., & Barnes, C. E. (1994). Teaching human anatomy in physical therapy education in the United States: a survey. *Physical Therapy, 74*(8), 720-727.

May, H., Cohen, H., Medlej, B., Kornreich, L., Peled, N., & Hershkovitz, I. (2013). Computed tomography-enhanced anatomy course using enterprise visualization. *Anatomical Sciences Education, 6*(5), 332-341.

Maynard, D. W. (2006). Ethnography and conversation analysis: What is the context of an utterance? In S. N. Hesse-Biber & P. Leavy (Eds.), *Emergent methods in social research* (pp. 55-94). Thousand Oaks, CA: Sage Publications.

McHoul, A. W. (1978). The organization of turns at formal talk in the classroom. *Language in Society, 7*(2), 183-213.

McHoul, A. W. (1990). The organization of repair in classroom talk. *Language in Society, 19*(3), 349-377.

McLachlan, J. C. (2004). New path for teaching anatomy: Living anatomy and medical imaging vs. dissection. *Anatomical Record, New Anatomist. 281*(1), 4-5.

McLachlan, J. C., Bligh, J., Bradley, P., & Searle, J. (2004). Teaching anatomy without cadavers. *Medical Education, 38*(4), 418-424.

McLachlan, J. C., & Patten, D. (2006). Anatomy teaching: ghosts of the past, present and future. *Medical Education, 40*(3), 243-253.

McMenamin, P. G., Quayle, M. R., McHenry, C. R., & Adams, J. W. (2014). The production of anatomical teaching resources using three-dimensional (3D) printing technology. *Anatomical Sciences Education, 7*(6), 479-486.

McMurray, T. (1949). The teaching of anatomy to the medical student. *British Medical Journal, 2*(4626), 510-512.

McNiesh, L. M., Madewell, J. E., & Allman, R. M. (1983). Cadaver radiography in the teaching of gross anatomy. *Radiology, 148*(1), 73-74.

McWhorter, D. L., & Forester, J. P. (2004). Effects of an alternate dissection schedule on gross anatomy laboratory practical performance. *Clinical Anatomy, 17*(2), 144-148.

Meehan-Andrews, T. A. (2009). Teaching mode efficiency and learning preferences of first year nursing students. *Nurse Education Today, 29*(1), 24-32.

Mehan, H. (1979a). *Learning lessons: Social organization in the classroom.* Cambridge, MA: Harvard University Press.

Mehan, H. (1979b). "What time is it, Denise?": Asking known information questions in classroom discourse. *Theory into Practice, 18*(4), 285-294.

Mehan, H. (1980). The competent student. *Anthropology & Education Quarterly, 11*(3), 131-152.

Mehan, H. (1998). The Study of social interaction in educational settings: Accomplishments and unresolved issues. *Human Development, 41*(4), 245-269.

Melander, H. (2012). Transformations of knowledge within a peer group. Knowing and learning in interaction. *Learning, Culture and Social Interaction, 1*(3–4), 232-248.

Metzler, R., Stein, D., Tetzlaff, R., Bruckner, T., Meinzer, H. P., Buchler, M. W., et al. (2012). Teaching on three-dimensional presentation does not improve the understanding of according CT images: A randomized controlled study. *Teaching & Learning in Medicine, 24*(2), 140-148.

Miller, R. (2000). Approaches to learning spatial relationships in gross anatomy: Perspective from wider principles of learning. *Clinical Anatomy, 13*(6), 439-443.

Miller, S. A., Perrotti, W., Silverthorn, D. U., Dalley, A. F., & Rarey, K. E. (2002). From college to clinic: Reasoning over memorization is key for understanding anatomy. *Anatomical Record, 269*(2), 69-80.

Mitchell, B. S., Xu, Q., Jin, L., Patten, D., & Gouldsborough, I. (2009). A cross-cultural comparison of anatomy learning: Learning styles and strategies. *Anatomical Sciences Education, 2*(2), 49-60.

Mitchell, R., & Batty, L. (2009). Undergraduate perspectives on the teaching and learning of anatomy. *ANZ Journal of Surgery, 79*(3), 118-121.

Mohandas Rao, K. G. (2006). A midlecture student seminar: An activity to break the monotony. *Advances in Physiology Education, 30*(4), 262-263.

Mondada, L. (2007). Multimodal resources for turn-taking: Pointing and the emergence of possible next speakers. *Discourse Studies, 9*(2), 194-225.

Mondada, L. (2011). Understanding as an embodied, situated and sequential achievement in interaction. *Journal of Pragmatics, 43*(2), 542-552.

Mondada, L. (2012). The conversation analytic approach to data collection. In J. Sidnell & T. Stivers (Eds.), *The handbook of conversation analysis* (pp. 32-56). Chichester, West Sussex, United Kingdom: John Wiley & Sons.

Mondada, L. (2013a). Displaying, contesting and negotiating epistemic authority in social interaction: Descriptions and questions in guided visits. *Discourse Studies, 15*(5), 597-626.

Mondada, L. (2013b). Embodied and spatial resources for turn-taking in institutional multi-party interactions: Participatory democracy debates. *Journal of Pragmatics, 46*(1), 39-68.

Mortensen, K. (2009). Establishing recipiency in pre-beginning position in the second language classroom. *Discourse Processes, 46*(5), 491-515.

Mortensen, K., & Wagner, J. (2012). Conversation analysis: Overview. *The encyclopedia of applied linguistics.* Chichester, West Sussex, United Kingdom: Wiley-Blackwell.

Moscova, M., Bryce, D. A., Sindhusake, D., & Young, N. (2015). Integration of medical imaging including ultrasound into a new clinical anatomy curriculum. *Anatomical Sciences Education, 8*(3), 205-220.

Murphy, K. P., Crush, L., O'Malley, E., Daly, F. E., Twomey, M., O'Tuathaigh, C. M., et al. (2014). Medical student perceptions of radiology use in anatomy teaching. *Anatomical Sciences Education, 8*(6), 510-517.

Murphy, M., & Brown, T. (2012). Learning as relational: Intersubjectivity and pedagogy in higher education. *International Journal of Lifelong Education, 31*(5), 643-654.

Mutyala, S., & Cahill, D. R. (1996). Catching up. *Clinical Anatomy, 9*(1), 53-56.

Nevile, M. (2015). The embodied turn in research on language and social interaction. *Research on Language and Social Interaction, 48*(2), 121-151.

Neville, A. J., & Norman, G. R. (2007). PBL in the undergraduate MD program at McMaster University: Three iterations in three decades. *Academic Medicine, 82*(4), 370-374.

Newble, D. I., & Entwistle, N. J. (1986). Learning styles and approaches: Implications for medical education. *Medical Education, 20*(3), 162-175.

Nguyen, N., Mulla, A., Nelson, A. J., & Wilson, T. D. (2013). Visuospatial anatomy comprehension: The role of spatial visualization ability and problem-solving strategies. *Anatomical Sciences Education, 7*(4), 280-288.

Nguyen, N., Nelson, A. J., & Wilson, T. D. (2012). Computer visualizations: Factors that influence spatial anatomy comprehension. *Anatomical Sciences Education, 5*(2), 98-108.

Nieder, G. L., & Borges, N. J. (2012). An eight-year study of online lecture use in a medical gross anatomy and embryology course. *Anatomical Sciences Education, 5*(6), 311-320.

Nishizaka, A., & Sunaga, M. (2015). Conversing while massaging: Multidimensional asymmetries of multiple activities in interaction. *Research on Language and Social Interaction, 48*(2), 200-229.

Nnodim, J. O. (1990). Learning human anatomy: By dissection or from prosections? *Medical Education, 24*(4), 389-395.

Nnodim, J. O., Ohanaka, E. C., & Osuji, C. U. (1996). A follow-up comparative study of two modes of learning human anatomy: By dissection and from prosections. *Clinical Anatomy, 9*(4), 258-262.

Noël, G. P. J. C. (2013). A novel patchwork model used in lecture and laboratory to teach the three-dimensional organization of mesenteries. *Anatomical Sciences Education, 6*(1), 67-71.

