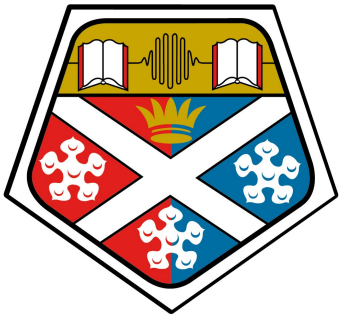

University of Strathclyde Glasgow

Juggling institutional and social demands: A conversation analysis of engineering students' interactions in self-managed problem-based learning

Robert Michael McQuade

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Department of Chemical and Process Engineering
School of Psychological Sciences and Health

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This thesis is the result of the author's original research. It has been composed by the author and has not been previously submitted for examination which has led to the award of a degree.

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EXTRACTS, FIGURES, & TABLES

ABSTRACT

There has been an increase in the use of problem-based learning (PBL) - a student-centred approach involving authentic problem cases and collaboration - within the engineering disciplines in response to the demands of 21st century industry. The vast majority of PBL research over the years, however, has either focused on determining its effectiveness, or reported on staff and students' perceptions *about* the approach. Much less attention has been given to the group practices that lie at the heart of PBL. Ironically, then, as a pedagogical approach that is so dependent on social interaction, we know very little about its interactional elements - about *how* it actually works.

With the aim of opening this interactional 'black box', this study analysed almost 100 hours of naturalistic video-recordings involving seven groups of engineering students undertaking PBL at a UK university. This thesis reports on the findings of the floating facilitator PBL model, in which learning is effectively tutorless, with only intermittent tutor contact. Conversation analysis was used to examine students' *actual* social interactions in this learning setting; to finely unpack the conversational mechanics behind PBL that have long been overlooked.

Although the student-centredness of PBL made the educational experience less formal in nature, this democratisation of institutional structures also allowed 'outside' social norms to percolate through. Added to the absence of the tutor, PBL thus made matters *more* complicated for students, forcing them to balance wider social values with their newfound institutional responsibilities (i.e. to self-manage their group work). Ironically, the groups co-constructed themselves as being largely detached from academia; as 'playing it cool' in blending in as ('non-academic') equals. At the same time, however, with no guiding tutor, the students also oriented to their collective need to 'do education'. In managing this dilemma - and in an apparent resistance against being substituted for the absent tutor - they treated the workload as a collective burden to be eradicated, neutralised all displays of authority, and made use of subtle interactional strategies in self-managing the likes of knowledge disagreements and social loafing. Such findings show that students do not always engage with (tutorless) PBL as intended, and provide a case for the continued naturalistic study of such conversational intricacies.

1. INTRODUCTION

The introductory chapter sets the scene for the discussions that will take place throughout the course of the thesis. The chapter overviews the key motivations behind the study, as well as detailing how it will go about achieving its aims. The overall structure of the thesis is also outlined as the chapter comes to a close.

1.1. 21st century engineering

Up until the early 2000s, an engineer's employability was dependent on their technical capabilities alone (Lehmann et al., 2008). In line with the continually evolving needs of industry, however, the role of an engineer has changed radically (Lutsenko, 2018). The current global mission of the engineering community, for example, is concentrated on developing sustainable and ethical solutions to the intensifying threats of overpopulation, climate change, and dwindling resources on humanity - to name but a few (Köhler et al., 2013; Mann et al., 2011; Monteiro et al., 2019). This major operation could not more clearly illuminate that engineering has far exceeded its once so clearcut technical boundaries. Instead, an engineer's day-to-day duties are now societal, economic, environmental, *and* technical in nature (Beagon et al., 2019; Royal Academy of Engineering, 2019).

In a recent review of the skills required of engineering accreditors within the Washington Accord, communication was shown to be the most emphasised skill by all 18 of the countries involved (Kamaruzaman et al., 2019). This was closely followed by teamwork, lifelong learning, problem-solving, and ethical skills. Therefore, in addition to the classic skillset - the calculations, and the 'hard' science - if the 21st century engineer is to do their job, they must engage in significant quantities of non-engineering work, as technical engineering knowledge on its own is of little worth in this present age. Communication is central to the very practice of engineering, in that, to be an engineer is also to be a collaborative problem-solver (Almeida et al., 2020; Trevelyan, 2019). Every aspect of engineering practice is dependent on one's ability to manage effective working relations. Engineering projects, for instance, tend to be complex and large-scale; dependent on the efforts of the collective team in distributing the workload, and in utilising the varying expertise at hand, if the

execution of projects are to be successful (Atman et al., 2008; Darling & Dannels, 2003; Fitzpatrick, 2017; Lehmann et al., 2008).

Unfortunately, the aforementioned needs of modern industry are not being met by many engineering graduates (Boklage et al., 2019; Chan & Fong, 2018; Lucas et al., 2014). As recent as 2019, in research involving over 700 engineering and technology employers throughout the UK, The Institution of Engineering and Technology (2019) found that 60% of respondents "consider that the recruitment of engineering and technical staff with the right skills is the biggest anticipated barrier to achieving business objectives over the next three years" (p. 1). Also raised in their findings was the prevalence of candidates possessing the relevant knowledge, but not the necessary workplace (i.e. non-technical) skills. This misalignment between the practices, values, and expectations of academia and industry has long been reported, but the gap continues to linger on, nonetheless (Trevelyan, 2019).

In part, these disparities between engineering degree programmes and the realities of industry appear to stem from engineering and its "long curricular tradition focused on technical knowledge" (Darling & Dannels, 2003, p. 1). That is, whilst traditional engineering courses are led by passionate educators who are keen to share knowledge, being too content-heavy, in fact, leaves students at a disadvantage in confronting all facets of professional practice. The lecture-based format which is common to engineering teaching, for example, is teacher-centred, where the primary objective is to ensure that students are supplied with the relevant technical content in all its depth (Tseng et al., 2016). Similarly, the problem tasks typically presented to students throughout the course of an engineering degree are methodical (e.g. in the form of step-by-step calculations), and lead to one clearly defined correct answer (Warnock & Mohammadi-Aragh, 2016). In this way, whilst students are learning vital content, they may have limited grasp of its applicability within real-life engineering scenarios (Almajed et al., 2016; Thomas, 2009). Furthermore, the use of neat and structured engineering problems promotes the misconception that there exists a single, fixed solution, which is completely at odds with the chaotic 'wicked problems' that plague industry (Köhler et al., 2013). As Winberg et al. (2020) notes, then, change is needed in the delivery of engineering education if it is to satisfy 21st century needs. How such interventions should take shape, however, is a point of confusion for many (engineering) educators.

1.2. Problem-based learning & the modern engineer

In recognition of these issues, there has been a major push by engineering associations worldwide towards the inclusion of active, student-centred learning in engineering education (e.g. Abbott et al., 2020; de Araújo et al., 2020; Lima et al., 2017; Tsalapatas et al., 2021). Active-learning is well supported both empirically, and by contemporary learning theories (e.g. Amaya Chávez et al., 2020; Dahms et al., 2017; Keenahan & McCrum, 2020; Maknun, 2021). Problem-based learning (PBL) - an active learning methodology - in particular has garnered significant attention as an effective means through which students' professional skills can be better developed in line with the unpredictability of 21st century engineering (Chan & Blikstein, 2018; Juandi & Tamur, 2021; Kumar & Hsiao, 2007; Lucas et al., 2014). PBL represents a shift from teaching to learning (Kolmos, 1996), in that students are empowered to take a more participative role in the educational process than when they are exposed to transmission style teaching (Saunders et al., 2020). Through the use of authentic scenarios, students engage in the collaborative construction and negotiation of knowledge as they work in small groups (Dahlgren & Dahlgren, 2002). By contextualising the learning, PBL tackles one of the principal complaints surrounding current practices in engineering education: the misalignment between the way in which universities deliver engineering teaching, and the skills demanded of graduates by engineering employers themselves. Engineering students must be granted the opportunity to actively engage in discussion, reflection, and meaning-making with their peers; to develop their skills in human relations that are as important as technical knowhow (Mills & Treagust, 2003; Topalli & Cagiltay, 2018).

PBL, however, is resource and cost intensive, meaning that certain institutions are not in a position to provide staff training on the fundamentals of PBL (e.g. its departure from instruction in the traditional sense), nor are they able to allocate each PBL group with a set tutor as recommended (McPhee, 2002; Ribeiro & Mizukami, 2005; Shanley, 2007; Woods, 1996). This is a significant concern for the engineering discipline specifically, with increasing numbers of engineering students globally. For example, in 2017, engineering was the second most commonly studied university discipline across the European Union, in addition to representing the second highest numbers of international students (Eurostat, 2019). Also, during the period of

2009-2017 - and even with fluctuating numbers of students enrolled in Higher Education as a whole - the number of engineering and technology students enjoyed steady increases in the UK (Engineering UK, 2019). A similar positive trend was shown in the USA, with enrolment in undergraduate and masters level engineering increasing in 2018 (Roy, 2019). There are, therefore, heightened pressures on engineering educators not only to deliver high-quality, student-centred learning in satisfying employers' needs (e.g. Lucas et al., 2014), but to navigate these resource constraints, too.

A solution to this dilemma comes in the form of tutorless (see Woods, 1996; Woods et al., 1996) and floating facilitator (see Allen et al., 1996; Duch, 2001) PBL. These modes of PBL are very similar in that, unlike the traditional PBL approach, individual groups are not allocated a dedicated tutor, thus calling upon students' skills of self-management more explicitly. In all forms of PBL, the tutor departs from the cognitive assistive role associated with traditional teaching in the traditional sense (e.g. correcting mistakes on their behalf), prompting students themselves to be accountable for their learning (Delaney et al., 2017). However, it is inevitable that the tutorless and floating floating facilitator models of PBL inflict significant added pressures on their learners, given that, effectively, they are left to fend for themselves (with only intermittent tutor contact, and PBL materials to guide them ahead). Azer (2009) notes how the main challenges in PBL (e.g. interactional problems, unequal participation, and stalled progression) should be managed promptly by the *tutor* if the groups are to avoid becoming dysfunctional. Tutorless groups, on the other hand, do not have such a luxury, and must do so themselves - but whether they achieve this or not is yet to be addressed.

1.3. The interactional unknown

Whilst there has been a major drive towards collaborative, student-centred learning in engineering education, and whilst the benefits of PBL have been widely publicised across a range of disciplines (e.g. Savery, 2006), the actual group practices that underpin the pedagogy itself have been massively overlooked (Bridges et al., 2012). That is, although the reasons for adopting PBL are abundantly clear, very little is known about how PBL interactionally unfolds (Azer, 2009; De Grave et al., 1996;

Imafuku & Bridges, 2016), with prior research predominantly limited to perceptions of PBL, and descriptions of PBL courses (Du et al., 2019; Warnock & Mohammadi-Aragh, 2016). It is ironic that our understanding of a pedagogical approach so reliant on interaction neglects the social processes themselves; problematic that we know so little about student engineers' group interactions when communication is said to be "the lifeblood of a practising engineer" (Darling & Dannels, 2003, p. 15). If engineering educators are to teach students how to collaborate, then, it is only logical that they themselves first grasp the interactional dynamics of PBL groups (McNair et al., 2008).

Amongst all of its theoretical tensions (e.g. Distlehorst, 2008) - to be explored in depth within the literature review - PBL is, undoubtedly, grounded in social constructivism (Hmelo-Silver & Eberbach, 2012). Central to PBL is the active and joint construction of understanding within the group setting, where students identify their own learning issues, and collaboratively negotiate knowledge, as opposed to the mere transaction of information (Hattie, 2008; Hmelo-Silver & Barrows, 2008). On the whole, however, the body of PBL literature that already exists does not align with these constructivist principles, and so, there is a pressing need to look *inside* the PBL programme - at PBL social interactions in situ - if we are to inform future developments (Bridges et al., 2012).

Furthermore, in the case of floating facilitator PBL - the model under examination within the present work - it is integral that we better understand the self-managed aspects of the PBL experience if pedagogical judgements are to made in terms of 'what works'. Specifically, given students' intermittent tutor contact, how do they interactionally manage the educational dimensions of PBL *in addition* to the group dynamics? How are social complications in the groups - another persistently underresearched aspect of PBL (Hendry et al., 2003) - navigated without tutor assistance? Amongst its pedagogical advantages, collaborative learning in itself can be an effective mechanism for overcoming high student-to-staff ratios (Reidsema et al., 2017), but this is only possible when collaboration is done well. No student group is the same, meaning that some may thrive (e.g. with little to no interpersonal difficulties), whereas others do not (e.g. those with major interpersonal issues which obstruct learning from taking place).

With such a strong need to understand precisely *how* PBL is done, the current study uses conversation analysis (CA) in the systematic examination of students' interactions as they naturally (i.e. non-experimentally) occur (Schegloff, 2007). CA captures speakers' methods for co-producing social order (and action) within specific situations, illuminating the structural underpinnings of social interaction (Brandt & Mortensen, 2015). Using recorded data, CA is particularly well equipped in providing rich empirical insight in areas where our interactional knowhow is lacking (Albert, 2017). Take, for example, the discrepancies noted between idealised and real-life PBL (Provan, 2011). By honing in on students' *actual* sense-making practices as they collectively navigate the PBL group work without a tutor, it may be possible to determine what conversationally works, and what does not (cf. Attenborough & Stokoe, 2012; Stokoe et al., 2012). That is, rather than relying on, for example, interviews or surveys about the PBL experience - discourse which can be tainted by the researcher's agenda - this work is driven by students' naturalistic (i.e. their actual, or everyday) interactions in terms of *how* they navigate through the tutorless phases of PBL.

From this interactional lens, then, the analytical chapters begin with the exploration of students' constructions of identity in PBL. With greater recognition of the role played by institutions in moulding students' professional identities, the issue of identity has become more prevalent in engineering (Morelock, 2017; Paretti & McNair, 2012). An engineer's identity formation typically occurs within their university years, and the university culture holds a powerful influence over its development (Christensen et al., 2015; Lakin et al., 2020). And yet, as per Greer et al. (2013), "one of the problems with much of the research on identity to date has been that it is difficult to make robust claims about a construct that is understood to exist within the individual's head" (p. 155). Rather than basing the upcoming analyses on students' *reflections about* identity, therefore, identity is instead treated as an interactional achievement; as something that is made available by the speakers in their talk (Benwell & Stokoe, 2006). In this way, rather than having any predetermined notions about identity, the analyses centre on the social and interactional work of 'doing' identity, and how students present themselves to one another; how they construct positions related to - as well as against - others in their identity displays within the local context (i.e. in real-time) (Haugh, 2008).

Relatedly, a core assumption of PBL is that knowledge is constructed through students' discussions with one another. It is within these discussions that diverse viewpoints (e.g. theories, definitions, and calculations) are shared, negotiated and evaluated, and within the processes of elaboration that cognitive change is said to occur (Brown & Palincsar, 1989). Cognitive change is prompted by the conflict between one's prior knowledge, and the new knowledge gained as a result of the group interactions, as students attempt to collaboratively resolve the PBL task at hand (De Grave et al., 1996). In this way, knowledge disagreements are an essential part of the PBL process if cognitive gains are to be made.

Whilst the notion of disagreement is deeply engrained in its pedagogical makeup, research is yet to demonstrate precisely *how* such acts unfold in PBL. Implementors of PBL, therefore, rest on the assumption that disagreements occur in the productive ways that are theoretically intended. This is troubling, as it risks mischaracterising disagreement as a straightforward act when, in fact, research has shown how disagreements are often treated in conversation as face-threatening moves to be avoided (Marra, 2012; Pomerantz, 1984a). Within the specific context of floating facilitator PBL, how do students challenge one another's knowledge stances *without* the presence of the tutor who would typically act as a buffer to more serious conflicts occurring? How are disagreements enacted amongst students of equal status, and how might this impact their group cohesion? Such questions are central if the objectives of PBL are to be satisfied.

Further to this, PBL tasks are ill-defined and messy; their complexity intentionally out of reach to the lone student. In this way, the resolution of PBL tasks are dependent on successful collaborations, where the (extensive) cognitive load is distributed equally amongst each of the members (Evensen & Hmelo-Silver, 2000). Group members make use of one another's expertise, and over time, the hope is that they become seasoned in this collaborative problem-solving (Hmelo-Silver, 2004). However, of the many varying forms of group work, a significant concern unites them all - that of the social loafer. With its roots in social psychology, social loafing refers broadly to a group member's chronic issues with tardiness, absenteeism, and equal participation (though, not necessarily all at once), where the offending member - contributing only minimally, and sometimes, not at all - shares in the group's academic successes, nonetheless (Latané et al., 1979). As the use of group projects

become more prevalent in catering to industry wants, so too does the issue of social loafing in student groups (Aggarwal & O'Brien, 2008). As per Wood (2003), each participant plays a part in PBL - but what happens when this is not the case? Social loafing has been classed as a critical incident in PBL (de Grave et al., 2001), whilst Woods et al. (1996) found that the issue of unequal participation was most problematic for tutor*less* groups - and yet, we know nothing about how PBL students interactionally confront such complications (or if they are able to at all).

1.4. Research aims & thesis overview

As a summary of the discussions thus far, modern engineering depends on graduates who are not only technically proficient, but socially adept, too. Collaborative skills are just as desirable as one's disciplinary knowhow, given that engineers must be capable of establishing working relationships with colleagues and clients if they are to confront the mammoth global problems of today (Fitzpatrick, 2017; Lee et al., 2015; Lehmann et al., 2008). PBL is one such method that immerses students in authentic and collaborative problem-solving group work (Kolmos, 1996). To date, however, research has not sufficiently considered the social dimensions of PBL (Bridges et al., 2012; Imafuku & Bridges, 2016); that which is necessary if the full potential of the pedagogy is to be unlocked (Hmelo-Silver, 2004), and if the longstanding need for empirical insight to inform future PBL guidelines is to be fulfilled (Hendry et al., 2003).

This is not, however, to put into question the value of previous research; only that it has centred almost exclusively on the *why* of PBL - reported attitudes, perceptions, and observations - rather than on the *how* - the actual interactional practices that lie at its core. If we are to open this social black box (Hak & Maguire, 2000) - and ensure that PBL does as intended - then we must turn to the students' interactions for answers. The over focus on cognitive outcomes, rather than on the actual collaborative processes themselves, has impeded evidence-informed implementations of PBL (Shimizu et al., 2021). The analyses are thus focused on how students 'do PBL' - largely, without the support of a PBL tutor - as well as exploring their conversational strategies in confronting the often uncomfortable facets of PBL (e.g. disagreements and social loafing) that inevitably arise in this arena. CA gives access to these collaborative practices at a level of detail that cannot be offered by

theories *about* PBL interaction (Stokoe et al., 2012), providing rich insights on the complexities of students' identity management that can directly inform pedagogical design (in this case, within the context of Higher Education) (Attenborough & Stokoe, 2012).

The central research question under exploration in this thesis, therefore, asks *how the learner-centredness intended of PBL is enacted by students in self-managed PBL (if at all).* To address this, CA was used on a large data corpus of naturalistic PBL group interactions to:

- Examine methodically the *actual* interactional practices of student groups as they engage in PBL without tutor participation;
- Document students' interactional strategies for self-managing disagreements and social loafing in PBL;
- Shed light on *how* students' (above) conversational strategies are steered by institutional norms and identities (e.g., what does 'being a student amongst other students' in tutorless PBL actually look like?). Specifically, how do students balance their newfound authority for their learning, alongside the typical social expectancies that come with interacting with one's peers?

The work carried out to achieve these research objectives - and to close the knowledge gaps mentioned above - is presented in the following sections of the thesis:

Chapter 2 positions the thesis amongst other research in the area of PBL. This review of the literature details the emergence of the PBL movement and its core principles, as well as showcasing the studies that have long dominated the field - notably, those focused on its theoretical tensions, and the (many) that have sought to demonstrate its effectiveness (and have largely succeeded). In doing so, chapter 2 also illuminates a clear gap in the field of PBL - problematically, our understanding of the collaborative and interactional elements that it is founded on. The rest of the chapter draws on a small, but extremely informative, body of interactional work in PBL that emerged in the 1990s, but has been only marginally expanded on since this time. Such insights are combined with naturalistic research on educational settings

more broadly - considering, for example, the interactional construction of group membership - further emphasising the need to investigate the 'how' of floating facilitator PBL (e.g. how disagreements and social loafing are self-managed in real-time by students themselves).

Having made clear the interactional void in PBL research, **chapter 3** more firmly establishes the study's methodological stance. It first taps into conversation analysis (CA) and its ethnomethodological roots, before outlining the features of interaction that CA concerns itself with (and that are relevant to the upcoming analytical chapters). Past research employing applied CA is discussed briefly in demonstrating its potential as a powerful tool for examining the architecture of actual social interactions within an institutional setting (e.g. the PBL group).

Chapter 4 overviews the four phases of data collection. Ethical and practical issues are considered, and the process of data transcription - following the Jefferson (2004) system - is described.

The study's analyses are divided across three chapters. **Chapter 5** illuminates the complex ways in which PBL groups interactionally negotiate institutional and social identities. As will be shown, continued group membership depends on being seen as 'doing the minimum' - as the 'uninvested' and 'carefree' student - but in the absence of the tutor figure - as in floating facilitator PBL - the groups, at the same time, have no option but to 'do education' (or risk failing the course). The opening of the analysis thus emphasises the importance of exploring identity as it occurs, and in terms of what the students themselves make relevant in the local context, given that 'being a student' functions much differently from what the 'university student' label might suggest.

Chapter 6 examines *how* the act of disagreement unfolds as students engage in collaborative knowledge building - a major social constructivist principle of PBL. Students' strategies for self-managing disagreements are documented, showing how they (delicately) evaluate one another's knowledge displays within the public space without 'breaking ranks', or positioning themselves as overly critical - moves of which would violate their 'average' student status.

Chapter 7 considers how students' self-manage unequal participation in PBL, which is recognised as one of the major complications specific to its floating facilitator and tutorless variations. This chapter details the non-authoritative and

subtle means through which students confront social loafing - like disagreements, in a way that conforms to the expectations of the 'neutral' student identity.

In **chapter 8**, the main findings of the analytical chapters are summarised, and the pedagogical implications of these interactional trends noted. I then consider the drawbacks of the study's method, before confronting some of the common criticisms directed at CA. The chapter closes with suggestions made for future interactional research in PBL.

It is proposed that the findings of this work, whilst situated mainly in engineering education, will also be applicable to implementations of PBL, as well as collaborative learning, across Higher Education more broadly.

2. LITERATURE REVIEW

The aim of this chapter is to review the main topics of research that have dominated the field of problem-based learning (PBL) since its inception (e.g. its origins, its theoretical tensions, and its empirical base). A key objective is to establish what is already known about the practices of PBL groups, and to pinpoint where research is most needed now. In fact, as in the introduction chapter, the demonstration of what has *not* been done in the examination of PBL - notably, the detailed, naturalistic investigation of students' actual group interactions (e.g. identity work, disagreements, and social loafing) - is just as important as understanding what *has* been done. As the data corpus comprises almost 100 hours of PBL group interactions, such detailed explorations dedicated largely to PBL alone are necessary in setting the rationale for the thesis, and in establishing the context for the analytical chapters to follow.

2.1. Why PBL?

Group working is commonly implemented across all levels of education, owing to its ability to enhance both students' learning and socialisation skills (e.g. Forslund Frykedal & Hammar Chiriac, 2018; Hammar Chiriac, 2014; Johnson & Johnson, 2002; Sharan, 2010). Group work can be defined as either collaborative or cooperative in nature (Hammar Chiriac & Forslund Frykedal, 2011). Cooperative learning involves *working within* a group - and achieving individual goals - whereas collaboration can be defined as *working as* a group - and achieving shared goals. In the case of cooperative learning, for example, it could be that, whilst students physically meet as a group, in reality, they work individually on separate segments of the overall group task (e.g. Baines et al., 2003). In contrast, collaborative learning requires that all members actively work with one another if they are to reach the same shared goal(s); they jointly problem-solve, negotiating their collective expertise with the aim of reaching consensus (Popescu, 2014). Ultimately, cooperative learning is a more defined process, usually led by a tutor, and driven by clearcut answers. On the other hand, collaborative learning is viewed as student-centred, where understanding is socially constructed, and students take on authority for *their*

learning (Bruffee, 1995; Panitz, 1999). The modern pedagogical perspective holds that successful learning *should* be collaborative (Sumtsova et al., 2018), and one such collaborative approach - perhaps the most widely known - is problem-based learning (PBL).