Nottingham, S., & Verscheure, S. (2010). The effectiveness of active and traditional teaching techniques in the orthopedic assessment laboratory. *Journal of College Science Teaching, 39*(5), 34-42.

Nutt, J., Mehdian, R., Parkin, I., Dent, J., & Kellett, C. (2012). Cadaveric surgery: A novel approach to teaching clinical anatomy. *The Clinical Teacher, 9*(3), 148-151.

Oh, C.-S., Won, H.-S., Kim, K.-J., & Jang, D.-S. (2011). "Digit Anatomy": A new technique for learning anatomy using motor memory. *Anatomical Sciences Education, 4*(3), 132-141.

Older, J. (2004). Anatomy: A must for teaching the next generation. *Surgeon Journal of the Royal Colleges of Surgeons of Edinburgh & Ireland, 2*(2), 79-90.

Pabst, R. (1993). Gross anatomy: An outdated subject or an essential part of a modern medical curriculum? Results of a questionnaire circulated to final-year medical students. *Anatomical Record, 237*(3), 431-433.

Palombi, O., Pihuit, A., & Cani, M. P. (2011). 3D modeling of branching vessels from anatomical sketches: Towards a new interactive teaching of anatomy: Interactive virtual blackboard. *Surgical and Radiologic Anatomy, 33*(7), 631-636.

Pampush, J. D., & Petto, A. J. (2011). Familiarity with Latin and Greek anatomical terms and course performance in undergraduates. *Anatomical Sciences Education, 4*(1), 9-15.

Pandey, P., & Zimitat, C. (2007). Medical students' learning of anatomy: Memorisation, understanding and visualisation. *Medical Education, 41*(1), 7-14.

Park, J. S., Chung, M. S., Hwang, S. B., Shin, B. S., & Park, H. S. (2006). Visible Korean human: its techniques and applications. *Clinical Anatomy, 19*(3), 216-224.

Parker, L. M. (2002). Anatomical dissection: Why are we cutting it out? Dissection in undergraduate teaching. *ANZ Journal of Surgery, 72*(12), 910-912.

Parmeggiani, P. (2011) Visual sociology in the classroom: Fostering interaction awareness using video. In A. Esposito, A. M. Esposito, R. Martone, V. C. Müller, & G. Scarpetta (Eds.), *Toward Autonomous, Adaptive, and Context-Aware Multimodal Interfaces. Theoretical and Practical Issues: Third COST 2102 International Training School, Caserta, Italy, March 15-19, 2010, Revised Selected Papers* (pp. 116-133). Berlin, Heidelberg: Springer.

Parpala, A., Lindblom-Ylanne, S., Komulainen, E., Litmanen, T., & Hirsto, L. (2010). Students' approaches to learning and their experiences of the teaching-learning environment in different disciplines. *British Journal of Educational Psychology, 80*(Pt 2), 269-282.

Patel, K. M., & Moxham, B. J. (2008). The relationships between learning outcomes and methods of teaching anatomy as perceived by professional anatomists. *Clinical Anatomy, 21*(2), 182-189.

Pea, R. D. (1993). Learning scientific concepts through material and social activities: Conversational analysis meets conceptual change. *Educational Psychologist, 28*(3), 265-277.

Percac, S., & Armstrong, E. G. (1998). Introducing a problem-based anatomy course in a traditional curriculum: A Croatian experience. *Medical Teacher, 20*(2), 114-117.

Phillips, A. W., Smith, S. G., Ross, C. F., & Straus, C. M. (2012). Direct correlation of radiologic and cadaveric structures in a gross anatomy course. *Medical Teacher, 34*(12), e779-784.

Plaisant, O., Cabanis, E. A., & Delmas, V. (2004). Going back to dissection in a medical curriculum: The paradigm of Necker-Enfants Malades. *Surgical and Radiologic Anatomy, 26*(6), 504-511.

Potter, J., & te Molder, H. (2005). Talking cognition: Mapping and making the terrain. In H. te Molder & J. Potter (Eds.), *Conversation and cognition*. Cambridge, United Kingdom: Cambridge University Press.

Preece, D., Williams, S. B., Lam, R., & Weller, R. (2013). “Let's Get Physical”: Advantages of a physical model over 3D computer models and textbooks in learning imaging anatomy. *Anatomical Sciences Education, 6*(4), 216-224.

Prince, K. J., van Mameren, H., Hylkema, N., Drukker, J., Scherpbier, A. J., & van der Vleuten, C. P. (2003). Does problem-based learning lead to deficiencies in basic science knowledge? An empirical case on anatomy. *Medical Education, 37*(1), 15-21.

Pryde, F. R., & Black, S. M. (2005). Anatomy in Scotland: 20 years of change. *Scottish Medical Journal, 50*(3), 96-98.

Pryde, F. R., & Black, S. M. (2006). Scottish anatomy departments: Adapting to change. *Scottish Medical Journal, 51*(2), 16-20.

Psathas, G. (1995). *Conversation analysis: The study of talk-in-interaction*. Thousand Oaks, CA: Sage.

Radford, J., Blatchford, P., & Webster, R. (2011). Opening up and closing down: How teachers and TAs manage turn-taking, topic and repair in mathematics lessons. *Learning and Instruction, 21*(5), 625-635.

Rae, J. (2001). Organizing participation in interaction: Doing participation framework. *Research on Language and Social Interaction, 34*(2), 253-278.

Raftery, A. T. (2007). Anatomy teaching in the UK. *Surgery (Oxford), 25*(1), 1-2.

Ramsden, P. (2003). *Learning to teach in higher education* (2nd ed.). London, United Kingdom: RoutledgeFalmer.

Ramsden, P. (Ed.) (1988). *Improving learning : New perspectives*. London: Kogan Page.

Raskin, J. D. (2002). *Constructivism in psychology: Personal construct psychology, radical constructivism, and social constructivism* (Vol. 1). New York, NY: Pace University Press.

Raymond, G. (2010). Grammar and social relations. In A. F. Freed & S. Ehrlich (Eds.), *"Why do you ask?" the function of questions in institutional discourse* (pp. 356-379). Oxford, United Kingdom: Oxford University Press.

Raymond, G., & Heritage, J. (2006). The epistemics of social relations: Owning grandchildren. *Language in Society, 35*(5), 677-705.

Reder, S., Harris, K., & Setzler, K. (2003). The multimedia adult ESL learner corpus. *TESOL Quarterly, 37*(3), 546-557.

Regehr, G., & Norman, G. R. (1996). Issues in cognitive psychology: Implications for professional education. *Academic Medicine, 71*(9), 988-1001.

Remedios, L., Clarke, D., & Hawthorne, L. (2008a). Framing collaborative behaviors: Listening and speaking in problem-based learning. *The interdisciplinary journal of problem-based learning, 2*(1), 1-20.

Remedios, L., Clarke, D., & Hawthorne, L. (2008b). The silent participant in small group collaborative learning contexts. *Active Learning in Higher Education, 9*(3), 201-216.

Rendle-Short, J. (2006). *The academic presentation: Situated talk in action*. Aldershot, England: Ashgate Publishing.

Roberts, S. G., Torreira, F., & Levinson, S. C. (2015). The effects of processing and sequence organization on the timing of turn taking: a corpus study. *Frontiers in Psychology, 6*, 509.

Robinson, J. D. (2006). Managing trouble responsibility and relationships during conversational repair. *Communication Monographs, 73*(2), 137-161.

Robinson, J. D. (2014). What "what?" tells us about how conversationalists manage intersubjectivity. *Research on Language and Social Interaction, 47*(2), 109-129.

Robinson, J. D., & Heritage, J. (2014). Intervening with conversation analysis: The case of medicine. *Research on Language and Social Interaction, 47*(3), 201-218.

Rochford, K. (1985). Spatial learning disabilities and underachievement among university anatomy students. *Medical Education, 19*(1), 13-26.

Roseano, P., González, M., Borràs-Comes, J., & Prieto, P. (2014). Communicating epistemic stance: How speech and gesture patterns reflect epistemicity and evidentiality. *Discourse Processes, 53*(3), 135-174.

Roth, W.-M., van Eijck, M., Hsu, P.-L., Marshall, A., & Mazumder, A. (2009). What high school students learn during internships in biology laboratories. *The American Biology Teacher, 71*(8), 492-496.

Sacks, H. (1974). On the analysability of stories by children. In R. Turner (Ed.), *Ethnomethodology: Selected readings*. Harmondsworth: Penguin.

Sacks, H. (1984). On doing "being ordinary". In J. M. Atkinson & J. Heritage (Eds.), *Structures of social action: Studies in conversation analysis* (pp. 413-429). Cambridge, United Kingdom: Cambridge University Press.

Sacks, H. (1995). *Lectures on conversation*. Oxford, United Kingdom: Wiley-Blackwell.

Sacks, H. (2010). Spring 1970. In *Lectures on conversation Vol I, II*. Oxford, United Kingdom: Wiley-Blackwell.

Sacks, H., & Schegloff, E. A. (1979). Two preferences in the organization of reference to persons in conversation and their interaction. In G. Psathas (Ed.), *Everyday language: Studies in ethnomethodology* (pp. 15-21). New York: Irvington Publishers.

Sacks, H., Schegloff, E. A., & Jefferson, G. (1974). A simplest systematics for the organization of turn-taking for conversation. *Language, 50*(4), 696-735.

Sahlström, F. (2002). The interactional organization of hand raising in Classroom Interaction. *The Journal of Classroom Interaction, 37*(2), 47-57.

Sahlström, F. (2009). Conversation analysis as a way of studying learning—An introduction to a special issue of SJER. *Scandinavian Journal of Educational Research, 53*(2), 103-111.

Saltarelli, A. J., Roseth, C. J., & Saltarelli, W. A. (2014). Human cadavers vs. multimedia simulation: A study of student learning in anatomy. *Anatomical Sciences Education, 7*(5), 331-339.

Saxe, R., & Kanwisher, N. (2003). People thinking about thinking people. *NeuroImage, 19*(4), 1835-1842.

Saxe, R., & Wexler, A. (2005). Making sense of another mind: The role of the right temporo-parietal junction. *Neuropsychologia, 43*(10), 1391-1399.

Schegloff, E. A. (1968). Sequencing in conversational openings. *American Anthropologist, 70*(6), 1075-1095.

Schegloff, E. A. (1972). Notes on a conversational practice: Formulating place. In D. Sudnow (Ed.), *Studies in social interaction* (pp. 75-119). New York: Free Press.

Schegloff, E. A. (1987). Recycled turn beginning: A precise repair mechanism in conversation's turn-taking organization. In G. Button & J. R. E. Lee (Eds.), *Talk and social organization* (pp. 70-85). Clevedon, United Kingdom: Multilingual Matters.

Schegloff, E. A. (1988). Goffman and the analysis of conversation. In P. Drew & A. J. Wootton (Eds.), *Erving Goffman: Exploring the interaction order* (pp. 89-135) Cambridge, United Kingdom: Polity Press.

Schegloff, E. A. (1991). Reflections on talk and social structure. In D. Boden & D. H. Zimmerman (Eds.), *Talk and social structure: Studies in ethnomethodology and conversation analysis*. Cambridge, United Kingdom: Polity Press.

Schegloff, E. A. (1996). Turn organization: One direction for inquiry into grammar and interaction. In E. Ochs, S. A. Thompson, & E. A. Schegloff (Eds.), *Interaction and grammar* (pp. 52-133). Cambridge, United Kingdom: Cambridge University Press.

Schegloff, E. A. (1997). Practices and actions: Boundary cases of other-initiated repair. *Discourse Processes, 23*(3), 499-545.

Schegloff, E. A. (2000a). Overlapping talk and the organization of turn-taking for conversation. *Language in Society, 29*(1), 1-63.

Schegloff, E. A. (2000b). When 'others' initiate repair. *Applied Linguistics, 21*(2), 205-243.

Schegloff, E. A. (2006). Interaction: The infrastructure for social institutions, the natural ecological niche for language, and the arena in which culture is enacted. In N. J. Enfield & S. C. Levinson (Eds.), *Roots of human sociality: Culture, cognition and interaction* (pp. 70-96). Oxford, United Kingdom: BERG.

Schegloff, E. A. (2007a). *Sequence organization in interaction: A primer in conversation analysis* (Vol. 1). Cambridge, United Kingdom: Cambridge University Press.

Schegloff, E. A. (2007b). A tutorial on membership categorization. *Journal of Pragmatics, 39*(3), 462-482.

Schegloff, E. A. (2013). Ten operations in self-initated same-turn repair. In M. Hayashi, G. Raymond, & J. Sidnell (Eds.), *Conversational repair and human understanding*. Cambridge, United Kingdom: Cambridge University Press.

Schegloff, E. A., Jefferson, G., & Sacks, H. (1977). The preference for self-correction in the organization of repair in conversation. *Language, 53*(2), 361-382.

Schegloff, E. A., & Sacks, H. (1973). Opening up closings. *Semiotica, 3*(4), 289-327.

Schleich, J.-M., Dillenseger, J.-L., Houyel, L., Almange, C., & Anderson, R. H. (2009). A new dynamic 3D virtual methodology for teaching the mechanics of atrial septation as seen in the human heart. *Anatomical Sciences Education, 2*(2), 69-77.

Schoenfeld-Tacher, R., McConnell, S., & Graham, M. (2001). Do no harm: A comparison of the effects of on-line vs. traditional delivery media on a science course. *Journal of Science Education and Technology, 10*(3), 257-265.

Scholz, J., Triantafyllou, C., Whitfield-Gabrieli, S., Brown, E. N., & Saxe, R. (2009). Distinct regions of right temporo-parietal junction are selective for theory of mind and exogenous attention. *PLoS One, 4*(3), e4869.

Seedhouse, P. (1997). The case of the missing "no": The relationship between pedagogy and interaction. *Language Learning, 47*(3), 547-583.

Seedhouse, P. (2005). Conversation analysis and language learning. *Language Teaching, 38*(4), 165-187.

Seedhouse, P. (2011). Conversation analytic research into language teaching and learning. In E. Hinkel (Ed.), *Handbook of research in second language teaching and learning* (pp. 345-363). Mahwah, NJ: Lawrence Erlbaum Associates.

Seedhouse, P. (2012). Conversation analysis and classroom interaction. *The encyclopedia of applied linguistics.* Chichester, West Sussex, United Kingdom: Wiley-Blackwell.

Selting, M. (2000). The construction of units in conversational talk. *Language in Society, 29*(4), 477-517.

Senger, S. (1996). Incorporating visible human project data into the undergraduate anatomy and physiology curriculum. *Studies in Health Technology and Informatics, 29,* 194-203.

Serrat, M. A., Dom, A. M., Buchanan, J. T., Williams, A. R., Efaw, M. L., & Richardson, L. L. (2014). Independent learning modules enhance student performance and understanding of anatomy. *Anatomical Sciences Education, 7*(5), 406-416.

Sert, O. (2013). 'Epistemic status check' as an interactional phenomenon in instructed learning settings. *Journal of Pragmatics, 45*(1), 13-28.

Sert, O., & Seedhouse, P. (2011). Introduction: Conversation analysis in applied linguistics. *Novitas-ROYAL, 5*(1), 1.

Sert, O., & Walsh, S. (2012). The interactional management of claims of insufficient knowledge in English language classrooms. *Language and Education, 27*(6), 542-565.

Shankar, N., & Roopa, R. (2009). Evaluation of a modified team based learning method for teaching general embryology to 1st year medical graduate students. *Indian Journal of Medical Sciences, 63*(1), 4-12.

Shin, D. S., Chung, M. S., Park, H. S., Park, J. S., & Hwang, S. B. (2011). Browsing software of the visible Korean data used for teaching sectional anatomy. *Anatomical Sciences Education, 4*(6), 327-332.