PBL was developed at McMaster University in the 1960s. The pioneers of PBL - Evans, Spaulding, Anderson, Walsh, Mustard - were driven by students' disengagement with the dated traditions of medical education (Servant-Miklos, 2019b). Despite partaking in content-rich courses - and passing subsequent examinations - medical students had great difficulties in later applying even the most basic of this clinical knowledge when presented with practical patient cases (Barrows & Tamblyn, 1980). The founders of PBL saw conventional teaching as confining students in passive learning roles - their single goal being the memorisation of huge quantities of information as delivered through the lecture format - and as disconnected from the harsh realities of clinical practice (Barrows, 1996; Norman, 2008; Spaulding, 1969). Instead, they emphasised the need for medical students to learn via authentic and collaborative patient problems in developing the clinical reasoning and problem-solving skills central to the medical profession (Barrows & Tamblyn, 1980). "Application in practice was seen as more important than storing facts by rote learning" (de Graaff & Kolmos, 2007, p. 2), where medical students could better appreciate the clinical relevance of the material they were studying.

PBL revolutionised traditional medical education by putting students at the centre of *their* learning. In fact, the McMaster vision for PBL was the first significant attempt to examine and redefine teaching practices in medicine, at a time when teaching was seen as the job of the professor, and as something not to be interfered with (de Graaff & Kolmos, 2007). PBL became so successful within the McMaster medical curriculum that it soon impacted medical faculties around the world; the first being Maastricht University who used PBL as the basis to their newly founded medical school in 1974 (Barrows, 1996). PBL completely reshaped the landscape of medical education (Servant-Miklos et al., 2019), and remains the dominant pedagogical approach in the field (e.g. Dasgupta, 2020; Ma & Lu, 2019; Mansur et al., 2012; Neville, 2009). Beyond this - and as covered in the previous chapter - it is perhaps best known for its use in engineering education (e.g. Abbott et al., 2020; de Araújo et al., 2020; Lima et al., 2017; Tsalapatas et al., 2021). However, the

innovative and student-centred spirit of PBL has spread far beyond its roots towards a multitude of applied disciplines (Yew & Goh, 2016), with PBL curricula now found in the likes of computing programming (e.g. Chang et al., 2020), travel and tourism (e.g. Yumatov et al., 2017), and English language teaching (e.g. Ali, 2019).

More notably, it been implemented quite extensively in nursing education, as the inherent messiness of PBL is said to best prepare nurses for the ever evolving demands of the healthcare world; pushing them to be innovative in their thinking, and to be open to a multitude of potential ideas in approaching problems (e.g. Barrow et al., 2002; Chan, 2012; Compton et al., 2020; Wosinski et al., 2018). Like many other applied disciplines, traditionally, dental nursing education was a passive, lecture-based process, where the sole focus was on the end qualifying examination. In contrast, PBL facilitates the applicability of theory to real-life practice that was once overlooked completely (e.g. Anderson & Reid, 2012; Winning et al., 2004). Although, as will be discussed later in the thesis, the self-directed aspects of PBL in nursing education are, by no means, realised immediately (Kocaman et al., 2009). This was also found to be true of, for instance, sports and exercise psychology students in PBL - but the investment of time and effort in PBL is said to be a worthwhile one, far outweighed by the eventual development of those all important professional skills, as in chapter 1 (Heaviside et al., 2018).

In more recent years, PBL has also been adopted in social work education (e.g. Calderwood, 2012; Strand et al., 2014; Wong & Lam, 2007). According to Altshuler and Bosch (2003), PBL is particularly well suited to the 'harshness' of the social work discipline, allowing students to develop the lifelong learning competencies that it demands. PBL empowers social work students to confront the progressively more complex social problems they are presented with in practice, in a way that (tidy) conventional instruction simply cannot (Congress, 2012; Lam et al., 2006). However, in what is a recurring theme across the literature - and as noted above - whilst social work students reported that they learned more via PBL, they nonetheless preferred the lecture setup (Monrad & Mølholt, 2017).

PBL has also been successfully utilised in teacher education (e.g. Bridges, 2019; Erdogan & Senemoglu, 2014; Murray–Harvey et al., 2005; Roliak et al., 2021). Filipenko and Naslund's (2016) collection, for example, delves into the strategies behind the University of British Columbia's longstanding teacher education

programme, centred around PBL. These PBL-based programmes are spread across early childhood and primary teacher education (e.g. Edwards & Hammer, 2006; Hadi & Izzah, 2021), as well as secondary school teacher education (e.g. Bosica et al., 2021; Navy et al., 2021), and on a worldwide scale. Additionally, PBL continues to be used as an effective method of learning (e.g., particularly, in developing students' skills in critical thinking) within primary and secondary schools themselves (Ahdhianto et al., 2020; Lapuz & Fulgencio, 2020; Perwitasari & Surya, 2017).

Further evidence of the continued demand for PBL in the world of today comes in the form of Buheji and Buheji's (2020) specific call for PBL programmes - as part of a wider educational strategy, and across all academic disciplines - if we, as a society, are to effectively adjust to what has been deemed as 'the new normal'; that is, the post-COVID-19 world. Much like the reasons behind its original inception, PBL *specifically* is said to be the pedagogical tool through which we, as a society, can confront the (continuing) ambiguities that come with COVID-19 (Sun, 2021). For example, Seibert (2021) considers how PBL can be used to develop critical thinking and perseverance amongst nursing students; skills of which have never been so important. They note that, as generation Z now make up the majority of nursing students, there is a need to utilise their unique technological expertise in the usage of PBL. This move towards online PBL has been escalated by COVID-19 (e.g. Bumblauskas & Vyas, 2021; Scheibenzuber et al., 2021). Haslam et al. (2021), as well as Aslan (2021), successfully used a digital mode of PBL in response to the pandemic, and the rather sudden switch towards online teaching (e.g. Sistermans, 2020), demonstrating that PBL need not necessarily be done on a physical (i.e., in-person) basis. Although, as noted by Morgado et al. (2021) in their study of clinical dental education, whilst online PBL certainly had its strengths, it offered no substitute for kinaesthetic learning.

The use of online technologies in collaborative learning, however, has long been a point of interest (e.g. Curtis & Lawson, 2001; Popescu, 2014; Reeves et al., 2004; Strauß & Rummel, 2020; Thompson & Ku, 2006). When used correctly, social media channels can facilitate the sharing of information between learning communities, serving as powerful collaborative tools in themselves (e.g. Al-Rahmi & Zeki, 2017; Ansari & Khan, 2020; Yuliana & Firmansah, 2018). In fact, as societal problems increase in complexity, and with the potential for (mis)information

overload, there is a greater need for students to be technologically savvy; to make full use of digital tools in their problem-solving (e.g. Scheibenzuber et al., 2021; Sumtsova et al., 2018). PBL is one such avenue for achieving this, combining its goals for capable problem-solvers in the real world, with the possibilities that come with technology (Wong et al., 2021). PBL is readily integrated with modern technologies (e.g., Zoom and its 'breakout rooms', as well as virtual learning environments such as Moodle), and can be used both synchronously and asynchronously (Bumblauskas & Vyas, 2021). Added to this, online PBL can be used to confront many of the common hurdles that come with in-person PBL, such as lack of tutor availability, and scheduling difficulties (e.g. El Mansour & Mupinga, 2007). As raised by Prasojo et al. (2019), however, we must be mindful that technological advancements are far from being accessible to all.

2.2. The theoretical basis of PBL

Since its genesis, "a strong educational theory has been developed to explain the mechanism for PBL" (Hmelo-Silver, 2015, p.1). Strong as this may be, however, these theoretical elements of PBL are far from clear-cut. Barrows (1986) maintained that PBL is not a fixed educational method, meaning that its global adoption has pulled it far beyond the localised context within which it originated, leading to large disciplinarian variations in terms of PBL design, delivery, and the pedagogical meanings attached. Although, as its community has grown, so too has the need to establish a clear theoretical framework for PBL. On the plus side, the flexibility of PBL curricula has ensured its growth alongside psychological and educational research insights over the years (Neville, 2009), but this fluidity has also made PBL by definition somewhat ambiguous (Distlehorst, 2008).

Essentially, the very fact that it can be approached in so many different ways means that researchers and practitioners have each generated their own views about the theory that best explains how PBL works (Schmidt et al., 2009). This has resulted in varied retrofitting of theory, and interpretations made, meaning that perspectives are sometimes diverging, and can be rather overwhelming. Furthermore, whilst there are extensive theoretical perspectives now attached to the PBL methodology, given its complexity, there is no single theory which perfectly encapsulates PBL in its own

right (Gewurtz et al., 2016; Hmelo-Silver, 2015; Solomon, 2005). Relatedly, the applications of such theories upon the practice of PBL - and across different contexts - are not fully understood, and are very much an ongoing matter of interest (Gewurtz et al., 2016; Hmelo-Silver, 2015).

Various researchers (e.g. Koschmann, 2001; Neville, 2009) have emphasised a strong likeness between PBL and the progressivist philosophies of John Dewey - to the extent that "PBL is what some say Dewey had in mind to build inquiry skills" (McCaughan, 2013, p. 18). Just like Dewey, the position of PBL is that people learn by doing problems that are a reflection of real-life events; that good educators provide their students with "something to do, not something to learn; and the doing is of such a nature as to demand thinking, or the intentional noting of connections; learning naturally results" (Dewey, 1916, p. 181). Dewey - like the founders of PBL - were fiercely critical of traditionalised teaching, seeing it as devaluing authentic learning in favour of content memorisation (McCaughan, 2013; Savin-Baden, 2000).

For purposeful learning to occur, Dewey emphasised the need for interaction between the student and their environment (Dewey, 1997). In PBL, the environmental trigger for the development of problem-solving skills is the problem scenario itself (Barrows, 2000). According to Dewey, the problem-solving experience should trigger a state of uncertainty in learners, as it is the disruption of routine (i.e. that which is achieved almost automatically, and without reflection) that forces individuals to think (Miettinen, 2000). The reflective process is fundamental in prompting learners to reconstruct their prior thinking; to widen their knowledge base, and to rid themselves of outdated, fragmented, and - often unbeknownst to them - inaccurate information (Dewey, 1933).

Likewise, in PBL, the problem tasks are designed to actively cause discomfort, leading students to reflect on the ways in which they can make sense of matters - and rectify any discrepancies between their prior knowledge and the problem information - in the form of brainstorming and hypothesis-testing. In fact, the emphasis on prior knowledge, group discussion, and critical analysis components of PBL enhance students' conceptual change, with this conceptual change shown to be greater in PBL than, for example, lectures or self-study methods (Loyens et al., 2015). McCaughan (2013) notes further similarities between PBL and Rogerian thinking - in many ways, a rebirth of Dewey's original philosophies - in that problems

cause disequilibrium which, in turn, motivates learners to restructure and better clarify their thinking, and this is what constitutes real learning.

These similarities are further reflected in Barrows' (1988) characterisation of the PBL tutor, which continues Dewey's (1916) belief that learning should be democratic, and Rodger's calls for learning being driven by students' individualities, rather than being constrained by what the expert teacher dictates (McCaughan, 2013). Essentially, the Deweyan and Rogerian ideals align with PBL holding the tutor as a non-directive facilitator of the student-centred learning experience which encourages students' innate desires for free experimentation - as they seek to discover real-world truths and personal meaning - through the design of contextualised and socially-based problem-solving (Hmelo-Silver, 2015). It is through the 'relaxed', humanistic tutor role, and the engaging problem-solving experience, that students' internal motivation is captured, and responsible, active learners are created (Barrows, 1988).

These classic schools of thinking are present in the constructivist stance that PBL is consistent with, in which social learning is seen as one of its defining features (e.g. de Graaff & Kolmos, 2003; Li, 2013; Savin-Baden & Major, 2004). Building on Vygotsky's (e.g. 1978) classic works, students' learning experiences are said to be more productive - and more powerful - when they are collaborative, as opposed to individualistic. Rather than group learning being seen as a mere exchange of knowledge, as per Dewey (1997), knowledge is something to be worked for; something that requires joint negotiation, and should incorporate individual learners' contexts in achieving (richer) shared understanding.

PBL and its social constructivist principles, however, have not been without criticism. Kirschner et al. (2006) discussed the flaws of (what they deemed to be) minimally guided instructional approaches - specifically, constructivist, discovery, problem-based, experiential, and inquiry-based learning - and concluded that they were both less effective, and less efficient, than guided instructional methods. The authors held that inquiry methods of instruction withhold vital information from students - requiring that they gather such knowledge themselves - whereas guided instructional methods (rightfully) outline the concepts to be learned, and the procedures to be undertaken, in detail. Consequently, PBL as a minimally guided approach neglects learners' cognitive structures, making for an unproductive

educational experience for students. Kirschner et al. (2006) warned that inquiry methods - and, in particular, their constructivist principles - force the learning of a discipline via its procedures and processes *only*, as opposed to students being taught the discipline "as a body of knowledge" in the traditional sense (p. 78).

In response, Hmelo-Silver et al. (2007) made clear that such shifts in instructional approach (e.g. towards active-learning pedagogies) are not solely the consequence of inquiry methods of instruction; that these changes are *also* representative of evolving educational policies which call for learners to go beyond the content alone, and to develop deeper discipline-specific epistemological awareness and investigative strategies. In engineering education, for example, students must be masters of the discipline of engineering from a content standpoint, as well as understanding discipline relevant issues (e.g. the concept of epistemological unity), and how to go about investigating (i.e. problem-solving) these (Hamzah et al., 2012). Disciplinary content, they noted, is in no way sacrificed for these practices, as knowledge *and* the theoretical frameworks of the discipline are of equal importance.

Added to this, both Hmelo-Silver et al. (2007) and Schmidt et al. (2007) treated Kirschner et al.'s (2006) characterisation of PBL as a minimally guided approach as inaccurate, and as clouding the empirical evidence that *does* support PBL as an effective instructional approach in its own right. In fact, Schmidt et al. (2007) "contend that the elements of PBL allow for flexible adaptation of guidance, making this instructional approach potentially more compatible with the manner in which our cognitive structures are organised than the direct guided instructional approach advocated by Kirschner et al. (2006)" (p. 91). PBL in practice, they emphasised, gives scrupulous attention to detail in terms of the scaffolding that is to cushion students' self-directed and collaborative efforts.

Building on Schmidt et al.'s (2007) point, scaffolding is at the core of the cognitive apprenticeship theory (e.g. Collins et al., 1989; Quintana et al., 2004) that lends support to PBL and its development of self-directed learning skills (Evensen & Hmelo-Silver, 2000). In accordance with its constructivist principles - and via modelling and coaching - "the major goal … is for students to see how experts use subject knowledge and metacognitive skills" (Gijselaers, 1996, p. 16) whilst being immersed in the complexities of problems that are situated in professional practice

(Hmelo-Silver, 2004). Here, the PBL tutor functions as an expert in learning - and *not* as someone who simply appeases students' content knowledge requests - who gradually leads students towards specialist status in both knowledge, and in the processes of learning. For example, the tutor's questioning stance - those questions that students *should* be asking themselves - models the self-monitoring and critical evaluation (of the problem-solving process) that an expert learner would engage in (Kazemi & Ghoraishi, 2012; Newstetter, 2006).

Therefore, the accusation that PBL students are 'left in the dark' is challenged by the fact that PBL tasks are, in fact, thoroughly scaffolded, not only in the form of the tutor's 'tips and tricks' (i.e. *how* to do the task, and *why* they should approach it in this way), but in the collaborative support that comes with PBL (i.e. the peer interactions), and through the carefully crafted problem cases and supporting materials with prior knowledge prompts (Evensen & Hmelo-Silver, 2000). Similarly, PBL tasks are intentionally pitched at a higher level of difficulty, owing to the fact that they depend on the collaborative efforts of the group. In Vygotsky's (1978) terms, this peer support assists students in reaching their zone of proximal development. That is, using language as a conceptual tool to jointly construct meaning, students in PBL have the capacity to confront problem-solving at a level of complexity that they would be unable to individually.

2.2.1. The PBL tutor and the place of expertise

Conventionally, teaching in engineering and the natural sciences has been authoritarian in nature. In this 'professor-centred' approach, it is the teacher who - by default - owns the expertise; it is they who determine what is 'right', and what is 'wrong' (Qvist, 2006). In contrast, PBL is a democratic learning system, because it removes this hierarchy, and places the power with the learners themselves. Democracy is one of its core educational, social, and political values (Barrett, 2004), and is key to its success (Barrett & Moore, 2010). Learning is said to be enhanced when students are empowered with more of the learning processes, and problem- and project-based learning are methods which, apparently, make this possible (see Lopes et al., 2020; Savery, 2006; Woods, 2014). Rather than being hierarchical, then, the notion behind PBL is that each participant is of equal status, and is free to influence decision making. In this way, PBL puts students' democratic skills - for

example, being open to varying knowledge stances, and working to reach consensus - to use, holding these as important life and career skills, too.

This democratic pedagogical setup, however, is dependent on students being empowered *by the PBL tutor* to take on more of the learning process. Barrett (2005) draws attention to the use of the word 'learning', as opposed to 'teaching', in the term 'problem-based learning'; that it falls under a *learning*, rather than a *teaching*, paradigm. In this way, the lecturer in PBL observes and provokes learning, rather than being the teacher in the traditional sense. That is, whilst PBL actively removes considerable ownership of the learning process from the tutor - instead placing it with its students (e.g. Lam et al., 2006) - such empowerment is dependent on the scaffolding put in place by the PBL tutor. As per Papinczak et al. (2009), "like the symphony conductor, the effective PBL tutor activates and motivates his or her students to support their cognitive growth" (p. 383). In this way, although democratic and empowering, PBL - and its student-centredness - should not be seen as a total loss of control for the tutor (Williams, 1992). The PBL tutor is still at the heart of the process; their continued connection with students being the driver of success (Ali, 2019; Neville, 1999).

The PBL tasks crafted by the tutor are the starting point of all learning that is to take place; "they are the driving force behind students' independent study in PBL" (Dolmans et al., 1997, p. 185). A significant 'measure' of pedagogical success in PBL, then, rests upon the tutor's construction of the cases and scenarios; whether they, for example, align with students' prior knowledge, contain relevant cues that prompt disagreement and the exploration of varying courses of action, integrate disciplinary concepts with profession-specific issues, and stimulate self-directed learning (Dolmans et al., 1997; Woods, 2014). Similarly, regardless of the mode of facilitation in PBL (i.e., whether 'standard', or floating facilitator), it is the tutor who instils democracy in the PBL group (Papinczak et al., 2009). The tutor encourages students to be 'doers' (Barrows & Tamblyn, 1980), which might involve incorporating their own industry experiences within their questioning as a means of making the problem case livelier (Lee et al., 2015).

On top of aforementioned duties, PBL tutors are the ones who must tackle students' (inevitable) discomforts with, and misconceptions about, the PBL process (Anderson & Reid, 2012; e.g. Barrow et al., 2002; Biley & Smith, 1999; Williams &

Paltridge, 2016), but in a way that is cohesive for all students (Wosinski et al., 2018), and that is not overly directive (Lee et al., 2009). With such a multifaceted role, it is understandable that many PBL tutors struggle with the job at hand, thus emphasising the need for regular, comprehensive training that pulls together these content and pedagogical expertise (e.g. Compton et al., 2020; Dolmans et al., 1997; Haith-Cooper, 2000; Kaufman & Holmes, 1998; Leary et al., 2013; McKendree, 2010) (though whether such training is currently up to standard is another issue that will be considered later in the thesis).

2.2.2. Problem-solving or knowledge?

PBL is also said to be based closely upon the principles of modern cognitive psychology (e.g. Hmelo-Silver & Eberbach, 2012; Schmidt, 1993). One of the longest running debates in the field of PBL, however, stems from Barrows' and Schmidt's - both of whom played critical roles in steering PBL in its early days - interpretations of cognitive psychology, and consequently, of the function of PBL (Servant-Miklos, 2019a). Of the information-processing psychology and hypothetico-deduction mindset, Barrows saw the development of students' problem-solving skills to be the ultimate goal of PBL (e.g. Barrows & Pickell, 1991). Inspired by the works of Newell and Simon (1972), Barrows contended that learners develop heuristic pathways which form their own problem spaces - completely independent of the problem content - and that heuristics training enhances problem-solving skills.

Such thinking shaped McMaster University's PBL curriculum, in which the teaching of 'general' problem-solving and reasoning skills took precedence over all else. Barrows considered it possible for the the *process* of problem-solving to be uncoupled from the problem *content* in which it is situated; to illuminate these (teachable) generic skills and strategies that allow students to confront *any* medical problem they are served with. He viewed problem content as almost secondary to PBL, focusing instead on the processes of problem-solving via hypothesis generation (e.g. observing data, and making clinical decisions) (Barrows & Tamblyn, 1980). In fact, Barrows warned that larger quantities of problem content could be damaging to students' problem-solving abilities, as this could distract from their ultimate objective - the formulation of hypotheses.

Although Schmidt originally saw problem-solving in the same hypothetico-deductive terms that Barrows did, by the late 1970s, he had firmly positioned himself within the newly emerged constructivist movement (Servant-Miklos, 2019a). Whereas formerly, "human minds were regarded as empty buckets that could be filled through repetition and rehearsal", constructivism saw learning as active and constructive (Gijselaers, 1996, p. 14). Unlike Barrows, then, knowledge was central to Schmidt's stance on PBL; that human memory, with its associative structure, contains semantic networks of prior knowledge which serve as frameworks in the processing of new information, and in the construction of meaning (Schmidt, 1993). PBL provides an environment in which learners are required to use their prior knowledge (Parton & Bailey, 2008). As the starting point in PBL is the problem - and is not, for example, preparatory reading - learners immediately activate their prior knowledge regarding a particular topic (in the form of hypotheses), with learning occurring on the basis of what is already known, and the peer elaborations that follow on from these.

Furthermore, rather than being the sole objective - as in Barrows' PBL - Schmidt saw the solving of problems as only *part* of the wider learning process. As well as resolving problems, for Schmidt, PBL was equally about grasping fully the phenomena (i.e. underpinning the problem content) at hand (Savin-Baden, 2007). That is, whilst Barrows' view of PBL also involved the generation of hypotheses, Schmidt saw these as brimming with content, as opposed to a means to an end (i.e. a solution). In this way, by seeing PBL as dependent on both the problem content and context - and not as a method for developing exclusively medical students' clinical reasoning skills - PBL could be used across a wide selection of disciplines.

In his vision of PBL, Schmidt was also driven by the Popperian mindset - most notably, the role of prior knowledge (Parton & Bailey, 2008; Servant–Miklos et al., 2020; Wang et al., 2008). According to Popperian philosophy, the practice of science begins with problems - as opposed to facts - and learners' hypotheses regarding the 'truth'. As Popper held that science is fallible, the objective is to demonstrate that hypotheses are false. The progression of science is geared around the detection and elimination of error; that with each hypothesis, knowledge claims are either abolished, further developed, or newly generated, as the non-truths are gradually eradicated (Popper, 2005).

Popper's (2014) notion of objectification is also present in PBL as we know it, in which learners' scientific practices (e.g. their theories regarding a problem task) are made publicly available. Learners' external representations are shared with other members of their research community (e.g. the PBL group) as the process of knowledge building takes shape (see Hmelo-Silver & Eberbach, 2012, regarding the use of representational artefacts in PBL). As per Popper's insistence, individuals' theories should be open to challenge and debate; something which is achieved as students making sense of their prior knowledge together via small group discussion where PBL is the creative arena for the (discursive) negotiation of ideas (Schmidt, 1983). In fact, Schmidt et al. (1989) showed how student groups who discussed a problem case *before* studying accompanying texts produced more than double the amount of hypotheses about the subject matter than did the control group, thus demonstrating how such interactions activated prior knowledge and facilitated the processing of new information.

Theoretically and empirically, Schmidt's (cognitive) constructivist conceptualisation of PBL, by far, took the win (Neville et al., 2019; Servant-Miklos, 2019a). Despite attempts to "instil problem-solving or clinical reasoning skills which may be applied to a diversity of problem situations", Norman (1988, p. 285) concluded, "the search for such skills was quixotic", in that expertise were shown to be dependent on the learner's knowledge base, as opposed to superior problem-solving algorithms. In the early 1990s, Barrows' information-processing psychology inspired PBL programme was dropped by McMaster University in favour of the more content-dependent stance, as championed by Schmidt at Maastricht University. Coupled with the collapse of the information-processing psychology theory (Norman & Schmidt, 1992), and the realisation that general problem-solving was *not* measurable (e.g. Ohlsson, 2012), Barrows' PBL received its biggest blow when Elstein himself - a pioneer of the hypothetico-deductive model upon which it was based - concluded that medical problem-solving was not the result of hypothetico-deductive processes. Testing their assumption that expert medical students would possess superior hypothetico-deductive skills than beginners would - and finding this not to be the case - successful problem-solving was, in fact, dependent on the learner's knowhow (Elstein & Schwarz, 2002; Elstein et al., 2013).

Despite the research literature being, overwhelmingly, in support of Schmidt's PBL - and of knowledge building with peers - Barrows was resistant to adapting how he envisaged the problem-solving aspects of PBL, to the extent that information-processing psychology ran throughout the entirety of his academic career (though he did incorporate *some* elements of learners' prior knowledge into his later works on PBL) (Servant-Miklos, 2019a). Furthermore, in the time taken to empirically establish the superiority of Schmidt's PBL, Barrow's thinking - of content-independent heuristic processes - had made its mark on the world of PBL. In fact, the hypothetico-deductive model became the traditional underpinnings of PBL in practice (e.g. Mandin et al., 1997), and there are educators who continue to follow the information-processing approach to PBL - in which PBL is seen as a means of developing problem-solving skills more generally - to this day (Schmidt et al., 2009).

As we make the transition into the next stage of the literature review, it is necessary to reflect on PBL and its somewhat chaotic beginnings; that it was led by clinicians who were, on the whole, unfamiliar with educational philosophies - a point that is in no way intended to discredit their vision - resulting in much speculation about its true theoretical underpinnings over the years (as we have seen). As recent as 2019, Hung et al. emphasised the need for stronger theoretical alignment between PBL practice and its core features: contextual, constructive, self-directed, and collaborative learning. However, it is also worth noting Neville et al.'s (2019) assertion that the 'perfect' - or standardised - PBL does not exist, and that instead, PBL "should be viewed as a broad family of pedagogical strategies using problems as a basis for learning (and not for learning problem-solving)" (p. 861). This means there can be large variance between institutions in terms of PBL design (de Graaff & Kolmos, 2003). It is beyond the scope of this research to examine such approaches in the depth that they require, though Savin-Baden (2000) nicely summarises the main models of PBL, whilst Savin-Baden and Major (2004) explain different implementations of PBL curricula. Before we draw a line under these theoretical debates, then, let us consider that which *has* been agreed on in PBL: its core principles.

2.2.3. Principles of PBL

PBL is a post-industrial model of teamwork in which the joint construction of knowledge overrides hierarchical decision-making, and learning is a fully student-centred affair (Savin-Baden & Major, 2004). One of its aims is to promote self-directed learning (Hmelo-Silver, 2004), and research has already shown PBL is effective at achieving this in the long-term (e.g. Norman & Schmidt, 1992). The PBL tutor serves as a facilitator of the learning process, as opposed to providing direct instruction, or being the expert of subject knowledge (e.g. providing students with the correct answers) (Hillman, 2003). Instead, the tutor's role is to assist students in steering their own learning, and in generating their own learning issues themselves (e.g. via coaching, or probing questions) (Barrows & Tamblyn, 1980; Neville, 1999). As discussed earlier in the chapter, then, the tutor in PBL is by no means redundant, nor can PBL be classed as a minimally guided approach (see Kirschner et al., 2006). Research (e.g. Schmidt & Moust, 1995) has, after all, demonstrated that effective facilitation can result in higher levels of academic achievement, and well-functioning PBL groups (cf. Chuan et al., 2011).

In line with this student-centredness, students must engage in self-directed learning, meaning that they - and not the tutor - should actively partake in the planning, monitoring, and evaluation of the learning process (Dolmans et al., 2005; Hattie, 2008; Zimmerman, 1990). The planning phase of PBL involves the analysis of the task at hand, leading into the generation of learning goals, and the formulation of appropriate strategies - whilst being mindful of potential complications that could arise along the way - for achieving these. As well as planning their efforts - and digging out the relevant materials to support their endeavours - students should also continuously monitor their learning, thinking about what is being done, what has been done, and then using such insights to determine progression. Upon completion of the PBL task, students should then evaluate the process of learning they have engaged in, as well as the outcomes of their learning, too. These skills involved in self-directed learning are closely associated with metacognition (Kuvac & Koc, 2019). The 'modern learner' should be both self-directed and metacognitive, as these are essential facets of the responsible, lifelong learner (Dahlgren & Dahlgren, 2002; Wiggins & Burns, 2009).

Collaboration is at the very core of PBL, in that social interaction is the driver of all learning, and talk is the mechanism through which students co-construct

knowledge and shared understanding (Dahlgren & Dahlgren, 2002; Hattie, 2008; Wiggins & Burns, 2009). As the problems in PBL are large, ill-structured, and complex - with the aim of replicating the messiness of real-world problems that accompany professional practice - they command the efforts of the collective group (Barrows, 2000; Bereiter, 2005). The use of authentic problem cases serve to align the learning content with the relevant workplace context, which captures students' motivation (de Graaff & Kolmos, 2003), and benefits their retention of knowledge for use in future related situations (Dahlgren & Dahlgren, 2002).

Through the small-group tutorial setup (Schmidt, 1983), students have the chance to manipulate newly acquired vocabulary, negotiate word meanings, and interact with other members of their discipline-specific community (Brown et al., 1993). Verbalisations - or 'thinking out loud' - are also key to PBL as they ensure the dissemination of information (Dahlgren & Dahlgren, 2002). In what is yet another feature of PBL that resonates with Popper's early works, it is crucial that students' individual theories are made public, not only in facilitating deeper understanding through diverse viewpoints (Evensen & Hmelo-Silver, 2000), but in ensuring an active community discourse where each member is granted the opportunity to contribute to group decision-making, and knowledge building (Savery, 2006; Savin-Baden & Wilkie, 2006). Rather than involving a simple exchange of knowledge from student to student (Hattie, 2008), PBL is social constructivist in nature, entailing the interactional evaluation, negotiation, and elaboration of knowledge, as well as the identification of knowledge gaps - and how they will be tended to - as the students progress with the ultimate goal of jointly constructing group understanding within the PBL space (Hmelo-Silver & Barrows, 2008).

Upon reflection of how the literature characterises the main components of PBL, it is quite striking that, pedagogically, it is so dependent on social interaction. The need for discussion is intertwined with each one of its major objectives - regardless of the PBL model in question. Take, for example, the cognitive load that must be distributed across the group; where the answers to the 'PBL puzzle' do not lie with any one student, but with the students' collaborations, instead (Evensen & Hmelo-Silver, 2000). Essentially, the intended cognitive outcomes of PBL are fully dependent on group activities - such as the identification of learning needs, brainstorming, and the testing of hypotheses (Hak & Maguire, 2000) - and yet, in

what is the main conclusion to be drawn from this review of the literature, these are the aspects of our understanding that are most deficient.

2.3. The evidence base behind PBL

Although PBL has been adopted successfully across countless academic disciplines, and whilst there is an extensive body of PBL research in existence, its effectiveness over traditional teaching methods is still hotly contested (Galand et al., 2012; Strobel & Van Barneveld, 2009). In a review of medical education literature, for example, Colliver (2000) concluded that there was "no convincing evidence that PBL improves knowledge base and clinical performance, at least not of the magnitude that would be expected given the extensive resources required for the operation of a PBL curriculum" (p. 259). Colliver (2000) questioned its weak theoretical basis, stating that, ultimately, PBL has not proven its supposed superiority over conventional teaching.

In response, Albanese (2000) and Norman and Schmidt (2000) did not outrightly challenge the accusation that PBL has no significant impact on cognitive outcomes (although, this was a stance that would soon change, as will be explored below), but they did take issue with Colliver's (2000) unreasonable expectations of how students undertaking PBL *should* perform - large effect sizes that "would require some students to move from the bottom quartile to the top half of the class" (Albanese, 2000, p. 737). In a point which links back to the common misconceptions about what PBL is (section 2.2), Norman and Schmidt (2000) acknowledged that, over the years, exaggerated claims *have* been made regarding the effects of PBL on knowledge acquisition and clinical skills, and that there is a need to be more realistic about its achievements. Relatedly, Galand et al. (2012) - in their study of PBL in engineering education - noted that caution must be taken in merely generalising the effectiveness of PBL within medical education (i.e. its place of origin) to other contexts.

Nonetheless, even with these efforts to be more transparent about its capabilities, the criticisms directed at PBL continued. Shanley (2007) denied the authenticity of its contextualised cases; that PBL, ultimately, weakens students' educational experiences, and that other case study methods would serve as more

efficient alternatives. Some years later, however, further empirical research in favour of PBL allowed claims about its cognitive effectiveness to be better substantiated. For instance, Schmidt et al. (2009) demonstrated that PBL is *not* detrimental to students' learning of content knowledge; that it is actually more effective in promoting professional skills than is conventional teaching. Additionally, Strobel and van Barneveld's (2009) qualitative meta-synthesis examined prior meta-analyses on the effectiveness of PBL and found that, whilst "PBL is not the only successful strategy to achieve effective learning of ill-structured and complex domains", it "is significantly more effective than traditional instruction to train competent and skilled practitioners and to promote long-term retention of knowledge and skills acquired during the learning experience or training session" (p. 55).

The effectiveness of PBL is supported by more recent research, too: Loyens et al. (2015) found that, within educational settings, the use of PBL is more likely to result in conceptual change than when traditional methods (e.g. lectures or self-study) are used. This is because PBL involves activities - notably, the activation of prior knowledge, group interaction, and critical evaluations of scientific viewpoints - which make possible the deeper processing of knowledge, and provide greater opportunities for change (although, in pushing students towards such deep learning, there is a risk that they become too honed in on one aspect of the knowledge, requiring that they rectify such gaps at a later date; de Graaff & Kolmos, 2003). Relatedly, Yew and Goh's (2016) review "conclude that the studies comparing the relative effectiveness of PBL are generally consistent in demonstrating its superior efficacy for longer-term knowledge retention and in the application of knowledge" (p. 75). This is in contrast to the likes of Colliver (2000) of whom questioned the cognitive benefits of PBL altogether.

2.3.1. The 'how' of PBL

In sum, research in PBL has been overwhelmingly quantitative in nature, where the main focus has been on determining its pedagogical effectiveness (e.g. measuring content learning by comparing the standardised test results of PBL students versus students exposed to traditional learning) as means of fending off its skeptics (Imafuku & Bridges, 2016; Jin & Bridges, 2016). In their study of meta-analyses and

systematic reviews on PBL from 1992 onward, Hung et al. (2019) described the trends that have dominated PBL literature, and whilst qualitative methods have not been overlooked completely, it is clear that quantitative research takes centre stage. This has, inevitably, overshadowed other avenues of investigation, bypassing the very processes *within* PBL that govern the end learning outcomes themselves (Bridges et al., 2012; Prosser, 2004).

As much as establishing (statistically) its success has been pivotal to its survival, there is a need to diversify our research methods if PBL is to be fully understood (Shimizu et al., 2021). Continuing to evaluate PBL as nothing more than a singular curriculum intervention - using ill-fitting quality measures originally designed for conventional teaching methods - and focusing on cognitive outcomes alone will merely produce the same results, time and time again (Evensen & Hmelo-Silver, 2000). Belland et al.'s (2009) review also raised issue with the validity of the measurements used in many of the studies aiming to determine the success of PBL. There are, they noted, core differences in how educational success is viewed within conventional curricula, and how it is viewed within PBL curricula. For one, PBL is not as clearcut in its view of knowledge use, in that it involves a multitude of academic goals (e.g. that *students* interpret problem tasks themselves; that *they* pinpoint the necessary information relevant in tackling such problems). Essentially, the 'PBL versus traditional teaching' debate is a tired one (Strobel & Van Barneveld, 2009). On the complexities of PBL, Hmelo-Silver et al. (2007) argued that straightforward research questions (i.e. those which involve channelling all of one's energy into assessing PBL in terms of its cognitive outcomes), quite simply, do not work. Instead, the unmeasurable aspects of the PBL experience - primarily, collaboration and self-directed learning - must be recognised as integral parts of meaningful, lifelong learning in our research endeavours, too.

2.4. Interaction in PBL

The eventual rise of qualitatively-based PBL research offered unique - and much needed - insight into students' and staffs' perceptions of PBL, richly capturing the voice of those participating in PBL (Jin & Bridges, 2016). Whilst illuminating more personable insight into PBL, however, qualitative research has largely constrained

itself to students (e.g. Dochy et al., 2005) and tutors (e.g. Kaufman & Holmes, 1996) self-reporting their experience of PBL through questionnaires and interviews; like the majority of the aforementioned quantitative work, commonly fixated on the contrast between PBL and traditionalised methods of teaching (e.g. Oderinu et al., 2020). Essentially, this has resulted in a wealth of research that tells us everything about PBL, except for how it actually (i.e. naturally) occurs.

Thankfully, in the 1990s, Koschmann et al. (1997) initiated the mission "to apply methods borrowed from studies of discourse to understanding PBL as a form of enacted practice" (p. 1). Citing a lack of insight pertaining to how students and tutors 'do' PBL, Koschmann (1997) and colleagues used conversation analysis to closely examine the discourse occurring *within* PBL. In consultation with the video-recorded segment of PBL, they specifically investigated medical students' interactional processes involved in the generation of learning issues, and the tutor's role in interactionally scaffolding these. This work subsequently led to Koschmann's (1999) influential special issue in Discourse Processes which firmly established the potential of - and need for - the in situ analyses of PBL tutorials as means of tending to the "difficult problem of how observers and researchers can make sense of how collaborating participants develop a shared understanding both of their task and their own participation in it" (p. 1). Based on a seminal panel presentation at the American Educational Research Association in 1996 - in which five researchers individually analysed a six-minute video recording of a PBL session involving medical students - this collection reinvigorated PBL research which had become oversaturated by self-reported pedagogical perceptions, and evaluative data (Imafuku & Bridges, 2016).

Glenn et al.'s (1999) contribution to the special issue, for example, raised the point that, as the goal of developing students' reasoning skills in PBL occurs *through* their discussions with one another, our understanding of *how* this reasoning takes place thus relies on the close examination of students' interactions themselves. Using conversation analysis, they shed light on the common conversational activities of a PBL group in terms of how students presented theories about the clinical case to each other, how these ideas were treated by their peers - via questions and assessments - and how the tutor interactionally scaffolded the group's attempts to resolve the patient's medical issues. The authors concluded that "such an approach

holds great potential for helping researchers understand the interactive processes in PBL group work that are so crucial to its success" (p. 132).

The aforementioned 1996 American Educational Research Association panel was included in full in Evensen and Hmelo-Silver's (2000) edited volume, which drew attention to the long neglected components of PBL - self-regulated learning and group participation - noting that "by narrowing the scope of inquiries to cognitive variables, studies have often bypassed or bracketed the social and pragmatic aspects of these key components" (p. 4). The collection itself involved varying methods of investigating the different facets of learning interactions in PBL - including ethnographic video analyses - and coincided with Hak and Maguire's (2000) review, in which further urgency was given to opening the social 'black box' of PBL; that is, students' and tutors' actual learning practices within PBL. Similarly, Hak and Maguire (2000) noted the limitations of the qualitative research that had been conducted by this point, in that the analyses of the collaborative processes were based on *fragments* of PBL, as opposed to the PBL curriculum in its *entirety*.

Since then, there has been a rise in microanalytic descriptions of video-recorded PBL interactions as they naturally occur. For example, research has considered how learner articulation is achieved, and how participants use gesture while displaying knowhow in PBL (Koschmann & LeBaron, 2002); how facilitation takes place in the PBL process, including how the facilitator interactionally enables collaborative knowledge-building discourse (Hmelo-Silver & Barrows, 2006, 2008); how - using both conversation analysis and discourse analyses of PBL talk - effective interactions take shape (Clouston, 2007); how students talk about PBL as the basis to better informing our understanding of the learning process (Barrett, 2010); how interdisciplinary learning actually occurs within the PBL tutorial (Imafuku et al., 2014); and how - examined via discursive psychology - students construct group cohesion in PBL through gossiping and teasing behaviours (Hendry et al., 2016b).

Although strides have been made in better understanding PBL as it naturally occurs, such research is only in its infancy. The need to examine the actual interactional processes within PBL is as pressing as ever (Imafuku & Bridges, 2016), with the social black box first identified by Hak and Maguire back in 2000 yet to be fully unpacked. Additionally, with increased usage of PBL as an online method, there comes the need to understand the social dynamics within these virtual contexts, and

how these impact on, for example, knowledge sharing behaviours (amongst many other outstanding questions regarding the virtual process) (Wang & Lin, 2021; Wong et al., 2021). But, the research that continues to dominate PBL - both qualitative *and* quantitative - centres on the post-PBL experience. As highlighted by Bridges, Botelho, et al. (2012), across its lifetime, "surprisingly few studies have examined and documented the in situ enactment of student learning in PBL contexts from an interactional perspective" (p. 99). Similarly, Prosser (2004) noted how large-scale meta-analytic studies - comparing the performance of PBL trained with traditionally trained students - overlooked the social and interactional aspects of PBL programmes, primarily concerning themselves with the acquisition of knowledge. In fact, despite a plethora of PBL research, there is still so much to be learned about *how* problem-solving in PBL collaboratively occurs (Hmelo-Silver & Eberbach, 2012; Mabley et al., 2020).

This problem is also reflected in terms of the nature of research about university group work more generally. Seeking to address the fact that the vast majority of studies on the life of the university student are approached via interviews, Attenborough and Stokoe (2012), for example, found that ethnomethodological approaches are much better suited to investigating (with exactness) *actually* 'doing being a student' in everyday life (and, in turn, directly influencing pedagogical design). Related investigations stemming from this research unlocked the many hidden layers that come with 'being a student'; that which had not been (and cannot be) captured by studies *about* (rather than within) tutorials, such as students' simultaneous management of face, category membership, and wider cultural influences (e.g. Benwell & Stokoe, 2002; Stokoe et al., 2013). This has led to related interactional work in educational settings, yielding similar patterns in terms of the tensions between educational and social identities (e.g. Moncada-Comas, 2020; Olinger, 2011; Attenborough, 2011).

Qualitative research thus allows us to delve inside the processes of PBL, but this is an opportunity that has not been properly utilised. This may be reflective of the fact that the mundane talk occurring within PBL tends not to be the obvious starting point for many researchers - even though these so-called 'ordinary' interactions have massive repercussions for the overall dynamics of any given group (Hendry et al., 2016a). Similarly, to finely examine an entire PBL curriculum is no

easy feat (Hak & Maguire, 2000). The need for empirical evidence which, for example, enables the production of effective guidelines, continued pedagogical development, and the true capacity of PBL to be fully realised, however, cannot be ignored (Hendry et al., 2003; Hmelo-Silver, 2004). There exists a great potential for interactional research to tend to these demands by developing a rigorous database detailing precisely how PBL is enacted by its participants (Bridges et al., 2012). Such a repository could be invaluable in exemplifying best practice PBL, particularly for those (e.g. researchers and practitioners) approaching PBL for the first time (Hmelo-Silver, 2015).

Whilst the implementation of PBL has reached far beyond its origins in medical education, such diversity is not reflected in the spread of PBL research (e.g. all of the aforementioned interactional studies on PBL were situated within medical and clinical education only) (Hmelo-Silver & Eberbach, 2012; Jin & Bridges, 2016). Interaction-based research in engineering PBL contexts is particularly sparse, with only a handful of naturalistic studies examining students' talk as they engage in PBL. For example, Mabley et al. (2020) - using qualitative content analysis on video-recordings of PBL tutorials - described 'what' interactional problem-solving strategies were used by chemical engineering students. Bernhard et al. (2019) analysed electrical engineering students' PBL interactions - with a focus on their practical epistemic cognition - using video ethnographic, conversation analysis, and embodied interaction analysis methods to show how learners used bodily-material resources in jointly producing understanding.

2.4.1. Disagreements, social loafing, & identities: the gap in PBL research

As a brief point of reflection, I now hope to have demonstrated the value of the naturalistic study of PBL interactions in illustrating, with careful precision, what *actually* takes place during group work. Added to this, I hope to have communicated that, whilst interactional research into PBL is growing (e.g. Bridges & Imafuku, 2020), there is still much to be done. Primarily, PBL is clearly rooted in constructivism (Wiggins & Burns, 2009) - and is regarded as a prime example of the constructivist learning environment (Savery & Duffy, 1995) - but most studies of PBL have failed to consider these theoretical groundings in terms of their research design (Bridges et al., 2012). Although the cognitive psychological perspective has allowed

us to tap into the *what* of students' learning in PBL, it has not permitted insights into the *how* of learning. Given that *what* students learn means very little without consideration of *how* this is learned, PBL must also be examined from the social constructivist stance (Hmelo-Silver & Eberbach, 2012; Kemp, 2011).

Constructivists hold that cognition does not exist within the individual alone; that constructions of understanding are interwoven with the context in which the learner is situated, too (Hendry et al., 1999). In PBL, knowledge evolves through students' interactional negotiations of their individual constructions of understanding, as made public within the group setting. As per Savery and Duffy (1995), "constructivism is not a deconstructivist view in which all constructions are equal simply because they are personal experiences" (p. 32). In PBL, what constitutes 'fact' is dependent on group agreement, meaning that through students' evaluations - and their co-constructions of meaning - within the social arena, certain hypotheses are deemed to be more accurate than others. In PBL, cognitive conflict serves as the environmental stimulus for learning, with the end goal of encouraging conceptual change (De Grave et al., 1996). Cognitive conflict involves a mismatch between what one already knows, and the problem task they are situated in presently, where the knowledge gap determines how students organise the learning that is to take place. Another source of cognitive conflict in PBL stems from misalignments between students' individual knowledge stances regarding a PBL task, prompting them to work to reach a point of resolution, with the construction of shared group understanding being the end goal.

An essential part of PBL, therefore, is that students bring their prior knowledge concerning the task at hand to the group space. The group members must evaluate one another's individual constructions of understanding, leading to the discussion of alternative hypotheses, and new material being sought out as they work towards conceptual change. In this way, PBL calls for productive knowledge disagreements on the part of its students. A student's peers are said to be better placed in developing understanding "since they are more likely to be experiencing the same kind of difficulty in comprehending the text than teachers, for whom comprehension occurs with relative automaticity" (Brown & Palincsar, 1989, p. 57). Although they are central to the enactment of PBL, however, in everyday conversation, disagreements are often treated as dispreferred conversational moves;

as transgressions, and as indicators of speaker disaffiliation (Pomerantz, 1984a; Pomerantz, 1984b; Sacks, 1987). Beyond emphasising the need for cognitive conflict, the subtleties of 'doing disagreement' have not been acknowledged by researchers in PBL, so it is necessary to turn briefly to those interactional studies in (non-PBL) educational settings that have.

There exists a high level of theoretical crossover between disagreement and related concepts: Kakavá's (2001) review of language and conflict studies, for example, adopts the terms 'disagreement', 'conflict', 'argument', and 'dispute' interchangeably, grouping together these acts as "any type of verbal or nonverbal opposition" (p. 651), which is quite commonly the case across the literature (e.g. Leung, 2002), and is the stance of the present thesis. Disagreement is often characterised as interactionally troublesome, and as something to be avoided (Sacks, 1987). According to Goffman's thinking, "displaying deference to others is an important feature of the organisation of human behaviour" (Goodwin et al., 2002, p. 1622). With this in mind, then, explicit conflicts must be avoided if social solidarity is to be maintained (Goffman, 1967). Disagreements are thus a tricky, and delicate, interactional business; moves that can threaten one's face without the usage of relevant politeness strategies (see Brown & Levinson, 1978; Longcope, 1995).

As above, the classic CA works of Pomerantz (1984a) and Sacks (1987) have been highly influential in shaping our (interactional) understanding of disagreements. These studies showed how, in everyday talk, there is a preference for interactional consensus, thus making agreements 'preferred' moves, and disagreements 'dispreferred' moves (see Goodwin et al., 2002; Sifianou, 2012). This notion of preference organisation is strongly aligned with the avoidance of threats to face, seeing disagreements as socially disruptive (Goffman, 1967; Heritage, 1989; Lerner, 1996). Disagreements represent a lack of common ground that must be addressed if speakers are to proceed with their interactions (Paramasivam, 2007). In opposition to the straightforwardness of agreement formulations, such interactional work can be intensive, involving the likes of delays, and partial agreement prefaces, in the minimisation of disagreement (e.g. Mulkay, 1985; Sheldon, 1992).

In contrast, research has shown that disagreements are not always dispreferred. For certain sociocultural groups, rather than disagreement being seen as leading to interactional trouble - as something to be avoided - it is, instead, seen as

a source of enjoyment; as a means of *facilitating* companionship (e.g. Tannen, 1983). Cordelia (1996) - studying the occurrence of disagreement amongst university students - found this to be the case for Spanish speakers, noting that these more intensive practices lie in opposition with the expectancies of the English language (i.e., where a more indirect approach to disagreement is usually preferred). Relatedly, Tannen and Kakavá (1992) and Kakavá (2002) showed how contentiousness served as an important, and ritualised, feature of sociability amongst Greek speakers, particularly when amongst family and friends. Schiffrin (1984) also found this to be true of Jewish speakers, in which they consistently disagreed, but in a non-serious way that actually maintained their solidarity (whereas the same could not be said for the British speakers involved). Such thinking is present in Corsaro and Rizzo's (1990) study of Italian children, too, as though there is a cultural security blanket that buffers disputes, and any damage to the relationship of the speakers involved.