Shin, D. S., Jang, H. G., Hwang, S. B., Har, D. H., Moon, Y. L., & Chung, M. S. (2013). Two-dimensional sectioned images and three-dimensional surface models for learning the anatomy of the female pelvis. *Anatomical Sciences Education, 6*(5), 316-323.

Sidnell, J. (2010). *Conversation analysis: An introduction*. Chichester, United Kingdom: Wiley-Blackwell.

Sidnell, J. (2012). Basic conversation analytic methods. In J. Sidnell & T. Stivers (Eds.), *The handbook of conversation analysis* (pp. 77-99). Chichester, West Sussex, United Kingdom: John Wiley & Sons.

Sinclair, J. M., & Coulthard, M. (1975). *Towards an analysis of discourse: The English used by teachers and pupils*. London, United Kingdom: Oxford University Press.

Smith, C. F., Martinez-Alvarez, C., & McHanwell, S. (2014). The context of learning anatomy: Does it make a difference? *Journal of Anatomy, 224*(3), 270-278.

Smith, C. F., & Mathias, H. S. (2007). An investigation into medical students' approaches to anatomy learning in a systems-based prosection course. *Clinical Anatomy, 20*(7), 843-848.

Smith, C. F., & Mathias, H. S. (2010). Medical students' approaches to learning anatomy: Students' experiences and relations to the learning environment. *Clinical Anatomy, 23*(1), 106-114.

Smith, S. B., Carmichael, S. W., Pawlina, W., & Spinner, R. J. (2007). Latin and Greek in gross anatomy. *Clinical Anatomy, 20*(3), 332-337.

Stanford, W., Erkonen, W. E., Cassell, M. D., Moran, B. D., Easley, G., Carris, R. L., & Albanese, M. A. (1994). Evaluation of a computer-based program for teaching cardiac anatomy. *Investigative Radiology, 29*(2), 248-252.

Stephens, B., Temkin, B., Krummel, T. M., & Heinrichs, W. L. (2000). Virtual body structures: A 3D structure development tool from visible human data. *Studies in Health Technology and Informatics, 70*, 323-326.

Stevanovic, M., & Peräkylä, A. (2012). Deontic authority in interaction: The right to announce, propose, and decide. *Research on Language and Social Interaction, 45*(3), 297-321.

Stivers, T. (2008). Stance, alignment, and affiliation during storytelling: When nodding is a token of affiliation. *Research on Language and Social Interaction, 41*(1), 31-57.

Stivers, T. (2010). An overview of the question–response system in American English conversation. *Journal of Pragmatics, 42*(10), 2772-2781.

Stivers, T. (2015). Coding social interaction: A heretical approach in conversation analysis? *Research on Language and Social Interaction, 48*(1), 1-19.

Stivers, T., Enfield, N. J., Brown, P., Englert, C., Hayashi, M., Heinemann, T., . . . Levinson, S. C. (2009). Universals and cultural variation in turn-taking in conversation. *Proceedings of the National Academy of Sciences, 106*(26), 10587-10592.

Stivers, T., Mondada, L., & Steensig, J. (2011). *The morality of knowledge in conversation.* Cambridge, United Kingdom : Cambridge University Press.

Stivers, T., & Rossano, F. (2010). Mobilizing response. *Research on Language and Social Interaction, 43*(1), 3-31.

Stokoe, E. H. (2000). Constructing topicality in university students' small-group discussion: A conversation analytic approach. *Language and Education, 14*(3), 184-203.

Stokoe, E. H. (2010). Gender, conversation analysis, and the anatomy of membership categorization practices. *Social and Personality Psychology Compass, 4*(7), 428-438.

Stokoe, E. H., Benwell, B., & Attenborough, F. (2013). University students managing engagement, preparation, knowledge and achievement: Interactional evidence from institutional, domestic and virtual settings. *Learning, Culture and Social Interaction, 2*(2), 75-90.

Stokoe, E. H., & Smithson, J. (2001). Making gender relevant: Conversation analysis and gender categories in interaction. *Discourse & Society, 12*(2), 217-244.

Streeck, J. (2009). *Gesturecraft: The manu-facture of meaning*. Amsterdam: John Benjamins Publishing.

Sugand, K., Abrahams, P., & Khurana, A. (2010). The anatomy of anatomy: A review for its modernization. *Anatomical Sciences Education, 3*(2), 83-93.

Svennevig, J. (2008). Trying the easiest solution first in other-initiation of repair. *Journal of Pragmatics, 40*(2), 333-348.

Tam, M. D., Hart, A. R., Williams, S., Heylings, D., & Leinster, S. (2009). Is learning anatomy facilitated by computer-aided learning? A review of the literature. *Medical Teacher, 31*(9), e393-396.

ten Brinke, B., Klitsie, P. J., Timman, R., Busschbach, J. J., Lange, J. F., & Kleinrensink, G. J. (2014). Anatomy education and classroom versus laparoscopic dissection-based training: A randomized study at one medical school. *Academic Medicine, 89*(5), 806-810.

ten Have, P. (1990). Methodological issues in conversation analysis. *Bulletin de Méthodologie Sociologique, 27*(1), 23-51.

ten Have, P. (1999). *Doing conversation analysis: A practical guide.* London, United Kingdom: Sage.

ten Have, P. (2004). Ethnomethodology's perspective in *Understanding qualitative research and ethnomethodology* (pp. 31-55). London, United Kingdom: Sage.

ten Have, P. (2006). Conversation analysis versus other approaches to discourse. [Review of the book *Conversation analysis and discourse analysis: A comparative and critical introduction]*. *Forum Qualitative Socialforschung / Forum: Qualitative Social Research. 7*(2), Art 3, http://nbn-resolving.de/urn:nbn:de:0114-fqs060239

ten Have, P. (2007). Introducing the CA paradigm. In *Doing conversation analysis* (2nd ed., pp. 4-14). Los Angeles, CA: Sage.

Terrell, M. (2006). Anatomy of learning: Instructional design principles for the anatomical sciences. *Anatomical Record - Part B New Anatomist, 289*(6), 252-260.

Thomas, J. K., Denham, B. E., & Dinolfo, J. D. (2011). Perceptions among occupational and physical therapy students of a nontraditional methodology for teaching laboratory gross anatomy. *Anatomical Sciences Education, 4*(2), 71-77.

Tobin, K., Ritchie, S. M., Oakley, J. L., Mergard, V., & Hudson, P. (2013). Relationships between emotional climate and the fluency of classroom interactions. *Learning Environments Research, 16*(1), 71-89.

Torreira, F., Bögels, S., & Levinson, S. C. (2015). Breathing for answering: The time course of response planning in conversation. *Frontiers in Psychology, 6*, 284.

Torres, K., Torres, A., Pietrzyk, L., Lisiecka, J., Blonski, M., Bacik-Donica, M., et al. (2014). Simulation techniques in the anatomy curriculum: Review of literature. *Folia Morphologiica, 73*(1), 1-6.

Trigwell, K., Prosser, M., & Waterhouse, F. (1999). Relations between teachers' approaches to teaching and students' approaches to learning. *Higher Education, 37*(1), 57-70.

Turney, B. W. (2007). Anatomy in a modern medical curriculum. *Annals of the Royal College of Surgeons of England, 89*(2), 104-107.

Tutarel, O., Luedemann, W., Nautrup, C. P., Jahn, K., Wilke, M., & Berens von Rautenfeld, D. (2000). Introduction and evaluation of a modular seminar system in gross anatomy teaching at the Hannover Medical School. *Annals of Anatomy, 182*(4), 393-396.

Vasan, N. S., DeFouw, D. O., & Compton, S. (2011). Team-based learning in anatomy: An efficient, effective, and economical strategy. *Anatomical Sciences Education, 4*(6), 333-339.

Vasan, N. S., DeFouw, D. O., & Holland, B. K. (2008). Modified use of team-based learning for effective delivery of medical gross anatomy and embryology. *Anatomical Sciences Education, 1*(1), 3-9.