On the other hand, however, in their study of Venezuelan speakers, Edstrom (2004) found that - whilst speakers engaged in confrontational disagreement styles, as per prior interactional research involving Spanish speakers - they also identified a large amount of *non-confrontational* disagreements, concluding that "generalisations about politeness orientation and conversational style that attribute differences primarily, or exclusively, to cultural distinctions must be reconsidered" (p. 1499). Instead, as explained by Georgakopoulou and Patrona (2000), "only contextual analyses can shed light on the local definitions of and interactional orientations to an act's dispreference as well as on the ways in which this is signalled or mitigated" (p. 336-337). There is a need, then, to consider the context at hand, and how *this* shapes the construction of disagreement (Forsgren & Björkman, 2021; Kakava, 2002).

Research has shown that disagreements hold a specific pedagogical relevance within the educational setting (Angouri & Locher, 2012). Waring (2001) shed light on students' use of peer referencing in maintaining alliances with other students during disagreement turns, as well as how students used displays of interactional vulnerability in backing down from disagreement deadlock. Similarly, Sharma (2013) showed how the tutor was invoked in resolving students' disagreements, whilst Sharma (2012) showed how students made use of tutor-provided resources in

validating their knowledge stances, and in exiting disagreement sequences. The L2 (second language) classroom setting has also been a point of exploration for disagreements (e.g. Hüttner, 2014). Hosoda and Aline (2015) found that, with increasing English proficiency, students' disagreements became more sophisticated in design (e.g. they were accompanied by prefaces, physical gestures, and accounts) as opposed to being explicit in form. Furthermore, in Tainio's (2011) study of Finnish classroom interactions, teachers' reproaches were coupled with humour and supportive discourse, whilst the reproaches themselves were generalised so that no one student was singled out as their target. In this way, even as the person of authority, the teacher worked around reproaches as face-threatening acts to ensure students' continued engagement in the interaction (see also Benwell & Stokoe, 2002).

The ultimate point to be made here is that disagreements are not the straightforward conversational moves that they are regularly characterised as in PBL literature and guidance; those that see only the content level of disagreement, rather than its face demands, too (Paramasivam, 2007). They are thorny, and highly context dependent; sometimes involving an engaging and productive exchange of opposing views, whereas in other cases, resulting in offence, and damaging social harmony (Edstrom, 2004; Sifianou, 2012). This is especially true of collaborative group setting, where disagreement entails the critique of opposing ideas, negotiating consensus, and finalising the task itself, without upsetting the harmony of the group (Toomaneejinda & Harding, 2018). Added to this, as PBL is constructivist in nature, it is the students - rather than the tutor - who decide what constitutes a learning issue (Savin-Baden, 2007). The size and complexity of the average PBL task demands that the cognitive load is distributed across the group (Evensen & Hmelo-Silver, 2000). Although individual levels of participation may fluctuate, it is pivotal that, on the whole, each member contributes sufficiently. After all, "the most important feature of small group work is that interaction should take place among all members present" (Azer, 2001, p. 392). But, it would be naive to assume that, in practice, this is always the case, and so, the question is raised: how do students respond to a group member(s) who fails to do their fair share of the work in PBL?

Much like the occurrence of knowledge disagreements, PBL students are encouraged to be resilient in the face of interpersonal complications - both in

adhering to the student-driven values of PBL, and for the purposes of replicating the dilemmas arising in professional life. In this way, PBL *should* provide a platform that enables students to train their communication skills in the likes of conflict resolution (Azer, 2009). Although research has acknowledged the challenges faced by PBL groups (e.g. unequal participation and recurrent absence), it has considered students' perceptions of these challenges (e.g. de Grave et al., 2001), rather than examining the events themselves. In Hendry et al. (2003), for example, PBL students reported significant frustrations with social loafers, and how they struggled to efficiently navigate such circumstances themselves. Furthermore, Kindler et al. (2009) found tutor feedback in response to dysfunctional PBL groups to be generally ineffective - even from the most skilled of tutors. Instead, the authors emphasised the need for *students'* collective confrontations with difficulties arising in PBL groups - in developing ownership for their learning - but gave no direction as to how this might be interactionally achieved. In contrast, within some institutions, it is common practice to change group members in response to group conflicts, but this does not allow students to confront challenging situations on their own (Öystilä, 2006), nor does it give the time necessary for healthy dynamics to develop in PBL groups (Wood, 2003). This lack of knowhow regarding the negotiation of conflicts and knowledge is pertinent to the growing usage of online PBL environments, also (Wong et al., 2021).

As discussed in the previous chapter, due to limited faculty resources, institutions may opt for the tutorless (see Woods, 1996; Woods et al., 1996) or floating facilitator (see Allen et al., 1996) adaptations of PBL. The learning setting under examination in this thesis involved a large class of engineering students and only a very small number of tutors, meaning that it was impossible for each PBL group to be allocated a dedicated tutor on a full-time basis. Instead, tutors divided their time amongst several PBL groups - acting as 'floating facilitators' - resulting in the PBL sessions being primarily self-managed by the students themselves. Whilst *all* approaches to PBL push students to be the drivers of their own learning, there is no denying that the demands placed on tutorless and floating facilitator PBL groups are heightened. Attendance and workload participation, for example, have been recognised as prominent concerns, largely unique to these tutorless modes of PBL (Woods, 1996). Relatedly, interpersonal conflicts in PBL (and in group work more

broadly) can be extremely damaging to students' learning and engagement (Elder, 2015; Wells et al., 2009), but without the presence of the tutor, the onus is on the students to resolve such social complications themselves (Azer, 2009; Wood, 2003).

On the whole, however, research has centred on the tutored - and not the tutorless - PBL experience (Klegeris & Hurren, 2011). Although PBL is inherently learner-centred, we know so little about how such learner-centredness is enacted (Bridges et al., 2012). And, to the best of my knowledge, only the work attached to this thesis (McQuade et al., 2020; McQuade et al., 2018; McQuade, Ventura-Medina, Wiggins, Hendry, et al., 2020) has embarked on the task of examining how students manage PBL (e.g. knowledge disagreements and social loafing) without the presence of a tutor. Strong similarities can be found between these works and conversation analytic studies - mentioned in the previous section - on (non-PBL) university tutorial interactions (e.g. Attenborough & Stokoe, 2012; Benwell & Stokoe, 2005, 2010; Benwell & Stokoe, 2002; Stokoe et al., 2013) in which 'expert' and 'overly keen' discourse was stigmatised, and 'being a student', ironically, centred on being seen as *non*-academic. However, the PBL studies emerging from this thesis - unlike the above research on university tutorials - involved no tutor to work around students' resistant behaviours; to facilitate their 'doing education'. Instead, with the elimination of the authoritative figure, the PBL students were faced with a unique interactional dilemma; of blending in as equal, and socially compliant, group members - by being seen as relatively detached from their academic endeavours - whilst also orienting to the need for some level of self-regulation (i.e. to 'do education') to be able to succeed without the PBL tutor.

Such work demonstrates that, in practice, social identities function differently from (and even in opposition to) what is commonly associated with their respective membership labels (e.g. university students) - thus providing the case for considering identity not as a fixed or pre-discursive (i.e. cognitive) state, but in terms of its indexicality; as a flexible, interactional achievement (see Antaki et al., 1996; Haugh, 2008). Research on professional identities, however, has sometimes failed to make this distinction (Wiggins et al., 2020). In engineering education, much attention has been given to the notion of students' identities; that by enabling engineering students to develop a sense of identity, the goal is that - as graduates - *they* will eventually lead the institutions that once shaped them (Tonso, 2006b). Similarly, a well-formed

identity is said to foster a sense of belongingness, resulting in students' persistence of effort with the engineering discipline: from their degree studies, through to employment (Lakin et al., 2020; Verdín et al., 2018). In fact, dropouts within the engineering discipline now result more frequently from students' absence of identity, than from their lack of academic capabilities (e.g. Rohde et al., 2019). And yet, such avenues of investigation - which impose predetermined categories on students - have distracted from how speakers *themselves* orient to issues of identity (Benwell & Stokoe, 2006). In floating facilitator PBL specifically, there is a need to understand what it is to be an engineering student amongst other engineering students when there is no 'expert' figure in presence. How does such identity work impact on students' interactional confrontations with the likes of disagreements and social loafing in PBL? The interactional activity of establishing who we are to one another is no easy feat, and to answer these questions, the only option we have is to turn to the actual interactions of the PBL students themselves.

2.5. Chapter Summary

The aim of this chapter was to more clearly establish the rationale behind the current works. This involved delving into the origins of PBL - the learning context explored in this study - as well as the key debates and theoretical tensions that have dominated the field. This review of the literature emphasises a clear need for interactional insight into the 'how' of floating facilitator PBL, where very little is known about how students self-manage, for example, knowledge disagreements - central to PBL's mission for collaborative knowledge building - and unequal participation - a particular organisational concern for tutorless groups. The chapter also raises issues that may be relevant to collaborative group work in Higher Education more generally.

3. METHODOLOGY

This chapter dedicates itself to the methodological principles of conversation analysis (CA) that guide the study's analytical chapters. It first taps into the ethnomethodological origins of CA, before giving attention to its key characteristics (e.g. its use of naturally-occurring data; its focus on the mechanics of human conversation; its emic lens; and its view that social action is constructed through ordinary talk). The applications of CA are then considered, with a specific focus on the institutional applied variation of CA which guides this study's analyses of PBL group work.

3.1. Ethnomethodology

Ethnomethodological research places itself within everyday settings, where it analyses mundane human activity as means of illuminating the sense-making practices - the 'ethnomethods' - used by members of society to achieve social order (Liberman, 2013). Garfinkel's work - namely, 1967's Studies in Ethnomethodology - was revolutionary in that it did not conform to the conventional sociological perspective that was so dominant at that time (Heritage, 1984). Whereas sociology theorises and explains, ethnomethodology - an inductive approach to research that seeks to illustrate in detail 'what happens' - does not, and it is "in this idea of enquiry, as opposed to theorising, ethnomethodology bewildered, and still bewilders, many sociologists" (Button, 1991, p. 5). Furthermore, ethnomethodology does not readily fit within one specific field or discipline, nor can it faithfully be defined as a methodology, a method, or a theory. Instead, it is "a distinct way of doing social science" in its own right (Neyland & Whittle, 2018, p. 32). Consequently, much of its surrounding controversy stemmed from what many of its critics believed to be its impenetrable nature; a sentiment only worsened by the convoluted style of Garfinkel's writings, and his continual refinements to the very foundations of ethnomethodology itself (Heritage, 1984; Wieder, 1977).

Ethnomethodology, of course, shares *some* degree of relatedness with the wider discipline of sociology (e.g. the general sociological topics of concern), but is so far detached from the principles of mainstream sociology that their relationship has

always been an unsteady one (Wieder, 1977). As noted by Liberman (2013), “it has been customary for philosophers and social psychologists alike to idealise thinking so that it can more readily be tamed by their theoretical models” (p. 45). In stark contrast, ethnomethodology has always been cautious of this ‘polished’ approach, and focuses not on how to best fit with theory for the purposes of neat explanation, but on “describing how thinking is actually done in practical circumstances" (Liberman, 2013, p. 45). By resisting theoretical modelling, or transplanting the findings from previous research and expecting them to work within another setting, ethnomethodology does not interfere with its data, and instead takes human action as it is, and as it occurs.

Another distinctive feature of ethnomethodology is that it makes no inferences regarding the conscious dimensions of thinking (Button, 1991). Rather than being introspective, ethnomethodology views thinking as an outwardly displayed activity, focusing on how individuals work to collaboratively organise society, and attain shared understanding with their fellow constituents (Neyland & Whittle, 2018). Ethnomethodologists turn to the intricate details of what societal beings are actually ‘doing’ as they socialise. Furthermore, as per Garfinkel’s breaching experiments, by disrupting everyday norms, it is possible for the ethnomethodologist to unearth the underlying sense-making methods that structure everyday life (Heritage, 1984). By violating these tacit rules, these ethnomethods - so engrained in our practices as social beings that we are unaware of their existence - are driven to the surface, thus elucidating the rational, and highly coordinated, practical methods employed in making sense of, and giving order to, our social lives.

3.2. Conversation analysis

In their development of conversation analysis (CA), Harvey Sacks and Emmanuel Schegloff were heavily influenced by the aforementioned ethnomethodological breakthrough of the 1960s (ten Have, 2007). Following his own personal collaborations with Garfinkel, in his classic series of lectures (see Sacks, 1992), Sacks realised his view that social life is constructed *through* talk, and that by examining social beings in their everyday interactions, it is possible to elucidate the recurrent practices that underpin the achievement of social action (Heritage, 1984). CA seeks to unearth “the machinery, the rules, the structures that produce and constitute

orderliness" (Psathas, 1995, p. 2), seeing these not as preexisting cognitive states, but as socially constructed and maintained (Neyland & Whittle, 2018). Later research involving Gail Jefferson - at one time, Sacks' own PhD student - played a pivotal role in defining CA as the methodology it is today, where Jefferson's fine-grained transcriptions of Sacks' audio recordings detailed the sophistication of naturally occurring human interaction that had been neglected until that point (2004). Through her painstaking attention to the delivery of talk - intonation, overlap, and silence, to name but a few - Jefferson "was the transcriber who made the precise identification and description of phenomena in interaction possible", and who "made transcription an art" (Wagner, 2010, p. 1474). The ensuing Jefferson transcription system is now intertwined with the very notion of doing CA; as the eyes through which talk can 'be captured' (2004).

For a conversation analyst, then, "the overriding concern of analysis is to examine sequential organisation of talk and how participants mutually orient to and achieve orderly conversation" (Stokoe, 2000, p. 185). That is, CA unveils the systematic practices which serve as the backbone to everyday social interaction, enabling the analyst to account for specific courses of talk and the actions they produce, as well as shedding light on the tacit norms that are adhered to by speakers in conversation (Stokoe et al., 2012). CA studies the patterned organisation and structure of talk at the turn-by-turn level, thus uncovering what language is 'doing' in situ (Albert, 2017). Analyses may take place over a series of lengthy conversational turns, or may consider only a small interactional segment, but in any case, the meaning of an utterance is dependent on the actions that precede it, where each of the speakers' turns are affiliated with one another (Antaki, 2008).

From an ethnomethodological standpoint, interaction is most crucial to the researcher (Button, 1991), and accordingly, for the ethnomethodologist to do their job, they must "get close to the social action" (Wiggins, 2017, p. 19). In CA, this is achieved by working with video and audio recordings of *actual* social interactions within their respective settings; "to see (and record) people living their lives" (Wiggins, 2017, p. 19). The data studied in CA-based research is naturally occurring, meaning that it is not invented (e.g. a reenactment of an interactional scene) (Hoey & Kendrick, 2017). As established in the previous chapters, the present catalogue of naturalistic recordings are pivotal to uncovering the 'how' of (floating

facilitator) PBL (Imafuku & Bridges, 2016). Interview and focus group methods about PBL, for instance, whilst important, are structured according to the researcher's aims - and the expectancies of the schedule that has been set - meaning that they are less focused on students' free-flowing group interactions, and *their* orientations that occur within these (Stokoe et al., 2012; Wooffitt, 2005).

Another hallmark of CA is its emic lens (ten Have, 2007; Wiggins, 2017). Rather than the analyses being driven ahead by the researcher's narrative, a preexisting theoretical base, or their interpretations of the data, the sole concern of CA lies within the orientations of its speakers (Sacks, 1992; Wetherell et al., 2001). CA brings to light *only* what emerges from the discourse at hand; whether that be membership categories, topical issues, or contextual detail that the interactants make available in their talk (Stokoe, 2000, Waring, 2015). If, for a moment, we give thought to the present study, one question that has been raised on numerous occasions - by researchers outwith the CA community - regards the (unintentionally) disproportionate gender ratios within each of the student groups across the data corpus (e.g. "doesn't the lone female feel out of place amongst five male peers?", and "how does this impact group dynamics?"). Unless the students *themselves* orient to, for example, gender minorities as relevant issues within the talk (intriguingly, no one single participant throughout the entirety of the data corpus discussed gender), however, it would be impossible to engage in such discussions without being analytically subjective; as breaching the boundaries of the speakers' interactional frameworks (Goodwin & Heritage, 1990).[1] In contrast, I am able to use the 'student' label in my analytical discussions, as this categorisation is continuously oriented to by the speakers (though, the 'being' a student contradicts what we would define or expect of a student), and has clear procedural consequentiality (Waring, 2015).

Over the years, the impact of CA-based research has been discredited by some researchers who subject CA to the traditional classifications of what can - and what can not - be deemed as sound *quantitative* - rather than *qualitative* - research (Waring, 2015). Therefore, Forrester and Sullivan's (2018) quality criteria for qualitative research was deemed to be the most appropriate in guiding ahead the present analyses. This criteria emphasises the likes of research value - exemplified

[1] For research that *has* specifically investigated the influence of gender on engineering students' participation in PBL, see Hirshfield and Koretsky (2018).

here by the fact that we are tapping into unknown pedagogical territory - as well as the need for research transparency - also raised by the CA works of Psathas (1995) and Waring (2015) who note that it must be possible to readily bring the written analyses to life through use of the supporting raw data from which they originated, so as to establish the analyst's depiction of the speakers' practices as being accurately done. Transparency was achieved through regular collaborative data sessions throughout the processes of transcription and analysis within this project.

CA tends to avoid making claims about generalisability - a difficult task, given that this would require interactional occurrences be removed from the context in which they originated - only that "formal descriptions of social actions capture and display the features of the machinery that was sufficient to produce the interactional phenomenon, in *this* case, in *its* details, in just the way it occurred" (Psathas, 1995, p. 50). In this way, CA holds that it is possible that certain interactional phenomena *may* also be produced in other conversational settings (see section 3.3 on the applications of CA), but goes no further than this (Waring, 2015) (although, more recent arguments hold that certain features of conversation are universal; see Stokoe, 2018).

Secondly, CA works with large datasets, with the current thesis examining almost 100 hours of video-recorded social interactions in total. Where it differs from quantitative indicators of analytical power is in its emphasis on large-scale data corpora of social interactions, rather than on high numbers of participants. Furthermore, as in the words of Sidnell (2011):

> …many approaches in the social and human sciences involve a methodological step (by coding, by experimental design, by extracting what is considered "good" data from what is considered "noise") in which the stubborn details of real events are filtered out. (p. 10)

In contrast, CA depends on the 'good' *and* the 'bad' (i.e. the difficult to describe) data, as preserving this 'noise' - during transcription - captures the rich details of what actually happened, and it is this which makes for a rigorous analysis - another of Forrester and Sullivan's (2018) signposts of high quality research.

Now that I have provided a theoretical overview of the CA methodology (though, we shall return to some of these issues within the discussion chapter), I shall now turn to the key components of CA that are relevant to conducting the analysis itself.

3.2.1. Turns-at-talk

Typical human interaction operates on the basis that speakers each take turns-at-talk, thus minimising the occurrence of delays and overlap (Schegloff et al., 1974). CA has focused predominantly on 'mundane' interactions, and thus, those which do not adhere to any precise turn-taking style (although, this is not to say that 'ordinary' talk is not systematically coordinated by the parties involved, nonetheless). As will be detailed in section 3.3.1, however, certain social circumstances (e.g. the PBL setting) entail a formalised turn-taking system with different interactional entitlements and rights, which demands more of an institutional lens. In examining turn-taking, rather than isolating one turn from the rest of the talk in which it is based, CA focuses on action sequences as they unfold over a series of turns, as well as investigating the relationships between these turns; fundamental in elucidating how speakers make sense of one another in their ongoing interactions (Sidnell, 2009).

Therefore, a central tenet of CA is that actions are achieved by speakers' turns-at-talk, and that these turns comprise turn construction units (TCUs): the place in which the social actions are produced. TCUs are utterances in their own right, and are made up of a combination of grammatical features - sentences, standalone words, phrases and pauses - and phonetic properties (2007). A completed TCU must recognisably implement an action - that is, the speaker must make visible what they have 'done' (e.g. inviting someone for dinner) for the proceeding speaker to act on this (e.g. to accept or decline this invitation). When a TCU is finalised, an interactional point arises in which another speaker is, potentially, in a position to further the conversation - this is known as a transition relevance place (TRP). This TCU will also establish relevant responding turns, and may identify a specific participant to act as the next speaker (e.g. in the aforementioned invitation for coffee, the speaker would have, most likely, addressed a certain 'target' individual). However, the presence of a TRP in itself does not mean that a change of speaker is guaranteed: only that a transition is *relevant*. It may be the case that the TRP is not

acted upon by other speakers involved in the interaction, or that the current speaker - upon finishing their TCU - begins a new TCU.

3.2.2. Sequence organisation

In CA, interaction is viewed as being sequentially organised, where the production of one social action follows on from what precedes it, and in doing so, makes relevant the next course of action (2007). The unit of sequence construction in CA is known as an adjacency pair, consisting of two conversational turns which are produced by different speakers as they co-construct action through talk (Heritage, 1984). These adjacency pairs comprise a first-pair part (e.g. a speaker's invitation) and a second-pair part (e.g. the respondent's acceptance of this invitation), where the first-pair is delivered prior to the second-pair - thus making it relevant - and the relationship between the first-pair and second-pair makes sense (Stivers, 2012). That is, given there are various classifications of adjacency pair parts, a 'farewell' first-pair part (e.g. "goodbye!"), for example, should be met with a 'farewell' second-pair part (e.g. "see you soon!"), rather than a 'greeting' second-pair part (e.g. "hello!"). Therefore, with the exception of unconventional sequence organisations (e.g. storytelling), when a speaker takes a turn-at-talk, normal conversation holds that another speaker will respond to this turn, both promptly, and appropriately (Stivers, 2012). The speaker who first begins a conversational turn makes recognisable their production of a first-pair part, and upon its completion, they stop talking. In doing so, the next speaker then takes over the conversational floor in their production of a relevant second-pair part, allowing the interaction to proceed smoothly, and without complication (2007).

However, everyday interactions do not unfold in such an effortless fashion, in that conversational flow is frequently disrupted. First-pair parts place significant demands upon the speaker who is expected to fulfil the corresponding second-pair part (i.e. what is - and what is not - relevant), and it may well be that no other speaker meets these expectancies. They may reject or challenge the speaker's assessment, or a second-pair part may not be provided at all - these are examples of dispreferred turns (Pomerantz, 1984a). As much as disagreements/agreements are the focus of one of the analysis chapters, it must be noted that dispreferred responses are not limited to disagreements, declinations, or lack of responses only (Weatherall, 2002). In the case of self-deprecation (e.g. "I'm so bad at this!"), the preferred

response is, in fact, a disagreement response (e.g. “no you're not!”) and the dispreferred response would be an agreement. Dispreferred second-pair parts are problematic to the first speaker as they impede the motion of talk by making relevant an interactional problem which must be dealt with by the parties involved. These dispreferred responses are pivotal to the upcoming analytical chapters, and so, the notion of ‘preference’ will be discussed in more depth in the following sub-section. It should be noted that Schegloff (2007) also discusses adjacency pairs which exceed the aforementioned two-turn structure through the use of pre-sequences/insertion sequences/post-sequences in their sequence organisation, but these analytical insights fall outwith the scope of this thesis.

3.2.3. Preference organisation

When a student invites their peer to undertake a specific group role (“do you want to be the team leader this week?”), the respondent has three options: to accept, to decline, or to ignore the invitation. Here, there are a magnitude of potential approaches for providing an acceptance (e.g. “yeah!”, “if you want me to”, “aye, okay then” or “right, I’ll do it!”) or a declination (e.g. “nah, no way!”, “no thanks”, “nope” or “I don’t fancy doing that”), where both types of response constitute different social actions (2007). In CA terms, the respondent’s acceptance of the speaker’s invitation would be classed as the ‘preferred’ conversational response, in that it facilitates the accomplishment of the activity raised in the first-pair part (Pomerantz, 1984a; Sidnell, 2009). The declination - given that it hinders the first-pair part’s proposed activity - would thus be classed as the ‘dispreferred’ - or ‘negative’ - response, owing to the fact that preferred seconds are “the default or “response of reference”” (Schegloff, 2007, p. 66). Preference is seen here in terms of sequence design - that the first-pair part holds a strong preference for a preferred response - and not as being reflective of one’s inner psychological stance (i.e. someone’s personal preference).

Whereas preferred responses tend to be produced without delay, and within the transition-relevance place, dispreferred responses disrupt both the contiguity and the adjacency of first and second-pair parts (Schegloff, 2007). The structural makeup of a preferred response - succinct and explicit in establishing the action that it is doing - is in marked contrast to that of the dispreferred second (Levinson, 1983).