Veneri, D. (2011). The role and effectiveness of computer-assisted learning in physical therapy education: A systematic review. *Physiotherapy Theory and Practice, 27*(4), 287-298.

Vine, E. W. (2008). CA and SCT: Strange bedfellows or useful partners for understanding classroom interactions? *Discourse Studies, 10*(5), 673-693.

Vishnumaya, G., & Ramnarayan, K. (2009). An appraisal of anatomy teaching and learning by undergraduate nursing students in a multiprofessional context: A study done at a medical school in South India. *Bratislavske Lekarske Listy, 110*(8), 506-511.

Vorstenbosch, M. A. T. M., Bolhuis, S., van Kuppeveld, S., Kooloos, J., & Laan, R. (2011). Properties of publications on anatomy in medical education literature. *Anatomical Sciences Education, 4*(2), 105-114.

Vorstenbosch, M. A. T. M., Bouter, S. T., van den Hurk, M. M., Kooloos, J. G., Bolhuis, S. M., & Laan, R. F. (2014). Exploring the validity of assessment in anatomy: Do images influence cognitive processes used in answering extended matching questions? *Anatomical Sciences Education, 7*(2), 107-116.

Vorstenbosch, M. A. T. M., Klaassen, T. P. F. M., Donders, A. R. T., Kooloos, J. G. M., Bolhuis, S. M., & Laan, R. F. J. M. (2013). Learning anatomy enhances spatial ability. *Anatomical Sciences Education, 6*(4), 257-262.

Vorstenbosch, M. A. T. M., Klaassen, T. P. F. M., Kooloos, J. G. M., Bolhuis, S. M., & Laan, R. F. J. M. (2013). Do images influence assessment in anatomy? Exploring the effect of images on item difficulty and item discrimination. *Anatomical Sciences Education, 6*(1), 29-41.

Voutilainen, L., Henttonen, P., Kahri, M., Kivioja, M., Ravaja, N., Sams, M., & Peräkylä, A. (2014). Affective stance, ambivalence, and psychophysiological responses during conversational storytelling. *Journal of Pragmatics, 68*, 1-24.

Vygotskiĭ, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.

Walker, T. (2014a). Form ≠ function: The independence of prosody and action. *Research on Language and Social Interaction, 47*(1), 1-16.

Walker, T. (2014b). The independence of phonetic form and interactional accomplishments. *Research on Language and Social Interaction, 47*(1), 23-27.

Walsh, S. (2002). Construction or obstruction: Teacher talk and learner involvement in the EFL classroom. *Language Teaching Research, 6*(1), 3-23.

Walsh, S., & O'Keeffe, A. (2010). Investigating higher education seminar talk. *Novitas-ROYAL (Research on Youth and Language), 4*(2), 141-158.

Ward, P. J. (2011). First year medical students' approaches to study and their outcomes in a gross anatomy course. *Clinical Anatomy, 24*(1), 120-127.

Ward, P. J., & Walker, J. J. (2008). The influence of study methods and knowledge processing on academic success and long-term recall of anatomy learning by first-year veterinary students. *Anatomical Sciences Education, 1*(2), 68-74.

Waring, H. Z. (2002). Expressing noncomprehension in a US graduate seminar. *Journal of Pragmatics, 34*(12), 1711-1731.

Waring, H. Z. (2009). Moving out of IRF (Initiation-Response-Feedback): A single case analysis. *Language Learning, 59*(4), 796-824.

Waters, J. R., Van Meter, P., Perrotti, W., Drogo, S., & Cyr, R. J. (2011). Human clay models versus cat dissection: How the similarity between the classroom and the exam affects student performance. *Advances in Physiology Education, 35*(2), 227-236.

Waterston, S. W., & Stewart, I. J. (2005). Survey of clinicians' attitudes to the anatomical teaching and knowledge of medical students. *Clinical Anatomy, 18*(5), 380-384.

Whitley, J. (1977). Effectiveness of small-group self-instruction in radiographic anatomy. *Investigative Radiology, 12*(6), 486-487.

Wiemann, J. M. (1981). Effects of laboratory videotaping procedures on selected conversation behaviors. *Human Communication Research, 7*(4), 302-311.

Wilhelmsson, N., Dahlgren, L., Hult, H., Scheja, M., Lonka, K., & Josephson, A. (2010). The anatomy of learning anatomy. *Advances in Health Sciences Education, 15*(2), 153-165.

Wilkinson, R. (2014). Intervening with conversation analysis in speech and language therapy: Improving aphasic conversation. *Research on Language and Social Interaction, 47*(3), 219-238.

Wilkinson, S., & Weatherall, A. (2011). Insertion repair. *Research on Language and Social Interaction, 44*(1), 65-91.

Winkelmann, A. (2007). Anatomical dissection as a teaching method in medical school: A review of the evidence. *Medical Education, 41*(1), 15-22.

Winkelmann, A., & Guldner, F. H. (2004). Cadavers as teachers: The dissecting room experience in Thailand. *BMJ, 329*(7480), 1455-1457.

Winkelmann, A., Hendrix, S., & Kiessling, C. (2007). What do students actually do during a dissection course? First steps towards understanding a complex learning experience. *Academic Medicine, 82*(10), 989-995.

Woodward-Kron, R., & Remedios, L. (2007). Classroom discourse in problem-based learning classrooms in the health sciences. *Australian Review of Applied Linguistics, 30*(1), 9.1-9.18.

Wooffitt, R. (2005). *Conversation analysis and discourse analysis*. London: Sage.

Wooffitt, R., Holt, N., & Allistone, S. (2010). Introspection as institutional practice: Reflections on the attempt to capture conscious experience in a parapsychology experiment. *Qualitative Research in Psychology, 7*(1), 5-20.

Wormald, B. W., Schoeman, S., Somasunderam, A., & Penn, M. (2009). Assessment drives learning: An unavoidable truth? *Anatomical Sciences Education, 2*(5), 199-204.

Wright, E. F., & Hendricson, W. D. (2010). Evaluation of a 3-D interactive tooth atlas by dental students in dental anatomy and endodontics courses. *Journal of Dental Education, 74*(2), 110-122.

Wright, S. J. (2012). Student perceptions of an upper-level, undergraduate human anatomy laboratory course without cadavers. *Anatomical Sciences Education, 5*(3), 146-157.

Yammine, K. (2014). The current status of anatomy knowledge: Where are we now? Where do we need to go and how do we get there? *Teaching & Learning in Medicine, 26*(2), 184-188.

Yeager, V. L. (1996). Learning gross anatomy: Dissection and prosection. *Clinical Anatomy, 9*(1), 57-59.

Young, L., Dodell-Feder, D., & Saxe, R. (2010). What gets the attention of the temporo-parietal junction? An fMRI investigation of attention and theory of mind. *Neuropsychologia, 48*(9), 2658-2664.

Zarahn, E., Rakitin, B. C., Abela, D., Flynn, J., & Stern, Y. (2006). Distinct spatial patterns of brain activity associated with memory storage and search. *NeuroImage, 33*(2), 794-804.

Zemel, A., & Koschmann, T. D. (2011). Pursuing a question: Reinitiating IRE sequences as a method of instruction. *Journal of Pragmatics, 43*(2), 475-488.

Zhang, S. X., Heng, P. A., & Liu, Z. J. (2006). Chinese visible human project. *Clinical Anatomy, 19*(3), 204-215.

Zhao, S., & van Leeuwen, T. (2014). Understanding semiotic technology in university classrooms: A social semiotic approach to PowerPoint-assisted cultural studies lectures. *Classroom Discourse, 5*(1), 71-90.

Appendix A CA Transcription Conventions

Timing Symbols		Description
Square Brackets	[ ]	Indicates utterances produced by two or more speakers that overlap
Curly brackets	{	Used to denote the beginning of corresponding movement transcriptions represented by frame grabs or annotations
Equal sign	=	Indicates no break or gap and may be used to break up an through-produced talk by one speaker for convenience of transcription
Timed silence	(1.8)	Intervals of silences (i.e. pauses and gaps in and between speakers' turns at talk respectively) are measured in tenths of seconds, and represented by numbers enclosed in parentheses.
Micropause	(.)	A timed pause of less than 0.2 seconds.

Delivery Symbols		Description
Comma	,	Indicates a continuing intonation with slight upward or downward contour
Period	.	Indicates a falling pitch or intonational contour
Question mark	?	Rising vocal pitch or intonational contour at the conclusion of a TCU
Hyphen	-	Indicates a cut-off or an abrupt (glottal) halt
Colon(s)	:	indicates sustained enunciation of a syllable. Longer enunciation can be marked using two or more colons.
Greater than/Less than signs	> < < >	Portions of an utterance delivered at a noticeably quicker (> <) or slower (< >) pace than surrounding talk.
Degree Signs	° °	Marks speech produced softly or at a lower volume.
Capitalization	HEY	Represents speech delivered more loudly than surrounding talk.
Underscored text	h<u>ey</u>	Underscoring indicates stress on a word, syllable or sound.
Underscored colons	<u>::</u>	Indicates intonational contours, and it indicates that the sound at the point of the colon is 'punched up'. So it gives a 'down-to-up' contour.
Arrows	↑ ↓	Marks a rise or fall in intonation
	.hh	Audible inhalation
	hhh	Audible exhalation

Delivery Symbols		Description
	(text)	Speech which is unclear or in doubt in the transcript
	((text))	Transcriptionist description of non-verbal activity

Other	Symbol	Description
Out breath	Hhh	Audible outbreath (linguistic aspiration) as in laughter, sighing, etc. When aspiration occurs within a word, it is set off with parentheses.
In breath	.hh	Audible inhalation is marked with a preceding period
Parenthesis	( )	Text enclosed in parentheses represents transcribed talk for which doubt exists. Empty parentheses represent talk that is not transcribed or unknown speaker.
Double parenthesis	(( ))	Use to mark out transcription annotations or transcriptionists' descriptions which may be used to provide details about movements or additional information.

Appendix B Relevant Sections from the Radiography Student Anatomy Laboratory Manuals

ANATOMY PRACTICAL 1 (S1W1L1):
Anatomical terminology & an Introduction to Joints

PART A

Task 1. Observe the following joints and fill in the table (allow 20 minutes)

Display	Articulating Bones	Type of joint	Major functions	ROM	Joint Structures
1	Frontal and parietal bones				
2					Fibrocartilage disc
3		Gomphosis			
4		synostosis			
5					Long collagen fibres between bones
6				Circumduction Flexion Extension Abduction adduction	
7	First rib and manubrium				

Task 2; Observe the synovial joints of the upper limb & pectoral girdle and fill in the following table (allow 25 minutes)

	Bones involved in synovial joints	Type of synovial joint	ROM
1	Sternoclavicular joint		
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12	Interphalangeal joints		

ANATOMY PRACTICAL 2 (S1W2L2):
Pectoral girdle and the Humerus

Please note; Students participating in student surface anatomy should be dressed to allow drawing of clavicle, manubriums, spine of scapular and head of humerus. (eg; loose fitting T-Shirt)

PART A

Task 1 Shoulder Palpation (allow 30 minutes)

Your partner should be sitting comfortably in a loose-fitting top to allow drawing of structures around the shoulder

1. Identify the *manubrium* & its superior edge with a central notch- the *suprasternal notch*. Draw in the notch. On each side of the notch are the proximal ends of the clavicles.

2. Draw in the *sternoclavicular (SC) joints*. Ask your partner to move his/her shoulder and palpate the SC joint during elevation/depression or protraction/retraction.

3. Follow & draw the line of the right clavicle noting how the anterior surface is at first convex medially and then concave laterally .

4. Place your index finger on the anterior-inferior surface of the clavicle & move along it laterally until you feel the *coracoid process*. Mark the borders of the coracoid process. You can also palpate the coronoid process, by elevating and then lowering the arm. As the arm is lowered, the coracoid process meets the fingers of the palpating hand.

5. Palpate and draw in the length of the *spine of the scapula and the lateral acromion process.*

6. Trace the lateral border of the acromion process, noting the anterior and posterior angles. Palpate the flat acromion that makes up part of the "roof" of the *glenohumeral joint*. Let your finger fall off the lateral edge and note the amount of joint space between the acromion and *greater tubercle of the humerus.*

7. Start at the anterior angle of the acromion and palpate medially along the edge of the acromion until your finger falls into a small "v-notch". Draw this in. This notch identifies the *acromioclavicular (AC) joint*.

8. A larger "v-notch" exists on the posterior edge. A dotted line between these 2 "V's" designates the AC joint line.

9. With the arm in the anatomical position, the *lesser tubercle* is palpated as the deep bony structure just lateral to the coracoid process. Mark its position. The lateral border of the lesser tubercle is defined by the *bicipital groove.*

10. To locate the bicipital groove, stand behind your partner and place the ring finger of your contralateral hand on the coracoid while the middle finger rests on the lesser tubercle. Have your partner abduct to 80-90° and give moderate resistance with the ipsilateral hand to identify the septum between the anterior and middle deltoids. Place your index finger in this groove. While maintaining your fingers in position, lower the arm to 15° internal rotation (IR). Your index finger is located over the bicipital groove. This can be confirmed by passive IR/ER of the arm which causes the tendon to roll under your finger and the edges of the greater and lesser tubercles to come in contact with your finger.

Task 2 Scapulohumeral rhythm (allow 10 minutes)

Instructions;

- Identify and place your hand over the inferior angle of the scapula (can be palpated over clothing)
- Ask your partner to slowly abduct their arm.
- Note when the inferior angle starts to move - at what angle is the upper limb?
- Ask the partner to continue to abduct their arm maximally to 180 degrees.
- How many degrees do you think the inferior angle moved?
- What is the ratio between upper limb movement and scapular rotation?

Degrees of movement

	humerus	scapula
Arm by side- no movement	0^0	0^0
Abduction of arm		Starts to move
Arm fully abducted	180^0	

What is the ratio of scapulo humeral movement when fully abducted ?----------

How does this compare to your fellow students results?----------

Student pairs	humerus	scapula	S/H ratio
1	180^0		
2	180^0		
3	180^0		
4	180^0		
5	180^0		

Task 3 (allow 20 minutes)

A. Using the specimens provided, check with your partner that you can locate the following anatomy;

- head of humerus
- articular surface
- surgical neck
- anatomical neck
- greater tubercle
- lesser tubercle
- bicipital groove
- deltoid tuberosity
- radial groove
- nutrient artery foramen

B. Observe and draw the relative positions of the humeral head, greater and lesser tubercles as the humerus is rotated.

Externally rotated	Anatomical position	Internally rotated

ANATOMY PRACTICAL 4 (S1W5L4): Muscles and Neurovascular structures

Please be prepared by wearing a sleeveless top.

PART A

Task 1.Surface anatomy of upper limb; (allow 40 minutes)

With the use of markers provided, work in pairs, with one student drawing the following anatomical structures on their partner with the appropriate colour.

1. Cephalic vein (blue)

The cephalic vein can be seen on the anterior side of the arm, as it traverses along the lateral border of the entire upper limb. It ends proximally, in a small depression, bordered by deltoid & pectoralis major (deltopectoral triangle)

2. Basilic vein & median cubital vein (blue)

The basilic vein originates on the medial side of the dorsal venous network of the hand & travels up the medial aspect of the forearm and arm. Near the elbow, it usually connects with the cephalic vein via the median cubital vein. About ½ way up the arm it goes deep.

3. Biceps brachii & tendon (brown)

On the anterior & medial aspects of the arm is the prominence of the Biceps brachii**,** bounded on either side by an intermuscular depression. It extends from the anterior axillary fold to the bend of the elbow. Flex the arm to outline the distal biceps tendon at the elbow.