Dispreferred responses share core structural features with one another in that they are considerably lengthier than preferred turns, where they hedge around the action in question (e.g. disagreement), and are often coupled with prominent silences, elaborations, mitigations, accounts, and excusals concerning the absence of the preferred second-pair part (though it may not be the case that a given sequence involves *every* feature) (Pomerantz, 1984a). Schegloff (2007) and Sidnell (2009) provide valuable insight into the interactional practices which are prototypical of dispreferred responses, and I shall elaborate on these below:

Delays: In a dispreferred second-pair part, the transition-relevance space is not put to use. A noticeable silence may take its place before the production of the dispreferred turn, in what is known as the inter-turn gap. Relatedly, the turn-initial delay may involve the use of hedges and discourse markers as prefaces to the eventual production of the dispreferred response.

Palliatives and accounts: Dispreferred responses commonly coincide with hedges (e.g. "e::h it's not really (.) kinda (.) who knows"), accounts (e.g. "I can't do X because of Y"), and appreciations ("that's really good that you've started that… but"). These interactional devices are usually positioned early on in the turn as means of delaying the dispreferred second-pair part, and in working to defuse the respondent's negative stance. For instance, if a student was unable to meet with the rest of their group to finalise their team project before the deadline, they would provide an excusal that establishes their inability, rather than their *unwillingness*, to attend (e.g. "I would've come along to help you guys, but I have a shift tonight" positions the speaker's declination to the invitation as being out of their control). Similarly, if a student disagreed with another student's display of knowledge, palliatives and accounts serve to cast doubt on the validity of the knowledge, but do not explicitly disagree, as this could be threatening to their alliances.

Pro-forma agreements: Another potential attribute of dispreferred responses are agreement-plus-disagreement formulations. Similar to the aforementioned use of palliatives and accounts, explicit agreement components delay the appearance of the dispreferred response, working to soften the disagreement by way of presenting a preferred response first. These 'pre-forma agreements' (Schegloff, 2007) will be

discussed later as regular interactional features of the forthcoming analysis chapters, but for now, a brief example from McQuade et al. (2018):

Extract 3.1: An agreement-prefaced disagreement (Group 1)

1	**Paul:**	THIS *((points at worksheet))* cycles straight from the chemical
2		reactor
3	**Megan:**	but it's not going through-i:t's just going
4	**Paul:**	uh huh so that's the line *((points at worksheet))*
5	**Megan:**	**I see what you mean (.) it does look like (that) but** it's doing
6		thi:s-thi:s (.) wee loop *((points at worksheet))*
7	**Paul:**	**yeah but** (I'm) just saying that-I'M JUST saying that is pa:rt of
8		(it)
9	**Megan:**	**yeah (.) but then no (0.2)** it's just the line ↑you know? just
10		the line that I'm thinking about_hh

In this extract, two students are negotiating the latest PBL group task, and in the face of disagreement, there are several points where the speakers soften - and avoid - explicit disagreement through provision of agreement (noted in bold). For example, in line 5, Megan first displays alignment with Paul ("I see what you mean"), even justifying his mistaken stance ("it does look like"), before entering into her dispreferred response ("but"). Agreement-prefaced disagreements are illuminated again through Paul's responding utterances ("yeah but", line 7), and then in Megan's "yeah (.) but then no" (line 9) as means of hedging around their knowledge conflicts.

Pre-emptive reformulation with preference reversal: The production of adjacency pairs is a collaborative feat, and so, it follows that *speakers* - and not just the recipient - may jointly work around the production of dispreferred responses. If a first speaker, following production of their first-pair part (e.g. "did you finish your research?"), is met with the standard warning signs (e.g. silence) of an upcoming disagreement, this first speaker may be in a position to rework - by 're-asking' - their first-pair part (e.g. by reversing the question to "did you not manage all of the research?") so as to halt the dispreferred response (e.g. silence, leading to an eventual "no"), and to make a preferred response more achievable (e.g. the respondent's admission that they "did some of it"). In this way, there exists a means

through which the first speaker can avoid dispreferred responses - and encourage alignment - even after the production of the original first-pair part itself.

3.2.4. Repair organisation

In everyday conversation, speakers will - inevitably - encounter some degree of interactional trouble; that which halts the ongoing flow of talk. CA examines how speakers attend to and manage these problems in speaking, hearing and/or understanding. To add a further layer of complexity, however, these interactional 'problems' and 'troubles' may not be directly observable to the analyst as 'errors', as one may expect from the use of such words (Schegloff et al., 1977). Rather, as Schegloff (2007) notes:

> Recipients may apparently fail to hear, or mishear, utterances which are crystal-clear to others, and apparently have no problem with talk blotted out by a hovering helicopter. Not only are "obvious" troubles unaddressed; anything in the talk may be treated as in need of repair. (p. 100)

There are four main types of repair practices that are identifiable through the use of CA (Hutchby & Wooffitt, 2008). In each of these cases, there exists a strong structural preference in the turn organisation for self-repair over other-repair, where "the organisation of repair is the self-righting mechanism for the organisation of language use in social interaction" (Schegloff et al., 1977, p. 381). The orderly nature of conversation and the relevance rules which underpin its turn-taking system enable repair organisation, in that interactional trouble is pinpointed as lying within the previous turn, and is thus repairable for the purposes of restoring conversational flow once more. However, in the event of other-initiations of repair, the initiating speaker's turn may offer varying degrees of specificity in more precisely establishing the trouble source's whereabouts (Hutchby & Wooffitt, 2008). As I will explore in my own analyses, for instance, the respondent may offer only minimal detail regarding the interactional trouble (e.g. "what?" or "eh?"), their turn may be category-specific (e.g. "who said that?" or "where do you mean?"), or they may provide a 'diagnosis' of the problem, which is often coupled with humour by way of softening this initiation (Schegloff, 2007).

3.2.5. The embodied turn

In contrast to its earlier (limited) conceptualisations - in which the focus was on verbal production alone - research in CA (and beyond) now gives much greater recognition to the role of the body in interaction (Hofstetter & Keevallik, 2020; Mondada, 2016). This move towards the study of the interactional work achieved by our bodies - of the relationship between language *and* the body - in research on language and social interaction has been termed 'the embodied turn' (see Nevile, 2015 for a detailed overview of this movement). Embodiment refers to bodily aspects such as gesture, posture, and gaze, as well as speakers' engagement with the material features of their environment (e.g. handling notebooks, typing on one's laptop, or holding one's phone), to name but a few (Stivers & Sidnell, 2005). In this way, embodied interactional research seeks to understand how speakers make use of bodily and material resources - in addition to unpacking the lexical organisation of interaction - in their sense-making, and in bringing about social action (e.g. Goodwin, 2000; Nishizaka, 2017). As summarised by Wiggins and Cromdal (2020), "the body is thus never an isolated object but always part of a series of activities and actions, and it is the organisation and sequentiality of these actions that is of prime importance to CA work" (p. 8).

A wide body of interactional research has shown embodiment to be pivotal to the interactional negotiation of, for instance, assistance (Kendrick & Drew, 2016), understanding (Mondada, 2011), friendship (Goodwin, 2008), knowledge assembly (Frenz-Belkin & Kleifgen, 1997), epistemics (Koole, 2010), enactment (Wilkinson et al., 2010), and instructions (Kääntä, 2012), within a variety of naturalistic settings. In such studies, video recordings are necessary to capture these delicate verbal and bodily details (Hofstetter & Keevallik, 2020; Nishizaka, 2017). In fact, as per Mondada (2016), "what is distinctive about CA use of video is the careful and precise attention to temporally and sequentially organised details of actions that account for how co-participants orient to each other's multimodal conduct, and assemble it in meaningful ways, moment by moment" (p. 340). With this in mind, then, several segments of the upcoming analytical chapters include embodied features of interaction (with supporting screenshots), looking at how students make use of

bodily, material, and verbal resources in their sense-making practices (i.e., in tackling the PBL business).

3.3. The applications of CA

Although Sacks made little acknowledgement of the potential applications of CA (Antaki, 2011; Silverman, 1998), since its inception over 50 years ago, a wealth of applied research has established the methodology as "a powerful tool for social change" (Stokoe et al., 2012, p. 147). Driven by the many followers of Sacks' classic principles - to describe naturally occurring social phenomena - CA has become a concrete solution to a magnitude of interactional problems by providing detailed insight into what *actually* happens within varied settings of interest (Silverman, 1998). In fact, current developments in applied CA have emphasised a need for bettering its public engagement so as to exhibit its vast applications which are not restricted to academia alone (Albert et al., 2018). One of the most significant developments in applied CA has been the Conversation Analytic Role-play Method (CARM): "an approach to communication skills training that can be adapted to any sort of workplace or institutional encounter" (Stokoe, 2014, p. 256). In keeping with the ethnomethodological prerequisite for naturalistic data, CARM departs from conventional simulation approaches to communication skills training by avoiding the use of scripted discourse, instead presenting its participants with real-time analyses.

There has also been a plethora of CA-informed research in the medical field, but here I shall present only a small selection of such studies. As a recent example, Albury et al. (2018) examined GP consultations involving referrals to a weight loss service, where the structural features of 'well received' patient responses were identified in the aim of streamlining future interactions within this setting. Similarly, in the case of a patient caller's first request being unsatisfied, Stokoe et al. (2016) concluded that GP receptionists must offer an alternative course of action as means of reducing the stress inflicted upon the patient; central to maintaining their contentment with the GP service, overall. Furthermore - in what was a simple, but highly effective intervention - Heritage et al. (2007) demonstrated the impact of a singular word exchange during GPs' inquiries about further patient concerns, in that 'something' - as opposed to 'anything' - led to patients more readily expressing their

worries during medical consultations, thus making them available to the GP for resolution. Besides GP-based studies, Wilkinson (2011) overviews a longstanding intervention programme underpinned by CA research which examines and works to improve the interactions of couples involving a partner with aphasia.

Outwith its medical applications, Stokoe (2013) examined hundreds of telephone calls made to mediation services in the UK, identifying the recurrent interactional wrongdoings within these intake calls which seemed to result in caller disengagement. Sikveland and Stokoe (2016) then demonstrated the interactional power of call takers adopting the word 'willing' in their invitations to potential clients, in that callers were more likely to agree to embark on the mediation programme if they were approached in this way. Furthermore, Sikveland et al. (2020) - using data involving police negotiators and emergency dispatchers - put into question the widely encouraged communicational practices for effectively dealing with suicidal persons in crisis. In clear opposition to the standard guidelines received by negotiators, the researchers showed how challenges to resistant responses could *positively* impact shifts in suicidal behaviours. As a whole, these studies provide only a glimpse into the wide-reaching impact of applied CA in terms of the disciplines and subject areas it has touched upon, but what I hope to have established is its capacity to make clear interactional recommendations for improved practice in a variety of settings; recommendations of which "will be an order of magnitude more precise and detailed than the kind of generalised advice one sees in text-books; based on folk theories or experiential reports of interaction, or on simulated encounters" (Stokoe et al., 2012, p. 487).

Antaki (2011) describes various forms of applied CA, but here we shall focus specifically on the institutional applied model of CA, as it is this which best describes the methodological approach taken in the current study (i.e. a project in which the discourse is situated institutionally). Although the distinction between institutional talk and ordinary conversation is not easily made - this is a whole topic in itself, as per McHoul and Rapley (2001) and Schegloff (1999) - differences *do* exist (Heritage, 2005), and these are shown through speakers' orientations to the institutions in question within their talk (Toerien et al., 2011). Unlike an informal chat with family or friends, for example, the participants in a PBL group have precise interactional goals (e.g. to work as a team to confront the academic workload) in accordance with

their institutional identities (e.g. students) (Heritage, 2005). In turn, group members' contributions to the educational business are more constrained, in that any knowledge shared must be relevant to the PBL task. To deviate from the PBL task requirements - or to refuse to participate at all - could obstruct students' institutional goals (i.e. they could fail the module in question). Furthermore, institutional talk may involve a specialised turn-taking system that differs from casual conversation (Drew & Sorjonen, 1997; Heritage, 2005). As will be illustrated in the analytical chapters, in floating facilitator PBL, for a student to interrupt another student as they are relaying their independent research findings to the group is a controversial move (i.e. one which violates the institutional turn-taking expectancies).

It is necessary to note that, in contrast with much of the applied CA research discussed in the previous section - which, in accordance with Antaki's (2011) overview, would be defined as directly interventionist in nature - the primary objectives of the current study are to explicate students' self-managed practices in PBL, as opposed to explicitly resolving any institutional problems. That is, contrary to its (misleading) name, institutional applied CA is less focused on application, and in this instance, is used to shed much needed light on a vastly overlooked institutional setting. As summarised by Antaki (2011):

> 'Application' here is more a redirection of the analyst's gaze – away from the ordinary conversation which made up the raw data of much of CA's early work, and towards the worlds of work and social institutions which impose their own imperatives on the exchange of talk. (p. 7)

In fact, most pertinent to the upcoming analyses is the absence of the authoritative tutor figure, and how this impacts on speakers' negotiations with institutional (i.e. formal) versus social (i.e. informal) demands (see Drew & Sorjonen, 1997). Although, this is not to say that there is *no* desire on my part to interactionally inform future practices in PBL; only that such suggestions come second to achieving my central goal of opening up the 'black box' that is (floating facilitator) PBL. The long-term intention is that more direct interventions could follow with better discursive knowhow on my part.

3.4. Methodological stance

Now, with the aim of tying up the previous discussions, this section will summarise the methodological assumptions of the thesis. Here, the corpus of student discourse is naturally occurring, in that it is not invented. Upon approaching the data for the very first time, rather than being guided by my own research interests or predetermined theory, I instead conducted an unmotivated looking (Psathas, 1995), allowing the speakers' orientations to guide the ensuing analyses, and the eventual development of my research questions. As discussed in some depth by Wood and Kroger (2000), however, the issue of discourse and its 'naturalness' is laced with tension. Whilst I do not delve fully into these arguments, there are two main points to be made in this respect. Firstly, as laboratory or interview-based discourse is inevitably clouded by the researcher's motivations, such data cannot be used as a substitute for what *is* naturally occurring (i.e. the present corpus of PBL talk was the singular means though which I could access students' actual collaborative practices). Further to this - and as discussed in the next chapter - although the students were aware that I was video recording them, the 'naturalism' of the data was preserved by my not being involved in actively contributing to the discourse (e.g. I was not one of the PBL tutors steering the groups' conversations), and by minimising my contact with the participants as much as was possible (e.g. when arranging the recording equipment).

As discussed previously, CA also acknowledges that certain interactions are more 'institutional' than purely 'ordinary' in nature (Antaki, 2008). This, perhaps, provides the strongest rationale for my adoption of CA, in that its 'applied' models (section 3.3.1) are not blind to the institutional dimensions of students' group interactions (i.e. talk as being moulded by the pedagogic goals of the institution in which it is situated). Additionally, CA regards human discourse as having a normative order, but for the speakers themselves, the systematic nature of their talk tends to go unstated (Heritage, 1984). CA brings these underlying norms to light through the identification of deviant analytical cases (Wooffitt, 2005). For instance, when a speaker deviates from the typical patterns of interaction (e.g. a student who formulates an explicit disagreement against another student's knowledge display), they breach the conversational expectancies of the institution. Such departures are

marked as unusual by other interactants via their actions taken to remediate matters, and in orienting to these norms, they are made available to the analyst (Wetherell et al., 2001). This focus on interaction as being moulded by normative expectancies is unique to CA, and is what sets it apart from other related methodologies (Wooffitt, 2005).

Similarly, whilst the interactions of interest are situated within the university environment, it is not the learning content (e.g. the technical engineering knowledge that is being discussed in PBL), nor its factual accuracy that is of relevance to CA. The analyses, instead, centre on speakers' orientations - their conversational practices (embodied and verbal) for attaining joint understanding, and what they position as being the 'truth' - in providing empirical insight (Wooffitt, 2005, ten Have, 2007). Ultimately, the analyst's goal is to document the social organisation of real-time talk, offering no speculation beyond what is occurring in that moment, nor making any assumptions regarding students' cognitive states.

3.5. Chapter summary

This chapter discussed the ethnomethodological origins of CA, before considering its core principles, and how they will drive the upcoming analytical chapters. CA has also been established as the most appropriate microanalytic approach in finely examining the mechanics behind students' naturalistic group practices within the institutional setting (i.e. the tutorless PBL setting).

4. METHOD

Now that the methodological principles of conversation analysis (CA) have been covered, the discussions in this chapter involve its associated methods and practicalities, as relevant to the thesis. An overview of the recruited participants is first provided, before the ethical dimensions of the study are considered. The particulars of the study's four phases of data collection - such as the number of PBL sessions captured, the amount of footage obtained, and the educational setting in which the studied interactions are situated - are then detailed. This is followed by a discussion of the Jefferson (2004) transcription system, as adopted in the present analyses. Towards the end of the chapter, practical challenges arising from the use of video-recorded data, such as participant orientations to the cameras, and incomplete recordings, are touched upon.

4.1. Participants

39 students in their third year of a chemical engineering undergraduate degree were video-recorded during a series of PBL sessions, spanning four phases of data collection in total (November 2015 - November 2018). In the first two phases of data collection, participants were randomly allocated to their groups by the class leader, whereas in phase 3, the class leader arranged the student groups in accordance with their scores on Belbin's (2010) self-perception inventory. The only self-assembled group - due to a lack of volunteers - was encountered in the final phase of data collection. Further elaboration is provided in section 4.3.

An overview of the participants - and the PBL sessions they were involved in - is provided in table 4.1. The discrepancies in the scheduled length of the PBL sessions and the actual number of hours recorded arose from two main factors outwith the researcher's control. Firstly, although the students were advised to work for the entirety of the allocated PBL session, many groups did not. Secondly, technical difficulties with the recording equipment meant that some PBL sessions were not captured in full. This was most problematic during the first phase of data collection, where older (and, as I later discovered) faulty cameras were in use (see section 4.5, also).

4.1.1. Demographics

As discussed previously in the methodology chapter, the emic lens of conversation analysis hones in on its speakers' orientations, which makes the analyst's own categorisations analytically redundant. This is not to say that participant demographics are unimportant; only that they are of little relevance to CA, where naturalistic talk should be untainted by the researcher's labels as much as is possible (Psathas, 1995). For example, gender, class, and race - 'classic' demographical concerns - become issues *only* when the speakers themselves make these topics publicly available in their discourse (which, throughout the present data corpus, they did not).

Table 4.1: Overview of recruited participants and recorded PBL sessions[2]

Group	Recording period	Members	Group formation	Number of PBL sessions*	Number of hours recorded
1	Phase 1: November 2015 - March 2016	Jordan Megan Michael Paul	Radom allocation by class leader	6 *(6 weeks of 1x2 hour sessions)*	8
2		Arthur Finn John Tommy		6 *(6 weeks of 1x2 hour sessions)*	4
3	Phase 2: October 2016 -February 2017	Annie Callum Craig Laura Linzi Molly Sharon	Radom allocation by class leader	10 *(10 weeks of 1x2 hour sessions)*	10
4		Hannah Josh Katie Matt Oliver Ryan Yasmin		10 *(10 weeks of 1x2 hour sessions)*	13

[2] *The length of the PBL sessions refers to timetabled hours, but as reflected in the significant variations in the amount of hours recorded, very rarely did students actually make full use of this allocated time.

5	Phase 3: September - November 2017	Aaron Conor Eva Jamal Richard	Allocation based on Belbin (2010)	19 *(1 week of 1x1 hour session; 4 weeks of 1x2 hour sessions + 2x1 hour sessions; 1 week of 1x1 hour session + 1x2 hour sessions; 1 week of 1x2 hour sessions)*	23.5
6		Adam Emily Grant Liam Nick Robert		19 *(1 week of 1x1 hour session; 4 weeks of 1x2 hour sessions + 2x1 hour sessions; 1 week of 1x1 hour session + 1x2 hour sessions; 1 week of 1x2 hour sessions)*	20
7	Phase 4 September - November 2018	Bella Carrie Kadisha Lily Norman Ronald	Self-assembled	14 *(7 weeks of 2x2 hour sessions)*	20
			TOTAL	84	98.5

4.2. Learning setting

Each week, the groups were presented with a new PBL case. These PBL cases were framed as though students had received an email from KUL Engineering, the (hypothetical) company they were interning for. As shown in appendix C, the needs of the client were loosely described, but with no clearly defined instructions attached (an intentional move, designed to encourage students to collaboratively construct their own plan of action, and to generate their own learning issues). Typically, the PBL tutor would greet the students at the very start of each session, presenting them with paper copies of the week's case (and any supporting materials), and then giving them a few moments to digest its contents, before offering a general explanation (and sometimes reflecting on outstanding issues from the previous week).

As per Maudsley (1999), PBL tutors "must use their expertise subtly and sparingly, and balance this with an informal empathetic style" (p. 657). Therefore, the PBL tutor - 'floating' between a few PBL groups, situated in different classrooms - would revisit the students at least once more in any given session, questioning their decisions, probing their knowhow, challenging their learning objectives, and offering their own suggestions (e.g., by referring students back to relevant prior learning). In

doing so, the tutor would also make use of the prompts provided on their specially adapted version of the PBL case, as created by the class leader (also visible in appendix C). In standard PBL - that is, when the groups have an allocated tutor - the tutor remains in close proximity with the students throughout, meaning that there is greater contact time, overall. However, as the intention in all modes of PBL is to empower students with their learning, a great deal of this contact time involves the tutor spectating - as opposed to contributing to - the students' interactions.

In line with common pedagogical practice (e.g. Wood, 2003), each week, students received a lecture - reflecting on the previous week's PBL session(s), and providing an overview of the core (and, sometimes, more difficult) engineering concepts relevant to the upcoming week's PBL case - prior to the PBL session. At the end of each week, the groups were required to submit a collaborative mini report with their solution to the PBL case at hand, with prompt feedback offered the following week by the class leader. These mini reports were worth only a few marks, but offered invaluable feedback, relevant to the final, and much larger, group project (e.g., involving the design a power plant from new), which made up the majority of the module credits.

4.3. Ethical considerations

Ethical approval for the study was granted by two separate departmental committees at the university in which data collection was based. Prior to any video-recording taking place, an information sheet and consent form was given to each participant (see appendix A). This information sheet provided a basic overview of the research aims - to video-record, and to later examine, student interactions in PBL - as well as detailing what would be required of them as participants; that is, given the naturalistic stance of the study, the students were to behave as they normally would during any academic group work. It must also be noted that participants were repeatedly assured - both verbally by the class leader, and within the information sheet - that their involvement in the study would be of no detriment to their academic performance, and that they would receive the same level of contact with the PBL facilitator, as well as the exact same case materials, as the rest of their non-participating colleagues. That is, although the rest of the class were based in one

large university room along with the class leader and the PBL facilitators, in line with the PBL approach utilised in the current study - the floating facilitator model (Allen et al., 1996) - *all* students received only intermittent contact with said tutors, and were expected to self-manage their efforts, instead. Once participants had been given adequate time to process this information, they were asked to sign their consent forms, which were stored in the locked office of the principal investigator.

Participants were made aware that the video recordings would be studied at close range by the research team (comprising three supervisors and their two PhD students - myself being one of them), and that - for the purposes of capturing, for example, eye gaze and facial expressions - it would not be possible to blur or distort their faces. Participants also consented to their faces being shown as part of research dissemination (e.g. the inclusion of screenshots in journal publications, or using short video clips during conference presentations). To maintain some degree of confidentiality, pseudonyms were used in place of the participants' real names, including where reference was made to individuals outwith the recruited groups (e.g. classmates or lecturers, as was often the case). Participants were advised that they could withdraw from the study, and that any footage involving them would be destroyed, so long as this was communicated to the researchers prior to the end of data collection. Throughout the entirety of data collection, however, no one participant expressed any apprehensions about being recorded.

Institutional contexts bring their own, unique sensitivities, meaning that there is a need to remain ethically reflexive *throughout* the entirety of the research process (Lester & O'Reilly, 2018). Naturalistic study can be highly unpredictable; there is no interview schedule, nor any gist of participants' main talking points beforehand. Therefore, whilst the 'naturalistic-ness' of the data corpus was central to the methodological stance of the thesis, the ethical aspects of the process were treated as unfolding, and I was prepared to intervene in data collection, where necessary. For example, there was an instance where students were offensive about PBL tutors (i.e., far beyond the usual levels of mockery) who also happened to be members of the research team involved in viewing the recordings. These members of the team decided that they would overlook such name-calling on this occasion, but we agreed that, in line with university policies, we would not tolerate another incident of this kind, and would disturb the 'naturalness' of data collection if required. As a research

team, we also agreed that, in future projects, no member should be involved in the teaching of a class presently under observation.

4.4. Data collection

Participants were video-recorded during PBL sessions at the same time as the rest of the student groups undertaking the chemical engineering-based module. Whereas the other PBL groups were based within a large university hall, however, the video-recorded groups were provided with their own private rooms (see figure 4.1, below) with the aim of maximising the quality of the data to be collected.

Figure 4.1: The standard arrangement of recording equipment in a private PBL room.