4. Triceps Brachii (brown)

On the back of the arm the long head of the Triceps brachii may be seen as a longitudinal eminence, emerging from under cover of Deltoid and gradually passing into the flattened plane of the tendon of the muscle at the lower part of the back of the arm. When the muscle is in action the medial and lateral heads become prominent. It inserts into the olecranon process

5. Olecranon process (**black**)

When the forearm is flexed the upper quadrilateral surface of the olecranon process is palpable, but during extension it recedes into the olecranon fossa.

6. Medial & lateral epicondyles & head of radius (**black**)

The epicondyles are just above either side of the elbow joint.
Pronate & supinate your forearm and palpate the head of the radius rotating around the ulna.

7. Equilateral triangle **(black)**

When the forearm is fully flexed the olecranon and the epicondyles form the angles of an equilateral triangle

On the anterior aspect of the elbow are two muscular elevations, one on either side, separate above but converging below so as to form the medial and lateral boundaries of the cubital fossa

8. Brachioradialis **(brown)**

Brachioradialis is attached to lateral supracondylar ridge of the humerus and occupies the lateral part of the dorsal surface of the forearm (with extensors & supinator)and inserts onto the distal styloid process of the radius.

9. Pronator teres **(brown)**

The medial elevation consists of the Pronator teres and the Flexors. They form a fusiform mass, pointed above at the medial epicondyle and gradually tapering off below. The Pronator teres is the most lateral of the group.

10. Cubital fossa **(black)**

The cubital fossa is a triangular region seen as a depression on the anterior side of the elbow.
Boundaries;

- an imaginary horizontal line connecting the medial & lateral epicondyles
- Medial (ulnar) boundary - lateral border of pronator teres muscle
- Lateral (radial) boundary - medial border of brachioradialis muscle
- Apex- it is directed inferiorly, and is formed by the meeting point of the lateral and medial boundaries.

11. Skin creases at the wrist (pink)

Anteriorly the wrist has 3 transverse furrows in the skin which correspond respectively from proximal to distal to the positions of the styloid process of the ulna, the wrist-joint & the midcarpal joint.

12. Styloid processes of radius & ulna **(black)**

The radial styloid process forms a prominent tubercle continuous with the radial dorsal border at the level of the wrist-joint. It is most evident when the hand is in a position midway between supination and pronation.
When the forearm is pronated, the styloid process of the ulna becomes more obvious.

13. Carpal & metacarpal bones **(black)**

- Draw the 1st metacarpal from the head to the base. Indicate the position of the trapezium.
- The scaphoid can be felt at the base of the thenar eminence, particularly on extension of the wrist (& in the anatomical snuff box).
- Draw the length of the middle metacarpal bone (include head & base).
- The capitate can be felt by sliding proximally from the middle metacarpal until reaching a slight depression. The capitate becomes more prominent on flexion of the wrist
- The pisiform may be felt at the base of the hypothenar eminence. When the wrist is flexed, FCU relaxes allowing the pisiform to be moved side to side. If the subject is thin, it may be seen as a bulge when the wrist is extended.

14. Flexor carpi radialis & Palmaris longus tendons at the wrist ***(brown)***

The PL presents no surface marking proximally- but when the hand flexes against resistance, its tendon stands out, at the wrist as a sharp, tense cord, in the middle of the wrist. FCR tendon lies to the lateral side of PL & and is medial to the radial artery.

15. Flexor carpi ulnaris (brown)

FCU determines the contour of the medial border of the forearm, its tendon is evident along the ulnar border of the lower part of the forearm, and is most marked when the hand is flexed and adducted against resistance.

16. Brachial artery (red)

The position of the brachial artery is marked by a line drawn from the junction of the anterior and middle 1/3 of the distance between the anterior & posterior axillary folds to a point midway between the epicondyles of the humerus and continued distally for 2.5 cm, at which point the artery bifurcates. Brachial pulse is located on the inside of the arm, just proximal to the cubital fossa.

17. Radial & ulnar arteries (red)

Radial artery; draw a line from the lateral margin of the Biceps tendon in the cubital fossa center to the medial side of the front of the styloid process of the radius when the limb is in the position of supination. The distal portion of the artery is indicated by continuing this line around the radial side of the wrist to the proximal end of the first intermetacarpal space. *Can you feel the pulse*?

Ulnar artery; 2 lines are required to indicate its course;

- Draw a line from the anterior aspect of the medial epicondyle to the radial side of the pisiform bone; the lower 2/3 of this line represents the artery
- The proximal 1/3 is represented by a second line from the center of the cubital fossa hollow to the junction of the upper & middle1/3rds of the first line.

18. Median nerve (green)

At first lateral to the brachial artery, it then crosses anteriorly to run medial to the artery in the distal arm & cubital fossa.(and deep to the biceps)

From the cubital fossa, it passes between the two heads of pronator teres and then travels between FDS & FDP.

The course of the nerve in the forearm is marked by a line starting from a point just medial to the center of one joining the epicondyles, and extending to the lateral margin of the tendon of Palmaris longus at the wrist. It enters the hand through the carpal tunnel deep to the flexor retinaculum.

19. Ulnar nerve (green)

The ulnar nerve descends on the posterior medial aspect of the humerus. It follows the line of the brachial artery in the upper 1/2 of the arm & at the middle of the arm it diverges and descends to the back of the medial epicondyle, where it can be palpated. It enters the anterior forearm through the 2 heads of FCU and runs alongside the ulna. It soon joins with the ulnar artery, travelling deep to FCU. In the forearm it is represented by a line from the anterior aspect of the medial epicondyle to the radial side of the pisiform bone.

20. Radial nerve (green)

The radial nerve crosses from medial to lateral behind the humeral shaft at its midpoint. Its' course can be indicated by a line from just below the posterior axillary fold, to the lateral side of the humerus at the junction of its middle and lower 1/3rds. It then passes vertically downward on the front of the arm to the level of the lateral epicondyle. The course of the *superficial radial nerve* is represented by a continuation of this line downward to the junction of

the middle and lower 1/3rds of the radial artery. It then crosses the radius and runs distally to the dorsum of the base of the first metacarpal bone.

21. Anatomical snuff box (brown)

The anatomical snuffbox is on the dorsal aspect of the hand & is most visible, during thumb extension. It is bounded by 3 tendons. More centrally placed is the *EPL* tendon and laterally (closest to the edge of the hand) is a pair of parallel and close tendons of *EPB & Ab PL*. The proximal border is formed by the *radial styloid process.* The floor of the snuffbox varies depending on the position of the wrist, but both the *trapezium & scaphoid* can be palpated. The *radial artery* crosses the snuff box and the *cephalic vein* arises in it.

22. Flexor retinaculum (brown)

The flexor retinaculum is attached medially to the pisiform & the hook of the hamate and laterally to the scaphoid & trapezium. The *hypothenar & thenar eminences* have some origins from the retinaculum

Task 2 Upper limb muscles (allow 20 minutes)

By observing the pots of muscles of the upper limb, test your knowledge on the position, origin, insertion and action of;

- Pectoralis muscles
- Latissimus dorsi
- Serratus anterior
- Axio-scapular muscles; levator scapulae, rhomboids trapezius
- Deltoid
- Rotator cuff muscles
- Biceps brachii
- Triceps brachii
- Brachialis
- Brachioradialis
- Supinator
- Pronator teres
- Flexor group of forearm
- Extensor group of forearms

ANATOMY PRACTICAL 1 (S2W2L1)

CERVICAL AND THORACIC VERTEBRAE

Student Outcomes

At the completion of this practical you will be able to;

- compare the structure and landmarks of typical and atypical cervical vertebrae
- compare the structure and landmarks of typical and atypical thoracic vertebrae
- describe the shape of cervical vertebrae from different views
- describe the shape of thoracic vertebrae from different views
- locate the position of joints of the cervical and thoracic vertebrae and some significant ligaments
- relate function and movements of vertebra to their structure

Associated Reading

- Anatomy lectures 1 and 2

- Saladin, KS 2012, *Anatomy Physiology The Unity of Form and Function* McGraw Hill, 6th edn Chapter 8 The skeletal system 8.3 The vertebral Column and Thoracic cage pp; 250-255

- Moore, KL Dalley, AF & Agur, AM 2010, *Clinically Oriented Anatomy*, Lippincott Williams & Wilkins, 6th edn, Chapter 4; The Back pp 440-449, 468 Chapter 8, The neck , Bones of the neck pp; 982-984,

Activity 1

From a collection of non-articulated vertebrae find a few typical cervical vertebrae *(Refer to page 11 for a list of anatomical landmarks)*

IMAGE 1: Draw & label a view of the superior surface of a typical cervical vertebra

IMAGE 2: Draw & label a sagittal view of a typical cervical vertebrae

Answer the following;

- List the typical cervical vertebrae

- What structures traverse thru the transverse foramen?