As before, the recorded groups received the same PBL cases and materials - and at the same time - as the rest of the class. Whilst the physical presence of the tutor was reduced for the video-recorded groups (with all tutors being based at a nearby university building in which the main session was taking place, and only visiting the recorded groups when necessary), the level of tutor *participation* was the same across the entire class. For example, at the beginning of every video-recorded PBL session, each student group was greeted by a tutor - for the sake of consistency, this was usually the same individual - who would ensure the groups were on-track with their work, and would provide them with instructional materials relating to an open-ended engineering problem that they were to collaboratively solve (a minimum of one new PBL task was provided each week). The tutor would exit the room, and

would only return towards the end of the session to conduct a summarisation of the group's learning, and to assess their plans for the subsequent meeting.

During each PBL session, two small and (relatively) unobtrusive video cameras were used to record the participating student groups. The cameras were placed on tripods, and situated opposite from one another around the table - i.e. the students' working space - so as to make each group member observable to the analyst. In the aim of capturing the entirety of each PBL session to be recorded, where possible (e.g. when the private room was not in use beforehand), the recording equipment would be arranged in advance of the students arriving. Failing this, the cameras were set up by the researcher as the students arrived at the room. In all instances, as soon as the equipment was arranged, the researcher would exit the room, engaging in only very minimal communication (and nothing related to the PBL teaching) with the students so as to avoid tainting the ensuing interactions. The researcher would, however, remain in close proximity to the filming locations to collect the recording equipment should the students decide to terminate the PBL sessions earlier than the arranged times, or in the case of any arising technical difficulties.

Only when the students left the room were the cameras powered down and disassembled. After each PBL session, the recorded video files were downloaded immediately to an encrypted university network, and then - in line with the research team's data management plan - to a password-protected external hard drive, which was stored in a locked unit within the office of the main analyst (myself). Beyond my supervisors and I, no other individuals were permitted access to these raw recordings. The cameras' memory cards were formatted to ensure availability of storage for the next PBL session. An attempt was also made to fully recharge the cameras for the subsequent recording date, but in some cases, the gap between PBL sessions was too small, and this was not possible (thus resulting in missing footage).

The total data corpus consists of 84 PBL sessions in total, comprising 98.5 hours of footage (see table 4.1, above, for a detailed breakdown of this data). Overall, the recording process was identical across the four phases of data collection, but the processes of recruitment differed slightly, as detailed below:

4.4.1. Phase 1

The first phase of data collection coincided with my primary supervisor's first year as class leader of the chemical engineering-based module under exploration. After identifying an opportunity to capture a large body of educational data for the purpose of pedagogical enhancements, ethical consent was attained in late September 2015, and during a lecture the following month, the class leader provided students with a brief overview of the research project: to video-record, and later analyse, the interactions of student groups engaging in PBL. If interested, students were invited to approach the class leader at the end of the lecture, or to contact any member of the research team (whose information was provided in the lecture slides) for further details. In turn, two student groups - who had already been randomly assembled by the class leader at the beginning of the module - expressed interest via email, and later provided written consent.

Groups 1 and 2 were recorded across 12 PBL sessions in total (six per group), with the students being allocated a two-hour slot during each of these six weeks. Due to the researcher's external circumstances in early 2016, the planned schedule for data collection was impacted significantly, which explains the relatively scarce number of PBL sessions recorded across this larger timeframe (October - March). Relatedly, only 12 hours of recordings were accumulated throughout the entirety of phase 1, owing largely to technical difficulties with the video cameras (which were replaced in time for the commencement of phase 2), and the students departing the sessions much earlier than had been scheduled.

4.4.2. Phase 2

Due to unavoidable delays in finalising ethical approval, participant recruitment for the second phase of data collection was not possible until week four of the first semester (October 2016), at which point the class leader - at the start of a lecture - presented the project aims to this new cohort of students. As means of encouraging participation - a significant concern, given I was a month behind schedule for data collection - during this lecture, three of the previous year's student participants voluntarily shared their positive experiences of partaking in video-recorded PBL. Soon after, two groups - who had already been randomly assigned together by the module leader - contacted the project team to express their interest in becoming

involved. As before, the students received information sheets, and then provided written consent, prior to any data collection taking place.

Each of the groups were video-recorded across 10 sessions of PBL (20 in total), receiving a two-hour session each week for 10 weeks (October - February). This provided 23 hours of recordings, overall.

4.4.3. Phase 3

The third round of data collection involved two student groups who were recruited in the same fashion as above, but had previously been assigned to these groups through the class leader's use of Belbin's (2010) self-perception inventory, rather than being randomly assembled. The two groups each received 19 sessions of PBL (38 in total), and produced 43.5 hours of video-recordings (the largest amount yielded by any of the four phases of data collection) during the period of September - November 2017. There were considerable variances in the timetabling of the sessions, as summarised above in table 4.1. Nick - of group 6 (of whom are pictured in figure 4.2) - was a chemistry, rather than a chemical engineering, student.

Figure 4.2: Group 6 shown in the typical PBL session.

4.4.4. Phase 4

The fourth and final phase of data collection took place within the first semester of the 2018-2019 academic year. On this occasion, only six students registered their interest in becoming participants of the study, and so, it was not possible to mould the groups according to Belbin (2010), as in the previous phase of data collection. Soon after video-recording of the group began, the students made the researcher

aware that they were friends, and had coordinated their voluntary participation in the study by sending individual enquiry emails, one after another. It is on these grounds that group 7 were classed as being the only self-formed group of the study, overall. In total, 14 sessions of PBL involving group 7 were recorded - providing 20 hours of footage - with the students receiving two-hour sessions twice per week over the course of three months (September - November).

4.5. Data analysis

As touched upon in the methodology chapter, the first stage of analysis involved an 'unmotivated looking' at the data (Psathas, 1995). That is, I approached the recordings with an open mind, immersing myself in the naturalness of the PBL sessions (selecting a few from each of the groups) to gain a broad sense of the interactions taking place. Given the educational context within which the data is situated, however, it is inevitable that this shaped my analytical lens, at least to some degree. Although, most important was that I resisted any early theorising; that I truly was driven by my data.

My engagement with the data corpus eventually led to the identification of phenomena of interest. Notably, what struck me was the sheer volume of disagreements; their lengthiness, and the recurring features that came with their production. I was confident that I had located a regular interactional practice within the data. With a basic sense of this disagreement phenomena, I then sought to build a collection of similar recordings by consulting all of the PBL groups. This was an intensive process - resulting in an extensive catalogue of video segments - but was pivotal in ensuring that I had captured sufficiently all variations of the disagreement sequences, in all of their intricacies (e.g., looking at how different variations of disagreement were oriented to in different ways by the students). I coupled this systematic review of the data corpus - in its entirety - with regular data sessions, which often led to other potential avenues of investigation.

In establishing the boundaries of the analytical phenomena, I came to the realisation that many of the instances I had compiled did not fit so well with the other disagreement formulations. Although related, instead, many of the interactional occurrences concerned the issue of group participation, and the

presence of social loafing, which resulted in further consultation with the corpus for more instances of these types of talk. The case of Callum was most informative in this respect, given that his recurrent social loafing was marked as an explicit problem by his group members, unlike any of the other groups. I was, however, able to identify more subtle confrontations with participation issues within these remaining groups.

Around this stage in the analytical process - and as recommended by Hoey and Kendrick (2017) - I began to make use of established CA research on disagreements, before exploring CA work specific to educational settings (though found very little in relation to PBL and disagreements/social loafing, hence the objectives of my study). This literature encouraged me to consider not only disagreements, but agreements, too, resulting in me revisiting the data corpus in search of such formulations. The contrast between agreements and disagreements further enlightened me on the interactional mechanics between these so called 'preferred' and 'dispreferred' actions.

During this time, I also arrived at the CA works of Benwell and Stokoe (2002), which was crucial to my understanding of the interactional patterns I had identified thus far (e.g., the conflicting social and educational demands of the institutional setting). By this point, being highly familiar with my recordings, I was able to quickly draw clear similarities between our datasets in terms of how students conducted their educational business, and how they negotiated (what appeared to be) opposing identities. Armed with fresh insight, I revisited my data corpus again, eventually leading into the generation of the three analytical chapters as they stand (a process which, additionally, involved the identification of deviant cases as a means of demonstrating normativity of the major 'themes'). Each of the extracts presented within the thesis are fully representative of the data corpus as a whole. In selecting the final extracts, I made a conscious effort to showcase the presence of these interactional patterns across all of the groups, but it is inevitable that some of the groups' extracts were, simply, more striking than others (hence the uneven distribution in places).

4.6. Jeffersonian transcription

In CA, the transcription of data marks the beginning of the analytical process. Whereas the collection of data tends to be relatively straightforward, transcription is intensive, and places considerable demands upon the researcher (Wooffitt, 2005). For example, in other qualitative methodologies it is possible to use automated audio-to-text transcription software, whilst in CA, the analyst has no option but to manually engage with the transcription of their data. Given the complexities of the Jefferson (2004) system in terms of how it describes human interaction, coupled with the inevitable overlap of speech which accompanies the naturalistic talk of social groups, CA-based data is, largely, incompatible with the capabilities of current technology.

In consideration of these challenges, first-pass transcripts - those which involved only the spoken utterances themselves - were initially produced for each of the video-recorded PBL sessions. The use of these basic transcripts - a common procedure amongst conversation analysts - resulted from the enormity of the data corpus and the resources of a single analyst (myself), whilst assuring immersion with the data, nonetheless. Each PBL session was transcribed individually, with supporting timestamps from the videos provided to ensure the raw data could be revisited at ease. Where two camera angles were captured, iMovie - a video editing application - was used to synchronise both videos into one file. This application was also used to enhance the quality of the recorded audio in all of the videos, and although this was a timely procedure, the clarity of the recordings was improved significantly. To maintain an organised catalogue of data, individual folders were created for the four phases of data collection, with each video file titled according to the group number (1-7), the PBL case number, and the date of the PBL session. The transcripts were named in correspondence with these data file names in the following format:

Phase4-2018 (Folder name)
Group1-Case1-291118 (Filename - video recordings and transcript documents)

However, first-pass transcripts provide the analyst with a mere starting point (i.e. to familiarise oneself with the arising conversational issues, and to take note of these), and are in no way equipped to methodically capture the interactional phenomena arising through talk. It was necessary, then, to refine these transcripts

through rewatching of the data, and by adopting the conventions of Jefferson (2004) (see appendix B).

The rigorous Jefferson (2004) system - universally accepted as the prime transcription measure by conversation and discursive analysts alike (ten Have, 2007; Wiggins, 2017) - examines the delivery of talk, highlighting changes in speed, intonation and volume, as well as pinpointing emphases placed on specific utterances, and the presence of pauses, which are measured to the second (the full system as used in the present thesis is provided in the appendix). The Jeffersonian stance posits that all structural features of interaction must be captured with a fine-grained lens, meaning that transcripts should be exhaustive if they are to satisfy the central goal of any CA; to elucidate the *how* of what is interactionally being *done* (Hoey & Kendrick, 2017; Lerner, 2004; Schegloff, 1999). Speakers' embodied conduct (e.g., shifts in gaze, or the handling of physical objects) was relevant to several areas of the analysis, and in these instances, embedded screenshots are included as part of the transcripts (Ayaß, 2015; Selting et al., 2011).

Upon initially identifying the recurrent interactional features of the data corpus - the most prominent of which involved the clear tensions between the institutional demands of PBL (e.g. disagreeing, and dealing with unequal participation), and the less formal expectancies that come with 'being social' (e.g. being seen as non-authoritative, and as a 'normal' member of the team) - I revisited the raw data, and more thoroughly inspected the organisation of these sequences. As means of maintaining the accuracy of the transcripts, and ensuring the validity of the analytical findings, I engaged in frequent data sessions with the research group in which my PhD is based, as well as branching out to external groups in the field of CA (e.g. SEDIT).

4.7. Practical issues

The students were made aware of the naturalistic stance of the project in that they were not expected to alter their behaviours in any way, and that the class leader would not observe any of the data involving them until teaching of the module had been completed. However, it is inevitable that the unfamiliarity of the educational setting (e.g. the physical presence of the recording equipment) would have some influence on students' interactions (at least initially). As in extract 4.1, below, there

were occasions where students made explicit acknowledgement of the cameras, often coupling these accounts with laughter and displays of humour:

Extract 4.1: Group 3

1	**Laura:**	↑why are we e:ven still doing these (.) when we're having (0.2)
2		a ↓design::?
3	**Sharon:**	yeah
4	**Laura:**	>like ↑why is she still giving u:s these ↓cases?<
5		(0.6)
6	**Laura:**	○**I sa::id tha:t on camera£**○
7	**Callum:**	the firs-first semester of third year is the wo::rst-

Where direct orientation was made to the cameras, this tended to be infrequent across the data corpus, and in the vast majority of instances, occurred only in the early phases of data collection (see figure 4.3 as an illustration of this). This may well be the result of students being engrossed in the PBL tasks; of them very quickly becoming accustomed to being video-recorded as they worked.

Figure 4.3. Group 1 are pictured waving jokingly at the camera during their very first video-recorded session.

A second practical issue encountered in the project was that of inaudible recordings. For example, in a few of the PBL sessions, after the researcher had arranged the cameras (and had left the room), some students arrived later than others, and often forgot to close the door of the private room upon their arrival. This meant that some of the audio was partially inaudible due to noise from the extremely

busy corridor in which the room was situated. Similarly, despite the researcher ensuring the lights were switched on in each of the filming locations during setup, some groups occasionally turned off the room lights, thus making their body language and use of physical objects difficult to decipher within their respective videos.

On a related note, the third practical concern of the study pertains to technical mishaps. For instance, in the earlier phases of data collection, several portions of data were lost due to malfunctions with the memory cards and batteries within the cameras being used, meaning that each PBL session was not captured in full, as planned. This explains the disparity in the number of PBL sessions that were supposed to be filmed, and the eventual number of recording hours that were actually obtained (as in table 4.1).

4.8. Chapter summary

The role of this chapter was to detail the study's methods on a step-by-step basis. I discussed the practical aspects of the thesis, ranging from the recruitment of participants, and the (ethical) collection of data, to the use of the Jefferson (2004) transcription system, and the challenges that come with audio/video-recorded data. Both the methodology - chapter 3 - and the recently detailed methods of this study are neatly connected, and serve as a preface to the analytical explorations of which I am about to embark on in chapter 5.

5. STUDENT IDENTITY

The aim of this first analytical chapter is to document the inner workings of floating facilitator PBL. In conventional university learning, the distinction between tutor and student is clearcut, where the tutor typically serves as the all-knowing figure of authority of whom the tutorial group are dependent on. In contrast, tutorless approaches to PBL involve a shift in power dynamics, where the students themselves are (expected to be) accountable for their own progress. As this chapter will detail, however, in what is an added layer of complexity to the students' collaborations, rather than the groups embracing the newfound learner autonomy granted by tutorless PBL as intended, they are, instead, highly resistant of any conversational moves (e.g. openly taking on the role of group leader, delegating the various components of the PBL task amongst one's peers, or showcasing one's individual competencies) that could threaten their status as equals.

The current analyses thus seek to illuminate how students - with no tutor to coordinate the educational business on their behalf - grapple with the unavoidable institutional responsibilities of 'doing PBL', *alongside* the (conflicting) social norms which demand that one does not stand out amongst one's peers (e.g. by being seen as overly authoritative, or as too clever). These interactions entail substantial identity work - often convoluted and contradictory in nature - and, ultimately, appear to be driven by a persistent avoidance of being substituted for the absent tutor. The analyses provide evidence of identity as a fluid and discursive achievement, providing novel insight into *how* students actually make sense of who they are to one another within the student-driven learning environment (Benwell & Stokoe, 2006; Wiggins et al., 2020).

5.1. Establishing collective responsibility

To begin, we will first consider the standard interactional work associated with the organisation of tasks in PBL. As above, whilst in traditional university tutorials the tutor tends to oversee the delegation of work, in tutorless and floating facilitator PBL, once the students have been presented with the session's materials, they are left to navigate matters for themselves, with just minimal tutor contact thereafter

(Woods et al., 1996). As a guide to their self-regulation, during the first PBL session, all students were required to construct a shared group contract, and a schedule for the weekly rotation of PBL roles. However, as the next few extracts will elucidate, students tended to neglect the agreed protocol of their respective group contracts, and were resistant to the notion of individual members fulfilling specific PBL roles - especially in the case of the leadership position. As a result, the organisation of each PBL session was considerably convoluted, where the enactment of educational agendas were very gently nudged ahead through lengthy clarification talk (see Stokoe, 2000) which involved the continual orientation to the collective responsibilities of the group, so as not to burden one member with sole accountability, as below:

Extract 5.1: Group 6

1	**Nick:**	[*((gazing at Liam))* [°I suppose we could even use-y-our phone to do it°
2		[(1.0) [*((Nick continues to gaze at Liam during this time, whilst Liam looks at his phone))*
3	**Liam:**	↓oh (0.4) [°I co-I could get that (0.2) jus' ↓now° [*((gazing at Nick briefly, before looking back at his phone))*
4		[(2.2) [*((Liam continues looking at his phone. Nick gazes at Liam, before looking at the documents in front of him on the desk.))*
5	**Emily:**	↓well (0.4) can we do th↑at? (.) can we get the-the
6		assignment [instructions up? [*((gazing at the projector))*
7	**Liam:**	yeah I'm gonna do that-right [now
8	**Emily:**	[right
9	**Liam:**	wa↑hoo£ [*((reaches for laptop and the connecting cables for the projector))*
10		*((Emily laughs))*
11	**Emily:**	right well we'll work on the questions (.) at the same
12		time so we won't (.) have to do work outside of those
13		(0.2) allocated times
14	**Liam:**	right (.) ↑SO so we're saying meetings on Mondays three
15		'til five? (.) we're all gonna be workin' on the questions
16		at the sa::me time? (.) what else?

Having recently received their materials for the first PBL case, in line 1, Nick initiates the group's transition into work mode ("suppose we could"), deviating from discussions about an event run by the university's engineering society (not included in the extract). This is a delicate interactional point, as related research - of psychology students in PBL - has shown how off-topic talk (i.e. that which is unrelated to the academic business at hand) serves as a space in which group cohesion is built (Hendry et al., 2016b). To deviate from this informal chat - occurring just a few seconds prior to the start of the extract - therefore, Nick's turn is designed in such a way that it takes a low modal stance ("suppose"; "could"), is presented to the entire group ("we"), and - through quietened speech - makes a suggestion, rather than a demand. As the speaker to lead these 'serious' discussions - in the midst of the group's fun - Nick avoids a forceful approach which could construct him as being overly authoritative, and as the substitute for the non-present tutor - a lingering concern for the speakers throughout the data corpus.

Relatedly, as the first respondent (line 3), Liam makes his move only after an extended pause (line 2), and like Nick, his turn features low modality ("could get that"), hedging ("↓oh (0.4) °I co-I could"), and is quietened in volume. In this way, Liam fulfils his social obligation to respond to Nick, but simultaneously displays hesitance in engaging with academia (e.g. the lowered pitch of the "↓oh" preface, and "↓now"). That is, Liam is cautious not to readily take on Nick's request, as such a move could construct him as 'the eager one', thus burdening him with primary responsibility for the PBL task; a clear threat to his unity with the rest of the group. This guarded approach is also apparent in Emily's entry to the conversation (lines 5-6) which follows on from another lengthy pause (line 4). Emily eases into her proffer (the decreased pitch of the "↓well" preface), and in making a call for action, she mitigates any authority through her inquisitive stance which requires the validation of her peers ("can we do th↑at?"). Furthermore, Emily builds on Nick's suggestion (line 1) that Liam loads the PBL instructions on his phone, but instead gazes at the projector as she speaks ("get the-the assignment instructions up?"). Here, her embodied actions (of positioning her body towards, and gazing at, the projector) make relevant the projector, without actually verbalising such a request (shown by Liam's acceptance of this in line 9, where he prepares the projector). In

doing so, she orients to the collaborative nature of the academic work, and the need for the instructions to be publicly available to the entire group (i.e. projected on screen), rather than being restricted to Liam's phone (where they cannot fully determine whether Liam is working or not).

It is after this point - having established the necessity of navigating the task together - that Liam is more forthcoming in communicating what he is setting out to do ("yeah I'm gonna do that-right [now", line 7), with his smiley voice ("wa↑hoo£", line 9) now lightening the serious tone of the previous lines. During lines 11-13, Emily then furthers the importance of their continued collaborative efforts ("we'll work on the questions (.) at the same"), framing them as the primary means through which they are to avoid working outwith official university hours ("have to do work outside of those (0.2) allocated times"). This interactional strategy was frequently identified throughout the data corpus; the notion that each group member must be equally engaged in the PBL work for the burden to be eradicated, and for their 'real' social lives to remain untouched. Here, Emily manages her investment in academia; it is not that she is acting as the dominant substitute tutor, or that Liam is being overly enthusiastic about the work at hand, but that they are merely protecting the group's personal lives from being encroached on. Once more, this is made explicit in the final lines, where Liam reaches out to his peers ("three 'til five?"; "what else?") to finalise (e.g. the repeated action-initiator, 'so'; Bolden, 2006) their *co-constructed* agenda ("we're saying"; "we're all gonna"; "sa::me time?").

In the next extract, we will examine the similarly prolonged nature of the students' interactions when confronting another dimension of PBL organisation: the allocation of group roles. Despite being advised to do so, each of the studied groups commonly overlooked the need to adhere to a weekly schedule for rotating the various PBL roles, with a particular resistance for duties associated with displays of leadership. In addition to this, during phase 3 of data collection, students were allocated to their PBL groups on the basis of Belbin (2010) scores. This measure was adopted by the class leader as means of exemplifying students' individual strengths and weaknesses, and from these, determining their ideal team position. It must be noted, however, that the analyst had no access to these scores, and that the analyses themselves are not guided by this insight. Instead, what is of interest here is how the students acknowledge - and negotiate - their existence, in that by following the

Belbin scores, certain members could be unmasked as stronger leaders than others, and thus, pushed into the substitute tutor role:

Extract 5.2: Group 5

1	**Richard**	are we::: gonna do lik- (0.4) a team leader and a scribe
2		↓again?
3		(0.8)
4	**Conor**	can I please not be scribe because I never brought my
5		ri:ght notepad in:: (0.2)
6	**Richard**	right ↓I: (.) I don't mind wri↓ti::ng (.) (.) if any of
7		↓you:: want to be team lead↓e::r
8		(1.0)
9	**Richard**	but see:: (0.2) remember ho:w- (.) she said like (0.2)
10		set (0.4) everyone find yo::ur (.) role that you're good
11		a:t (.) and stick with ↓that-
12	**Conor**	is that what she ↓sa:id?
13	**Richard**	no: like'd'ya know that we did that Be:[lbin thing
14	**Conor**	[ye:ah ↓yeah but
15		li::ke (0.2) y- (.) kinda (0.2) I don't know (.) the
16		thing i::s I don't know what the Belbin score:r-means£
17		(.) kinda:£ (.)
18		*((Richard laughs briefly))* (2.6)
19	**Conor**	I thi:nk we even probably all have-
20		(1.0)
21	**Conor**	erm (.) we're all (.) com-probably competent in leading
22		though y'know
23	**Richard**	yeah
24	**Conor**	not just one stand out person
25	**Richard**	yeah of course
26	**Conor**	but honestly (0.2) like see even when we do:: have a
27		leader£ doesn't really affect anythi::ng£ (.) ['cos like
28	**Richard**	[ye::ah
29	**Conor**	you would say like a:w you're the leader (.) but it
30		doesn't really change anything£

We arrive at this extract as Richard, in lines 1 and 2, raises the idea of

modelling the previous week's practice ("a team leader and a scribe ↓again?"). By referencing week one - the group's first PBL session together - Richard simply suggests a continuation of what went before, rather than actively calling for the allocation of PBL roles, which - as we shall soon see - is marked as a problematic move. Following a pause (line 2), Richard is met with little advancement, with only Conor focusing on what he would prefer *not* to do ("can I please not be scribe", line 3), providing a rather inadequate excusal ("I never brought my ri:ght notepad in::", lines 3-4), and making no acknowledgement of the "team leader" role. In light of his outstanding proffer, therefore, Richard - in lines 5-6 - refines his initial suggestion as means of better facilitating the group's task organisation; that he will do his part for the group ("I don't mind wri↓ti::ng") so long as his conditions are met ("if any of ↓you:: want to be team lead↓e::r"). Similar to extract 1, however, Richard is not forceful in his approach; regardless of his expectation that someone fulfils the position of leader, he presents this to his peers as a choice ("if any of ↓you:: want"), as opposed to a demand.

Despite Richard's voluntary gesture to serve as the session's scribe, he is unsuccessful in moving the group's organisation ahead (line 8's one second pause). This appears to stem from the risks which encircle the leadership role; that it is interactionally safe to publicly subscribe to note taking duties, but to be seen as willingly taking on a position of leadership inevitably elevates the speaker's status above that of their peers. Throughout the present analyses, speakers evaded displays of power and neutralised the concept of hierarchy in what seems to be a wariness of being thrust into the substitute tutor role. Subsequently, then, Richard (lines 9-11) invokes the absent tutor's supposed instructions as means of strengthening his proposal for progressing with the group work ("she said"). Richard prompts his peers to "remember" the tutor's directions that they were - according to him - all witness to; that based upon their individual strengths ("find yo::ur (.) role that you're good a:t"), they each attach themselves to a specific PBL role for the duration of their collaborations ("stick with ↓that-"). Rather than being met with alignment, however, in line 12, Conor cuts off Richard's turn ("that-") by putting his claims into question ("is that what she ↓sa:id?"). Here, it may be the case that Conor simply did not hear the tutor provide such information, or it could be that Conor doubts the accuracy of Richard's account itself, but regardless of his reasoning, Richard must promptly

attend to these matters, given his repeated inability to obtain any agreement from his peers (i.e. lines 1-2; lines 6-7; lines 9-11).

In line 13, note how Richard's talk veers away from the tutor, where he instead offers more concrete detail as means of increasing the likeliness that his proposal will be taken on board. By referencing the group's shared engagement with the Belbin (2010) inventory, Richard draws upon an almost guaranteed commonality, given that every student *had* to complete the survey before being allocated to their respective PBL groups. In line 14, therefore, Conor - at Richard's request - has little option but to acknowledge Belbin ("ye:ah ↓yeah"). Although, alongside this acknowledgement, Conor also establishes his unfamiliarity with "what the Belbin score:r-means£" (line 16), thus allowing him to maintain some distance from Richard's suggestion that they each fulfil a fixed group role. Notice how Conor uses smiley voice here ("means£", line 16; "kinda:£", line 17) so as to gently - rather than directly - resist Richard's proffers; resistance of which Richard orients to (line 18) through his brief laughter, and the extensive 2.6 second silence in which he offers no further response.

In line 19, it is Conor who advances the conversation ("we even probably all have-"), where he emphasises the group's sameness by constructing each member as "competent in leading" (line 21), rather than "just one stand out person" (line 24). It is intriguing that Richard now agrees with Conor's stance ("yeah", line 23; "yeah of course", line 25), but as the only member to have called for a group leader, to continue pushing this agenda could burden Richard with the role himself. In the latter phases of the extract, Conor then positions the notion of an allocated leader as being largely redundant ("when we do:: have a leader£ doesn't really affect anythi::ng£"). His repeated use of smiley voice trivialises the leadership role ("would say like a:w you're the leader") as though it will have no bearing upon the group's continued collaborations ("doesn't really change anything£") within the unregulated and informal space.

In summary of this extract, then, the above interactions are characteristic of the data corpus as a whole. Although groups 5 and 6 were made aware that their varying Belbin scores underpinned the makeup of their PBL groups, they were highly resistant of any moves which showcased these individual strengths amongst their peers. If we reconsider the resistance to Richard's proffers, therefore, it appears that

it would be problematic to the group's social unity - as equal speakers - if each member was to publicly disclose their Belbin scores, given that it would inevitably reveal the 'strongest' leader; a particularly sensitive topic of discussion. That is, rather than the leader role being treated as an aid to guiding the PBL work ahead, in light of the self-managed dynamics of the groups, demonstrations of authority jeopardise the 'average' student identity by forcing the 'offending' speaker into the absent tutor void (as will be discussed later in the analysis).

To close this analytical subsection on the collective - rather than the individualistic - construction of the PBL group, we will now explore the highly critical stances against the institution which were frequently embedded in students' interactions. Whereas their communications with one another were very carefully coordinated, this conversational policing was widely discarded when it came to condemning - and mocking - the PBL tutors, the content of the PBL tasks, and PBL as a pedagogical approach itself. Across the dataset, these moments of institutional criticism predominantly occurred when students encountered difficulties with the PBL cases, received poor tutor feedback on previous submissions, or were in the process of arranging the session's PBL group roles. In extract 5.3, below, a few minutes prior to the opening lines, the group attempted to organise the PBL roles, but these discussions were overridden by Josh's critique:

Extract 5.3: Group 4

1	**Josh**	I think (0.6) wha-wha:t have I ↓learned (.) from them?
2		(.) have they actual taught me anything? (0.2) and she's
3		no:t-○I've not learned anything○ *((shaking his head))* she
4		was being ↓so:-she's SO:: vague ↓bu::t (.) like you ask
5		for he::lp (.) she ↓doesn't he:lp
6	**Katie**	yeh
7	**Josh**	what are you meant to ↓do::? *((shaking his head))*
8	**Oliver**	should we sta::rt ○everyone::?○ (.)
9	**Ryan**	yea:h yeah
10	**Katie**	[yeah
11	**Josh**	[○couple of seconds○
12		(1.0)
13	**Ryan**	who was the ↓e:::m la::st (0.2) ↓leader and note (.)
14		[taker

15	**Josh**	[I think I wro::te last time (.)
16	**Oliver**	yea::h should we do me and you ↓again Josh (.) 'cos we
17		were (.) like the last up?
18	**Josh**	yeah (.) go for it *((nodding))* (.) ↓erm (0.4)
19	**Oliver**	↓right (.) see::: in the re↑po:rt (1.0) did she say at
20		a::ny point (.) to reference ba::ck to the cases? (.) is
21		that what she was saying?£
22	**Katie**	↑ye:::h-she ↓ne:ver said that while she (.) bu::t she
23		↑said we're meant to present as a company£ so why the
24		he::ll does a company know ↓anything about cases?£
25	**Josh**	exa:ctly

Throughout lines 1-5, Josh engages in extensive - and unrestrained - chastisement of the academic staff ("they") involved in delivering the chemical engineering module within which the PBL programme is based. In making these negative assessments, Josh constructs university learning as a one-sided transaction, in which the teacher's sole responsibility is to provide the submissive student with the required knowledge ("wha:t have I ↓learned (.) from them?; have they actual taught me anything?") (see Biley & Smith, 1999; Warnock & Mohammadi-Aragh, 2016). In what was a consistent finding across all of the groups, Josh overlooks the autonomy permitted by PBL - and the students' duty to self-manage their own work - as though he is being failed by the institution (○I've not learned anything○), much to his apparent frustration (lines 3's head shaking). Also making reference to the group's allocated tutor - who, in line with floating facilitator PBL, visits only intermittently - Josh notes that when reaching out "for he::lp", "she" provides no clarification ("she's SO:: vague; "she ↓doesn't he:lp", with emphasis placed on "↓doesn't") to aid the group's progression with the work. This picture of hopelessness is carried into line 7, in which Josh orients to their total isolation from support

("what are you meant to ↓do::?") and, yet again, appears to construct his exasperation with the process by shaking his head.[3]

Although they could quite easily access the spreadsheet - collectively designed in week one - which contains the full rotation of PBL roles for the semester ("who was the ↓e:::m la::st (0.2) ↓leader and note (.) [taker", lines 13-14), on their second attempt at establishing role allocation for the present session, the students disregard the use of this 'formal' approach by simply remodelling the previous week's practice ("should we do me and you ↓again Josh (.) 'cos we were (.) like the last up?", lines 16-17). While this involves the same members repeating the roles of notetaker and - more problematically - leader, here, this is not treated as a serious matter (e.g. Oliver's "yeah (.) go for it" in line 18). Instead, the organisational business is almost glossed over; deflected by their ongoing institutional criticisms, as below.

For instance, during lines 19-21, now that Oliver has been instated - albeit informally - as team leader, it is intriguing that his first interactional move is to invoke the class leader ("did she"; "what she") as the source of blame in his public 'sense-making' talk pertaining to the group's recently graded PBL report. Much like Josh's opening lines, Oliver makes indirect reference to the class leader's ill-defined instructions ("did she say at a::ny point"), as though *she* misguided their efforts in producing this report, within which they were criticised for failing "to reference ba::ck to the cases" (i.e. to consolidate the knowledge gained across each of the PBL sessions until that point). Oliver's use of smiley voice ("saying?£") in his final line indicates a degree of institutional mockery, where - ultimately - his utterances work to downgrade the relevance of his newfound position as team leader; that the PBL

[3] Despite Josh's claims that the tutor ignored the group's requests for assistance, upon viewing all tutor-student interactions throughout the corpus, it was often the case that the groups would candidly share their academic struggles with one another, but were far less forthcoming - sometimes, not at all - when it came to utilising the rare opportunity to consult with the tutor directly. Even when the tutor asked - explicitly - if there were any task-related queries or issues, and even when - just moments before the tutor's arrival - these proffers followed on from intense discussions regarding their need for help, students frequently declined offers of tutor support. There exist a multitude of potential reasons behind the students' apparent resistance to confide in the tutor (e.g. the fear of asking a 'stupid question'), but it must also be considered that the groups' supposed struggles and dissatisfactions with PBL were perhaps, to some level, exaggerated for the purposes of maintaining a clear, collective resistance against the institution (i.e. a place of common ground within the unfamiliarity of tutorless PBL, and thus, not necessarily something the tutor was capable of resolving).

roles are inconsequential in light of the group being bound by their subjection to this defective institutional treatment.

Katie, in lines 22-24, displays alignment with Oliver's proffers, where her repeated smiley voice continues this ridicule of the class leader, and trivialises the worth of the PBL report itself. Katie's talk is reflective of the overall corpus, in that students quite commonly questioned the 'real-life' dimensions of the academic work in terms of (in)accurately depicting the demands of professional engineering. In this way, Katie marks a misalignment between the class leader's (supposed) initial instructions for tackling the report ("she ↑said we're meant to present as a company£") and the feedback they received at the start of the present PBL session ("so why the he::ll does a company know ↓anything about cases?£"), as though they are victims of an institutional fault. This stance is bolstered in line 25, with Josh's definitive "exa:ctly" finalising their co-constructed resistance against academia, and thus, the insignificance of both the poor report feedback, and the PBL roles.

As a conclusion to this analytical subsection, the main point to be made is that, given the absence of the tutor figure, the allocation of PBL group roles may endanger students' unity by way of introducing a hierarchy (e.g. the team leader as a substitute for the tutor void). In turn, this discursive vulnerability was addressed in the form of speakers' constant reference to the collective duties of the group, an opposition to positions of authority, and negative assessments against academia; those which construct the institution as the common enemy as means of preserving their cohesion as students of equal status (i.e. 'us and them'). In this way, students were able to take on the various roles as necessary - and thus, drive the PBL process forwards - but with only very little interactional investment made, and their sameness intact.

5.2. 'Being an average student'

As covered earlier in the thesis, prior research on British university tutorials (e.g. Benwell & Stokoe, 2005, 2010; Benwell & Stokoe, 2002; Stokoe et al., 2013) showed how students - when in the presence of their peers - co-constructed the interactional expectancies of 'being a student' as entailing 'average' status, and by displaying a constant resistance to all things educational. To be seen as too intellectual, or as being too invested in academia, was to violate the 'normal student' identity: the

academically uninvested student who blends in with their peers. This interactional culture maps directly onto the present analyses, also, in which each of the student groups treated their academic business as a necessary evil - worthy of only minimal effort - and downplayed their individual competencies for the purposes of maintaining average, and equal, social status. Given the tutorless PBL setting under exploration, this discursive fight for sameness appeared to be intensified, in that violations of average status not only risked the speaker being 'othered' by their peers (e.g. being positioned as the group 'swot'), but could thrust them - involuntarily - into the position of substituting for the absent tutor figure - a prominent concern made clear throughout the entirety of the data corpus.

As a demonstration of the aforementioned conversational delicacies, we now turn to extract 5.4 as an illumination of the identity work demanded of 'being a student' in tutorless PBL. Here we see how vigilant the students are in their moderation of talk as it occurs, where the use of just one word on its own ("fun") is enough to jeopardise the maintenance of the average student identity:

Extract 5.4: Group 5

1	**Jamal**	so::mehow we'll be able to work out:: (.) the thickness
2		of: (0.2) the pi:pe
3	**Eva**	↑oka:y
4	**Jamal**	depending on what material we choose to use
5	**Eva**	okay (.) this really see::ms (0.4) more fun than case
6		(0.2) o↓twoo
7	**Jamal**	yeah
8	**Eva**	>not more fun bu:t less::< (.) ba::d (.) than case two
9		*((Conor and Jamal laugh briefly))*
10	**Conor**	FU::N? *((Conor frowns))*
11	**Jamal**	it makes-it ↑makes that nine o'clock ↑worth it-you know
12		how everyone wants some heat transfer in the morning£ (.)
13	**Aaron**	chill out
14	**Jamal**	ye::ah£

As shown in lines 1-4, Jamal and Eva are clarifying the objectives of the latest PBL task to be undertaken by group 5. What is of particular interest in this extract, though, pertains to lines 5-6, where Eva positions the present week's academic work

as more appealing ("see::ms (0.4) more fun") than the previous week's ("than case (0.2) ○↓two○"). Beyond Jamal's basic acknowledgement of Eva's evaluation ("yeah", line 7), nothing is offered by any of the remaining four students, which seems to trigger Eva's prompt downgrade in line 8 (">not more fun bu:t less< (.) ba::d (.) than case two"). Here, just a few seconds after her initial positive assessment of the work, Eva reformulates her stance, establishing the current PBL task as "not more fun", but merely, as more *tolerable* than the last; an important distinction to be made, as will now be discussed.

In line 9, Eva's backdown is met with laughter from Conor and Jamal, before Conor's loudened utterances in line 10 ("FU::N?"); stretched in sound, and followed by his frowning facial expression. In this way, it could be that Eva's mere use of the word "fun" is marked as problematic, as though it is unthinkable that academia could incite any enjoyment amongst the group. Alternatively, it could be that Eva's own reframing (line 8) of her original assessment (lines 5-6) is what opens up the space for the 'mockery' to ensue. This is also shown in lines 11-12, where Jamal - by referring to its undesirable qualities - mockingly positions the PBL session as a source of excitement, drawing upon its early morning scheduling ("↑makes that nine o'clock ↑worth it"), as well as the subject matter at hand ("everyone wants some heat transfer in the morning£"), which is spoken in a laughing voice.

Intriguingly, although Jamal only teasingly constructs the academic work in a positive light (lines 11-12), in line 13, Aaron instructs Jamal to "chill out" (line 13). This request is acknowledged by Jamal's smiley voice ("yea::ah£", line 14) and - most notably - the immediate discontinuation of his joke. Here, it may well be that even toying with the notion of violating the group's collective resistance against academia is too risky a move (see section 5.3), given that such utterances could be open to misinterpretation (i.e. that Jamal is serious in assessing the PBL work as being gratifying). Nonetheless, this extract is reflective of the analysis as a whole in that, following Eva's self-repair of her 'troublesome' talk - where the incompatibility between academia and "fun" is confirmed explicitly - the group do not linger on delicate matters surrounding identity, instead progressing with the actual PBL task itself (not shown in the extract).

In short, whilst it is most likely that the students experience *some* level of satisfaction from their academic studies - this seems to be inevitable given their

continued, and optional, enrolment in Higher Education - when amongst one's peers in the PBL space, to openly display enthusiasm for academia is to appear as too engaged in learning, which is at odds with the average student identity; the student who confronts what is required of them, but goes no further (Attenborough, 2011; Benwell & Stokoe, 2002). This recurrent interactional disconnection with education is shown in the next extract involving another of the PBL groups under study. In this excerpt, group 7 are featured in one of their first sessions as a group, and have been provided with guidance materials instructing them to develop a team contract, which is common practice in PBL (Woods, 1994). Kadisha - the session's notetaker - is asking each of her peers to provide their expectancies for their upcoming year of work together:

Extract 5.5: Group 7

1	**Kadisha**	right what do you want Ronald?
2		(1.0)
3	**Ronald**	at least four (.) meetings a week
4	**Bella**	°uho
5	**Carrie**	↑FO-
6	**Kadisha**	are [you joking?
7	**Lily**	[↑FO:UR MEETINGS IN A WEE:K?
8	**Norman**	no mother of God-no ↑no::
9	**Bella**	I don't know if he's kidding on or-
10	**Ronald**	I was
11	**Bella**	↑a::w oka:y
12	**Carrie**	oh my God that is such£-
13	**Bella**	I was gonna sa:y with ↑<u>your</u> schedule
14		*((group laughter))*
15	**Kadisha**	so like: one meet-one meeting a week?
16	**Ronald**	oh I-I-was
17	**Norman**	will we say minimum one: meeting a week?
18	**Ronald**	[I spend a long time planning a joke£
19	**Kadisha**	[a meeting's quite long anyways

At a first glance of the opening line ("right what do you want Ronald?"), Kadisha's invitation appears to grant Ronald with the freedom to respond as he chooses. However - following a one second pause (line 2) in which he seems to

ponder his upcoming decision - Ronald's suggested practice for the group's future PBL collaborations ("at least four (.) meetings a week", line 3) is confronted immediately with overwhelming resistance from each of his five peers (lines 4-9). As shown in line 4, Bella leads the opposition with her quietened, minimal response (○uh○). This is followed by Carrie's turn ("↑FO-", line 5) - increased in both pitch and volume - which is interrupted by Kadisha ("are [you joking?", line 6), with Lily's utterances - like Carrie's, heightened in volume and pitch - then produced in overlap ("[↑FO:UR MEETINGS IN A WEE:K?", line 7). As we move to line 8, Norman's surprise token ("no mother of God-no ↑no::") works to display both his disbelief, and his aversion to Ronald's agenda (Wilkinson & Kitzinger, 2006), whilst in line 9, Bella - similar to Kadisha in line 6 - raises the notion that Ronald's proposition may not be genuine ("I don't know if he's kidding on or-"); that he could not possibly be serious in calling for four group meetings per week, thus making available the interactional opportunity to retract his proposal.

Whilst we cannot determine the sincerity of Ronald's talk (i.e. whether he truly was joking, or not), line 10's interruption ("I was") - in which he states his humorous intentions - looks to be prompted directly by the aforementioned conversational backlash. It is only after Ronald detaches himself from this keen investment in academia (line 3) that the usual lightheartedness of the group's discussions are restored. In line 11, for instance, Bella's talk is risen in pitch and stretched in sound ("↑a::w oka:y"), whilst in line 12, Carrie's exclamation ("oh my God") and her use of smiley voice ("that is such£-") serve as displays of relief. Furthermore, Bella's reference to Ronald's personal life ("with ↑<u>your</u> schedule", line 13) - an earlier topic of discussion in this PBL session - functions not only as a joke (shown by the subsequent group laughter in line 14), but as an orientation to the group's co-construction of the student identity, where - at least within the *public* space - the social life takes priority over any academic endeavours (similar to extract 5.1). Effectively, so long as the minimum is being done, it is wholly acceptable to make public the intensity of one's personal life, yet highly problematic if the same is displayed in 'doing academia'.

In line 15, now that Ronald has eradicated the source of trouble, Kadisha uses the 'so' discourse marker to formally establish the group's agreed schedule ("so like: one meet-one meeting a week?") (Bolden, 2006). Notice how, in line 17, Norman

distributes Kadisha's proffer amongst the group (e.g. the "we" personal pronoun), before orienting to their collective responsibility to engage in *some* level of collaborative work ("will we say minimum one: meeting a week?"). That is, whilst Ronald's request in line 3 was marked as outrageous for the demands it would place upon the group, it is not the case that they can altogether abandon their shared 'doing education', either. 'Being a student' is underpinned by the achievement of institutional goals (e.g. completing the PBL task), and thus, a "minimum" - at least some presence of 'policing' - is necessary (Attenborough & Stokoe, 2012). In the final line (19) of the extract, Kadisha rationalises this decision; that "a meeting's quite long anyways", and that the group are doing all that is required of them (and no more). As a brief side note, it is notable that even after Ronald's initial clarification (line 10), he continues to account for his joke ("oh I-I-was", line 16); that it was, indeed, deliberate, and planned well in advance ("[I spend a long time planning a joke£", line 18), the firm assurance that this turn could not be anything other than a joke.

If we return to the opening lines, then, rather than Kadisha's request permitting any number of potential responses from Ronald, there are in fact significant interactional constraints regarding what is - and what is not - an acceptable proposition. Kadisha - as opposed to any of the other members - asks the question because it is expected of her as the current session's notetaker, and as the respondent, Ronald should impose only minimal workload on his peers, or risk being seen as too heavily immersed in academia. As well as impacting the students' confrontations with the PBL workload, in the next extract, we will now see how this educational resistance manifests itself in the students' use - and negotiation of - technical discourse (e.g. chemical elements and terminology). Whilst the student identity centres around average status - within which comes a degree of 'doing unknowing' - a chemical engineering degree *inevitably* involves significant quantities of technical - or expert-like - jargon, thus presenting a clear interactional dilemma which must be very sensitively navigated, as explored below:

Extract 5.6: Group 6

1	**Robert**	I was thinking for seve:n-eh do you understand all the
2		terminology-chemical jargon-should probably like:: (0.2)
3		talk abou::t (0.2) *((pointing at the worksheet))* all this

4		shite::
5	**Adam**	that's fine
6	**Liam**	and what's tha:t? *((pointing at the worksheet))*
7	**Nick**	that i:::s *((Nick looks at his notepad and then lifts his*
8		*calculator))*
9	**Liam**	U::M no tha:t *((pointing at worksheet))* pro thing
10		(0.6)
11	**Nick**	>OH THAT'S propanoic acid<
12	**Liam**	oright okayo
13		(1.0)
14	**Nick**	I can't say that->I don't even know how to say that<-pro
15		pro:pionic (.) pro-py:-anoi::c (.) pr-pro
16	**Liam**	yeah just go for it
17	**Nick**	PRO-PROPA-PROPAYON-propy:↑ioni:c
18	**Emily**	you're a ba::d chemist£
19		*((Emily and Nick laugh briefly))*
20	**Emily**	you should know thi:s£

Throughout lines 1-4, having read through the present week's PBL worksheet for several minutes now, Robert raises the group's need to confront "all the terminology" and "chemical jargon" required of question "seve:n". Given the misalignment of these actions with the student identity, however, Robert does not embark upon a straightforward initiation (e.g. 'we need to work out the terminology'), as the business of 'doing professional engineering' is one which must be delicately approached. Instead, Robert eases into his proposal as shown through low modality, hedging talk ("I was thinking for seve:n-eh do you"; "jargon-should probably like:: (0.2)"), and his speculative framing of the proposition ("do you understand") as means of involving all of his peers, rather than isolating one individual for an answer, or commanding group engagement. What is also striking is Robert's identification of the group's knowledge gap - he refers to the *task* of approaching the chemical terminology - yet his avoidance in actually verbalising any of the content itself ("talk abou::t (0.2) *((pointing at the worksheet))* all this shite::"). By negatively assessing the technical knowledge ("shite::", which is British slang for 'rubbish') and making the shared PBL worksheet relevant to the group, Robert

maintains a relatively uninvested stance, but also orients to the group's responsibilities to 'do education'.

Another point of interest in this extract relates to line 11, where Nick - in response to Liam's prompts for clarification ("and what's tha:t?, line 6; "tha:t *((pointing at worksheet))* pro thing", line 9) - accurately pronounces the "pro thing" (">OH THAT'S propanoic acid<") that Liam does not. Here, Nick demonstrates his readiness to satisfy Liam's queries, shown by the loudened "OH" discourse marker - 'oh' is often used to interactionally display recognition of one's prior knowledge (e.g. Heritage, 1998) - and the increased speed of his talk. And yet, following Liam's quietened response in line 12 ("○right okay○"), and the lengthy one second pause which ensues (line 13), Nick then makes the admission that he *cannot* pronounce this word ("I can't say that->I don't even know how to say that<", line 14), making his struggles clear to his fellow group members ("pro pro:pionic (.) pro-py:-anoi::c (.) pr-pro", lines 14-15; "PRO-PROPA-PROPAYON-propy:↑ioni:c", line 17). This stark - and contradictory - shift appears to stem from Liam's minimal uptake, in that, by positioning himself as being so well rehearsed in his technical register, Nick risks elevating his status from equal student member to expert. This is of significant concern to Nick, given that he is the only chemistry student - as opposed to chemical engineer - of the group; an issue of which is further addressed by the students below.

In line 16, for instance, Liam disregards Nick's 'difficulties' with pronunciation ("yeah just go for it"), as though his question has already been adequately addressed, and so, their continued discussions here are unnecessary. On the other hand, Emily treats Nick's mispronunciation teasingly ("you're a ba::d chemist£", line 18), orienting to his position as the sole chemistry student in their group, who - given his academic background - should know better ("you should know thi:s£"). Interestingly, Nick engages in this humour (line 19), making no attempt to resist or manage Emily's joking criticisms, given that they work to downgrade the expertise he - problematically - displayed earlier. It seems that it is interactionally safer to be constructed as the "ba::d chemist" than to risk one's average status by demonstrating technical competence. Nick is receptive to Emily's teasing because it serves to restore his sameness with his peers; that his chemistry background grants him no epistemic superiority in this respect.