- Comment on the angle of the superior and inferior articulating processes of cervical vertebrae. What effect does this have on movement and stability?

- Comment on the size and shape of cervical vertebral foramena.

- How is C7 different from the typical cervical vertebrae?

Activity 2

From a collection of non-articulated vertebrae find C1 and C2

IMAGE 3. Draw & label a view of the superior surface of C1 & C2 .(*Refer to page 11)*
Indicate the position of the transverse ligament. Comment on the width of C1

IMAGE 4. Draw and label a sagittal view of C1 with C2. (*Refer to page 11)*

- Position the foramen magnum & occipital condyles above C1

In IMAGE4

- Label the articulations between C1, C2 and the skull
- Indicate the position of the anterior and posterior atlanto-occipital membranes, tectoral membrane and apical ligaments

Activity 3

From a collection of non-articulated vertebrae find some thoracic vertebrae- group them into typical & atypical vertebrae

IMAGE 5. Draw & label a view of the superior surface of a typical thoracic vertebra. *(Refer to page 11)*

IMAGE 6. Draw & label a sagittal view of 2 articulated thoracic vertebrae (*Refer to page 11)*

On Image 6 indicate the position of the following joints. What type of joints are they?

- Intervertebral
- zygapophyseal
- costovertebral

What determines if thoracic vertebrae are typical or atypical? Which vertebrae are atypical?

Activity 4

Observe the ROM of the neck of a fellow student. Fill in the following table

(*Approximations will do!)*

Movements	ROM (degrees)	Joint/s contribution to ROM
Flexion/extension		
Rotation		
Lateral bending		

4. Discuss the bony structures that affect the range of movements of thoracic vertebrae. Comment on mobility vs stability

Word reference

List of landmarks

Cervical vertebrae	Thoracic vertebrae
• lateral mass • anterior & posterior arches • anterior &posterior tubercle • transverse foramen • intervertebral foramen • prominent C7 process • transverse process • body • dens • bifid spinous process • tubercles of transverse process • uncal process • spinous process • superior facet • inferior facet	• body • Spinous process • Intervertebral notch • Superior articulating process • Superior articulating facet • Inferior articulating process • Inferior articulating facet • Facet/Demi facet costal facet • Transverse process • Facet on transverse process

ANATOMY PRACTICAL 4 (S2W7L4)

THORACIC CAVITY

Student Outcomes

At the completion of this practical you will be able to;

- describe the position of the heart within the thorax
- locate the major structures of a sheeps heart
- compare right and left sides of the heart
- list and locate structures within the mediastinum

Associated Reading

- Anatomy lectures 6

- Saladin, KS 2012, *Anatomy Physiology, The Unity of Form and Function,* 6th edn, Chapter 19 The Circulatory System pp717-725

- Moore, KL, Dalley, AF & Agur, AM 2010 *Clinically Oriented Anatomy* 6th edn, Chapter 1, Thorax, pages; 135-144,173, 160-168

*NOTE; LAB COATS ARE REQUIRED******

Activity 1

Anatomy of the heart

A. External view of a sheep's heart

- Examine the exterior of the heart & determine the superior, inferior, anterior & posterior surfaces. (hint; apex is inferior and to the left)
- Use probes to find the connection between arteries(aortic or pulmonary) & ventricles (left or right). (Note; most of the atria & great vessels have been probably been removed)
- Note the presence of fat and look for the coronary vessels.

Observe & draw in the space for IMAGE 1 the anterior exterior of a sheep's heart.
Label the following

- apex
- anterior interventricular sulcus (contains fat & left anterior descending coronary vessels within sulci)
- atrioventricular groove (coronary sulcus –separates right ventricle & right atrium , contains fat & right coronary artery giving the posterior descending artery and marginal artery)
- Lt ventricle
- Rt ventricle
- Rt atrium
- Rt & Lt auricle
- Position of base of aorta
- Position of base of pulmonary trunk

IMAGE 1; ANTERIOR VIEW OF EXTERIOR ASPECT OF THE HEART

B. Dissection of sheeps heart

On the table some students cut the heart vertically and others cut horizontally to show different views of the heart

Note; Always be careful with the sharp blade and always point and push the blade in the direction away from you or anyone else. Do not use excessive force. Scissors will also do the job!

Vertical incision

Right side of heart

Insert dissecting scissors or scalpel into SVC opening and cut thru the right atrium down to the right ventricle and pull apart the sides (If in doubt of vessel identity use a probe to determine which chamber it is going to)

Observe

- the Rt atrium
- the tricuspid valve (3 cusps, cordae tendinae)
- 3 Papillary muscles
- the Rt ventricle
- fossa ovalis
-

Note the thickness of the right ventricular wall.
Can you find the opening for the coronary sinus? It is thin walled compared to arteries and at the superior part of the right atrium.
Find the entrance to the pulmonary artery. Observe the semilunar shape of the pulmonary valve at the base of the pulmonary artery. Note the central relationship between the pulmonary artery and aorta

Left side of the heart

Insert your scissors or scalpel into aorta and cut down thru the left atrium and left ventricle and pull apart the sides

Observe;

- the mitral valve and note the number of valves it has.
- the size of the papillary muscles
- the thickness of the left ventricular muscle compared with the right ventricle.
- the trabeculae carnae
- the opening of the aorta (a probe maybe useful)

Cut the aorta to show the aortic valves.

- Observe the opening for the coronary arteries at the base of the aorta, behind the valves

Horizontal incision

Draw in IMAGE 2 space, a horizontal section thru the right & left ventricles
Label anterior and posterior views, Rt & Lt ventricles, Rt & Lt chambers & interventricular septum

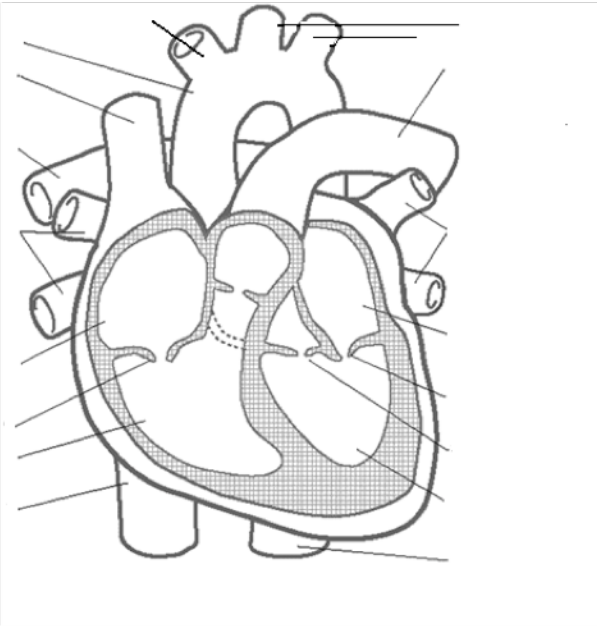
IMAGE 2

- Colour in/indicate on IMAGE 2 the areas you think are supplied by the
    1. left circumflex artery,
    2. left descending artery
    3. posterior descending artery
    4. right marginal artery.

- Explain the different size & shape of left & right ventricles.

Activity 2

Observe wet specimens and pots of human hearts & complete the label the following image



- Define fibrous, serous (parietal and visceral) pericardium and pericardial space.

- List the functions of the pericardium