Whilst the previous extracts show how students must be seen as interactionally neutral (i.e. the minimally prepared, non-expert) if they are to retain their average student membership, there is a fine balance to be struck, nonetheless:

Extract 5.7: Group 4

1	**Oliver**	did yous do much for thi:s?
2		(1.0)
3	**Ryan**	[nah
4	**Hannah**	[o↑na:::ho
5	**Oliver**	↑nah?
6	**Ryan**	na:h
7		*((Oliver, Ryan and Hannah laughing))*
8	**Ryan**	I jus' go- (.) got one picture up and then just wrote it
9		down£
10	**Oliver**	↑yea::h£ yeah I know I'm just gonna get a screenshot of
11		it-it's like what's the point of me rewriting it-it's
12		just gonna say the same stu:ff that's off the webpage
13		anyway
14	**Ryan**	yea:h£
15		(1.4)
16	**Ryan**	that lecture was pretty intense ↓ma:n

We approach group 4 at the very beginning of the PBL session, with three members having arrived in the room so far. As agreed in the last session, each student was to independently conduct research in preparation for the week's task; something which Oliver raises in the first line ("did yous do much for thi:s?"). Notice how Oliver frames this question in such a way that places very little interactional pressure upon his peers, asking only if they have done "much", rather than checking if they have completed the work in full. In this way, Oliver's question is open to the likeliness that his respondents - and, potentially, himself included - have only partially attempted their research; a likeliness which is confirmed via the successive 'no' responses throughout lines 3-6. The ensuing laughter of the three speakers in line 7 marks these admissions as acceptable; that engaging in only minimal preparation for the PBL session is deserving of humour, as opposed to concern, or disapproval.

To the same extent, however, as much as Oliver's question is accommodating of his peers having done just the bare minimum, he does *not* ask whether they have failed to attempt the work, altogether. From analysis of the corpus in its entirety, the act of 'doing nothing' was simply not a viable option within the tutorless educational environment; that which is completely reliant on each *students'* - rather than the tutor's - dedication to self-management. In fact, as will be explicated in the forthcoming social loafing chapter, to have made no contribution to the PBL task at all is as interactionally damaging to the preservation of the student identity as being *too* involved (e.g. the 'swot').

Orientation to these implicit group expectancies is shown in both Ryan's talk ("got one picture up and then just wrote it down£", lines 8-9) and in Oliver's rationalisation ("↑yea::h£ yeah"; "what's the point of me rewriting it"; "just gonna say the same stu:ff that's off the webpage anyway", lines 10-13). Here, the repeated "just" minimiser is used by the two speakers to downplay the demands of the current PBL task as a justification for their minimal progress (Lindemann & Mauranen, 2001; Wiggins, 2017). Similarly, their joint adoption of smiley voice maintains the lighthearted tone of the conversation - that this is not a serious issue - with Oliver concluding that any further advancements in their independent research would have been redundant, given that the "webpage" contains direct access to all of the relevant information, anyway.

In addition to the aforementioned mitigatory work, what the speakers also make clear is that they have at least attempted *some* research engagement. That is, although they have shown little investment in the task, they have not abolished their educational duties completely. To sever all attachment with academia would be detrimental to one's standing as a group member, where - as in the first section of this chapter - collective ownership for PBL is fundamental in light of the tutorless composition of the groups. 'Being an average student' entails navigating the delicate line between constructing oneself as relatively uninvolved in academia, whilst at the same time, actually tackling the unavoidable educational business (i.e. the PBL tasks) that accompanies university study. This is shown in the final line of the extract when Ryan refocuses the discussions away from the group's shared minimal progress by referencing the lecture they just attended ("that lecture was pretty intense ↓ma:n") as a demonstration of the educational duties they *have* fulfilled. Through emphasis on

the lecture's intensity, Ryan appears to further justify the group's lack of preparation for the present session, orienting to other - overwhelming - demands involved in university life (i.e. those which, potentially, overshadowed their independent research).

As we progress with the analysis, we remain with group 4 as extract 7 sheds light on the group's management of unequal expertise as they embark upon another PBL session. Similar to the previous excerpt, these interactions follow on from a period of independent research in preparation for the task. Unlike extract 5.7, however, instead of the group maintaining equal standing (e.g. joint minimal progression), here one member must neutralise their knowhow - and advance preparations - to avoid being 'othered' by her peers:

Extract 5.8: Group 4

1	**Matt**	what about Math↑ca:d
2	**Ryan**	I ↓dunno: (.) I got to 1B and the:n (.) couldn't figure
3		out what to ↓do£ (.) so I left it there£ (.) ye-you've
4		done it-haven't you? *((looking at Katie))*
5	**Katie**	I've done up to the::-like ○second last ques↓tion○
6		(0.4)
7	**Ryan**	how did you [do it?
8	**Katie**	[○kinda guessed it○
9	**Ryan**	when we did it *((pointing to Matt))* it just stopped
10		↓countin' (.) did you-
11	**Katie**	just guessed
12		(0.6)
13	**Ryan**	guess?
14	**Katie**	kinda what ↓Kare:n said *((the tutor))* (.) ↑see like when
15		it stops telling you what to ↓do:: (0.2) ↓e:::m (0.2)
16		like the ↑ne::xt ques↑tion's£ similar to the: (.) ↓one
17		↓before so I just ○copied ↓tha:t○ (0.2) ○similar○ (0.2)
18		○for that one anyway○
19		(1.0)
20	**Matt**	is it alri::ght? (0.4)
21	**Katie**	e:m (.) ↓yeh

In line 1, Matt brings Mathcad - specialised software used for engineering-based calculations - into discussion ("what about Math↑ca:d"), and throughout lines 2-4, Ryan responds by constructing an unknowing stance (the decreased pitch of "I ↓dunno:"), and making clear his struggles in operating this software effectively ("couldn't figure out what to ↓do£"; "I left it there£"). Note how Ryan couples his admission with a smiley voice, showcasing the jokey stance commonly taken by the students when making academic assessments. His smiley voice may also serve to lighten the potential seriousness of his difficulties in carrying out what was expected of him for the present session. That is, although 'being an average student' requires downplaying the importance of preparation (Benwell & Stokoe, 2002), as will be shown in later analyses of social loafing sequences, to present oneself as having exerted *no* effort at all would be interactionally troublesome. Ryan makes orientation to this fact in his talk, establishing that he has attempted at least some of the work - albeit, making only minimal progression ("I got to 1B") - as means of striking this balance.

As we continue our focus on Ryan's utterances into lines 3-4, he then pinpoints Katie as having successfully completed the task ("ye-you've done it-haven't you?"), and for Katie, this is a vulnerable interactional point. To be marked out as being capable of confronting what the rest of her peers were - potentially - unable to might suggest that Katie possesses greater expertise, and thus, is too studious to be a fellow average student. In her subsequent response (line 5), therefore, Katie skirts around the full extent of her efforts (e.g. "I've done up to the::-like"; the quietened volume of "○second last ques↓tion○") as opposed to outrightly stating that - unlike Ryan - she completed the vast majority of the task. In line 7, Ryan requests that Katie elaborates upon her approach ("how did you [do it?"); a request of which she attends to promptly, shown in line 8's overlapping turn ("[○kinda guessed it○"). Here, instead of sharing any methodical strategy, however, Katie works to neutralise her outperformance by downgrading her achievement.

Katie encounters further threat to her student identity when, in lines 9-10, Ryan invokes Matt in documenting their shared unproductive experiences with Mathcad; that they attempted the calculations collaboratively ("when we did it"), yet "it just stopped ↓countin'". Through power in numbers, and by persisting in his attempts to solicit more information from her ("did you-"), Ryan indirectly

challenges Katie's 'guesswork', making her accountable for achieving what they - collaboratively - could not. But, before Ryan has the opportunity to complete this turn (line 10), Katie interrupts to once again emphasise her lack of competency in this area; that she "just guessed" (line 11). Katie's assertion leads to a pause, before Ryan - in line 13 - hones in on ("guess?") her repeated assurance that she merely "guessed", thus marking her narrative as unsatisfactory, and putting into question its authenticity.

Consequently, throughout lines 14-18, Katie orients to the insufficiency of her prior accounts, this time offering an extensive justification for her successful completion of the PBL work. By invoking the tutor ("what ↓Kare:n said"), Katie projects knowledge ownership upon the hierarchy, positioning herself as having merely followed the tutor's instructions - a brief overview given to the students upon first receiving the session's PBL materials - rather than her rapid progress being the product of her advanced skillset. Furthermore, in making relevant the tutor, Katie orients to the universality of this advice; that the entire group were witness to Karen's guidance, and not her alone. Regardless of their absence, students often used the tutor figure in this way; as an interactional device for managing their accountability in making academic moves. Katie's subsequent laughing voice ("↑ne::xt ques↑tion's£ similar") works to remedy the tenseness of the group's interactions, whilst in line 17, she further clarifies her passive role in the task ("so I just ○copied ↓tha:t○"), as though she simply replicated what worked before.

Despite Katie's persistence, however, a prominent one second pause ensues in line 19. In acknowledgement of Ryan's violating the transition relevance place, it is then Matt who intervenes by rerouting the group's discussions away from the trouble source - the idea that Katie guessed her way through Mathcad - so as to avoid stalling the group's interactions. For instance, in line 20, Matt's proffer shows some alignment with Katie's stance, raising the notion that the PBL task may not be *completely* unmanageable ("is it alri::ght?"). Katie's response to Matt is fairly minimal, and is lowered in pitch ("e:m (.) ↓yeh", line 21) - orientation, perhaps, to Ryan's failure to acknowledge line 14-18's account - but, nonetheless, underlines the simplicity of the work; that very little effort was actively exerted on her part as a result of her following the tutor's guidance. Beyond Katie's final utterances - not included in the above extract for the purposes of brevity - the group engage in further

silence, before discussion is turned towards the release of peer review scores by the class leader. This swift topic transition exemplifies the standard interactional practice identified from analysis of the whole data corpus, where students tended not to linger on points of conversational trouble for extended periods of time, instead moving onto the next order of business in the PBL task (i.e. without any formal resolution).

5.3. Pushing the discursive boundaries

In the previous extract, Katie engaged in substantial interactional work to avoid exemplifying any discrepancies in expertise amongst her peers - discrepancies of which could be extremely detrimental to the preservation of her identity as an equal and average student. With the aim of further demonstrating the normative structures of students' interactions in tutorless PBL, this next analytical subsection features a couple of instances identified in the data corpus in which interactional norms were pushed to their limits.

Firstly, in extract 5.9, during the group's examination of the tutor feedback received on the previous week's PBL submission, Matt makes the highly unusual move of exhibiting his academic talents - and thus, going beyond the expectancies of average student membership - via an explicit display of self-praise. Below, we explore how this is treated by the other speakers involved, as well as considering the circumstances which permit such talk:

Extract 5.9: Group 4

1	**Matt**	I thought (.) I thought I wrote a belter of an
2		introduction as well ma::n-I was li:ke ↑A:W I'm so: proud
3		of that-that's the best bit of writing I've eve::r di:d£
4		*((Hannah laughing))*
5	**Oliver**	this the introduction£? *((pointing at the laptop))*
6		(0.2)
7	**Matt**	this is the introduction but they said it was shi::te
8		*((group laughter))*
9	**Josh**	I was pure like being reflective as fu::ck->like every
10		time I said a point I was like::< (.) on this bit I used
11		↑thi::s£ and then I was like£

12	**Oliver**	just writing loads of shi::te£
13	**Josh**	if there's one thing I can do it's write bu::llshit£
14	**Katie**	did you see on ↓ours (.) she said we didn't use enough
15		like ↓emo:tion or some shi:t
16	**Josh**	EMO::TION£ *((Josh laughs loudly))*
17	**Katie**	like we did really ba::d in that
18	**Matt**	didn't really give a fu:ck about ↑i::t£
19	**Oliver**	don't think ↓anybody ↑does to be fai:r£

Throughout lines 1-3, Matt initially appears to disregard one of the most fundamental expectancies of 'being an average student' when he openly commends the quality of his own work ("I wrote a belter of an introduction"; "↑A:W I'm so: proud of that-that's the best bit of writing I've eve::r di:d£"), thus making his active engagement with the PBL task clear. Rather than genuinely boasting about his efforts, however, Matt's prominent use of self-praise instead serves as a preface to his self-deprecation (line 7), first hinted at in his use of smiley voice (line 3). Matt's peers also make orientation to his humorous stance in their responses, with Hannah's display of laughter (line 4), and Oliver's pointing gesture towards the laptop which has Matt's work - and its accompanying negative tutor feedback - on screen (line 5). Here, Oliver's smiley voice portrays sarcasm ("this the introduction£?"), marking Matt's positive self-assessments (lines 1-3) as being at odds with the physical evidence at hand. In turn, Matt confirms - in line 7 - that "this is the introduction", but notes that "they said it was shi::te", where "they" refers to the tutor who marked the PBL report; utterances of which are met with laughter from every member of the group (line 8).

As the extract progresses, in line 9, Josh models Matt's interactional approach as he quite candidly discusses his own immersion in the writing process ("I was pure like being reflective as fu::ck"), where "as fu::ck" is used as Glaswegian slang to emphasise the intensity of a specific activity; in this case, his reflections for the PBL report. Like Matt, Josh maintains smiley voice as he details the magnitude of his efforts (lines 9-11), and it appears to be this orientation to humour which - similar to line 5 - permits Oliver's 'jokey' move (line 12) in which he completes Josh's turn to downgrade the effort involved in (the "just" minimiser; Grant, 2011), as well as the calibre of ("writing loads of shi::te£"), his work. In line 13, Josh corroborates Oliver's

talk immediately ("if there's one thing I can do it's write bu::llshit£"), now using self-deprecation to make clear that, whilst he only recently admitted to carrying out his required reflective duties (lines 9-11), the end product (i.e. his writing) was wholly reliant on his ability to "write bu::llshit£", rather than his taking academia seriously, or striving to produce high quality work.

If we now continue to line 14 of the extract, Katie does not join Josh or Oliver in their co-produced humour, instead pointing the conversation towards more serious matters: the critical tutor feedback ("she said we didn't use like ↓emo:tion"). Josh, in line 16, fixates on the tutor's apparent dissatisfaction with the lack of emotion in the group's reflections, loudly emphasising the word in a smiley voice ("EMO::TION£") before laughing emphatically, as though such a request is worthy of mockery, and that it is the tutor who is in the wrong here. In line 17, however, Katie once again resists her peer's joking, drawing attention to the full extent of the group's underperformance on this reflective aspect of the PBL assignment ("we did really ba::d in that"), as though it cannot be merely ignored. Subsequently, during the extract's final lines, both Matt and Oliver work to mitigate the potential severity of their shared circumstances, with Matt's flippant "didn't really give a fu:ck" (line 18) - though misaligned with his opening talk - and Oliver's assertion in line 19 ("don't think ↓anybody ↑does to be fai:r£"). That is, owing to a universal lack of investment in the assignment, there is not so much at stake, and thus, the group's collective inability to successfully confront the PBL work is rationalised.

In conclusion of extract 5.9, this was an unusual interactional sequence in that it involved both explicit displays of self-praise, and open admissions of engagement with academia; stances of which are typically problematic in the maintenance of the average student identity. However, in light of the group's circumstances - that they had received their PBL report feedback in advance of the current session, and thus, were already aware of their underperformance - these transgressions were granted, as opposed to being discursively policed. Therefore, rather than Matt being seen as indulging in his 'academic genius', or Josh constructing himself as being overly studious, these moves were countered with co-constructed humour and mockery, and appeared to serve as a mechanism for softening the gravity of the poor tutor feedback (though, going by Katie's stance, whether or not this was actually achieved is another matter).

In the next extract - split into two sections as a result of its length - we focus on a deviant case drawn from the data corpus (see Antaki, 2008). Unlike the previous extract, this breach of customary student behaviour is not treated so lightly, where one member works themselves into a (dangerous) position of authority:

Extract 5.10A: Group 3

1	**Molly**	e::m (0.4) Laura£ (0.6) you're next on the list
2	**Laura**	↓oka::y (0.2) abo:ut animals and fi:sh?
3	**Molly**	yea::h£ *((Sharon laughs quietly))*
4	**Laura**	it ↑wa:sn't ↑really mu::ch [it was literally just e::m
5	**Molly**	[yeah
6	**Annie**	O:H I thought that it was ba:d for fi:sh? *((gazing at Laura))*
7		(0.8)
8	**Laura**	wha:t-e::h-(.) probably 'cos like all the po↓llution::
9		(0.2) leaks into the rivers and stuff
10	**Annie**	↑mhmm it's ve::ry bad fo:r (.) water life (0.2)
11		(0.2)
12	**Laura**	↓mhmm
13	**Annie**	classed as HI::GHLY toxic:
14		(1.0)
15	**Craig**	is wa↓te:r life the co:rrect ↓word?
16		(0.2)
17	**Annie**	mm:: *((Annie nodding))*

In the opening line, Molly - who, on this occasion, is acting as team leader - makes the typical interactional move to prompt the group's progression with the PBL work. Hedging into her educational talk ("e::m (0.4)"), Molly uses a smiley voice to soften what could be perceived as a serious request ("Laura£"), and then invokes the predetermined "list" - designed collectively by the group during their very first PBL session - so as to avoid being positioned as commanding her peers around (i.e. 'it's not me who's telling you to do this; I'm just following the list'). This cautious conversational approach is made apparent once more in line 3 - following Laura's response ("abo:ut animals and fi:sh?", line 2) to Molly's initial request - where Molly's smiley voice ("yea::h£") and subsequent laughter detach her from the authoritativeness which often couples a formal leadership role. In line 4, Laura establishes the topic area - of which she was allocated for her individual research

during the previous PBL session - as involving only minimal effort, and one which has produced only a small amount of information ("↑wa:sn't ↑really mu::ch"; "literally just"); an account which is acknowledged through Molly's overlapping "yeah" (line 5).

If we now move to line 6, before Laura is able to verbalise any of her gathered knowledge to her peers, Annie's loudened "O:H" token marks Laura's talk as newsworthy (i.e. as unexpected) (Gardner, 1997), where she provides her own assumptions regarding what Laura *should* have found ("I thought that it was ba:d for fi:sh?"). As she makes her turn, and in the 0.8 second pause which follows it (line 7), Annie gazes directly at Laura, whereas Laura does not engage in any eye contact until she hesitantly ("wha:t-e::h-(.)") offers elaboration ("'cos like all the po↓llution:: (0.2) leaks into the rivers and stuff") in lines 8-9. Rather than accepting Laura's answer, however, in line 10, Annie reinstates her stance which was first raised in line 6 ("↑mhmm it's ve::ry bad fo:r (.) water life (0.2)"), as though there is more to be said on this matter. This is met by Laura's minimal response - produced in a falling pitch - in line 12 ("↓mhmm"), before Annie follows this lack of uptake by emphatically reestablishing - once more - the extent of the problem ("classed as HI::GHLY toxic:", line 13), thus raising the possibility that Laura has not confronted these issues at the necessary depth.

In light of the corpus as a whole, Annie's interactional moves here are very unusual. Normally, upon conducting their individual research comprising a specific aspect of the given PBL task, each of the students would relay their findings to their peers without being challenged, and without another group member suggesting any further research (counterproductive to the aims of PBL as this may be). However, in this instance, Annie runs the risk of breaching her student membership by intruding on Laura's personal investigations, thus questioning the sufficiency of her efforts. This conversational trouble is made known through line 14's lengthy one second pause (Goodwin & Heritage, 1990), and through Craig's utterances which question Annie's factuality ("is wa↓te:r life the co:rrect ↓word?", line 15), and seem to make orientation to her (lack of) interactional rights to interfere in another group member's allocated research topic.

As shown in the second portion of this extract below, Laura provides a final elaboration of the research she conducted in preparation for the session:

Extract 5.10B: Group 3

1	**Laura**	the only two things are like you ca::n't build on where
2		animals are like: endangered or protected like: (0.2)
3		↑na::tional parks and stuff like tha:t (.) and the:n (.)
4		you ca::n't (.) >have like direct< (0.8) entry of:: (0.2)
5		wa:ste wa:ter or like he:at (.) water ↓into:: (.) rivers
6		(0.4) and lakes: (0.4) ○that's all like (.) that I've go:t
7		no:w£○ *((reading from her notes throughout))*
8	**Annie**	are ↑the::re (0.4) ar:e ↑the::re (0.2) >legislation< (.)
9		about it: (.) like (0.2) being near farms with ↑livesto:ck?
10		(2.0)
11		*((Sharon and Molly laugh; Laura does not look up from her laptop))*
12	**Annie**	I mean I'm ↑ju:st curious *((Annie shrugs; Sharon laughs again))*
13	**Molly**	like:
14		(1.0)
15	**Molly**	you can't release wa:ste into like: (0.2) wa-like lakes and
16		stuff like that
17	**Sharon**	yeh
18		*((the next few lines - including hesitations and a six*
19		*second pause - are omitted for the purposes of brevity))*
20	**Molly**	Sharon which one are we: doing next?
21	**Sharon**	↓u:::m (0.2) the::-good and ba:d *((looking at the worksheet))*

Throughout lines 1-7, Laura provides more of an extensive knowledge display than previously. She also minimises the scope of the topic under exploration ("the only two things are", line 1), as though she has provided all that is required of this section of the PBL case. Similarly, her use of smiley voice, and the quietened tone of her speech in lines 6-7 ("○that's all like (.) that I've go:t no:w£○") work to lighten interactional tensions, underlining the fact that she has shared with her peers all that she is able to. Nevertheless, despite her provision of more concrete content examples, as well as her continual consultation with the notes she prepared in advance of this session, Laura is unsuccessful in silencing Annie's interrogations, which continues into lines 8-9 ("ar:e ↑the::re (0.2) >legislation< (.) about it:"; "being near farms with ↑livesto:ck?").

By line 10, a pronounced two second pause makes clear the consequences of Annie's talk, with Laura showing no acknowledgement (line 11) of Annie's proffers, and ceasing all contribution to the group's discussions of her topic beyond this point. Orienting to these interactional tensions, Sharon and Molly engage in shared laughter (line 11), whilst Annie provides justification for her queries ("I mean I'm ↑ju:st curious", line 12), followed by a shrugging gesture. Here, Annie downplays the seriousness of her actions; that she is merely interested in the topic area, rather than scrutinising - or checking up on - Laura's efforts, as the authoritative tutor may do. Annie's account is met with brief laughter from Sharon (line 12), whilst Molly (from lines 13-16) attempts to steer the conversation back towards the relevant knowledge domain ("you can't release wa:ste"). However, with no response from Laura - of whom this topic area belongs - nor anything of substance offered by her peers, Molly - as team leader - has little option but to proceed with the next member's research ("Sharon which one are we: doing next?", line 20).

In summary, then, whilst the interactional tensions were apparent throughout the course of this extract, rather than any explicit conflicts arising between group members or, for example, Laura stating her discomfort at being challenged by Annie in *her* allocated subject area, the students worked away from the problem source - a common finding across the corpus. Whilst this may have temporarily soothed the social wants of the group, however, the lack of a deeper resolution meant that Laura's research was not collaboratively reviewed alongside her peers, and thus, significant quantities of core knowledge were, potentially, glossed over.

5.4. Chapter summary

In conclusion, this chapter illustrated the interactional complexities of operating within student-managed PBL. Similar to research on university tutorials (e.g. Benwell & Stokoe, 2005, 2010; Benwell & Stokoe, 2002; Moncada-Comas, 2020; Olinger, 2011; Stokoe et al., 2013), 'being a student amongst other students' in the PBL setting involved positioning oneself as largely uninvested in academia; as 'playing it cool' for the purposes of fitting in. But, in contrast with the aforementioned tutor-led studies, with the removal of the leadership figure in floating facilitator PBL, the students also oriented to their institutional responsibilities (i.e. to 'do education' or fail the class), shown to be a tricky

interactional business; as a clash of identities. Therefore, this chapter is evidence of students' capacity to embrace the learner empowerment granted by floating facilitator PBL; to generate their own learning issues, and to negotiate a consensus (e.g. Woods, 2014), even if this was done in more guarded ways than might be anticipated.

6. DISAGREEMENTS

The interactional management of knowledge within the university learning setting often entails significant epistemic work. The formulation of a knowledge claim, for instance, can depend on various epistemic factors, including the source of one's knowledge (i.e. epistemic access), their right to possess such knowledge (i.e. epistemic primacy), and their accountability for the knowledge in question (i.e. epistemic responsibility) (Stivers et al., 2011). As this chapter will exhibit, the complexity of knowledge management is escalated within the context of PBL, whose social constructivist and Popperian foundations require that students not only make knowledge claims themselves, but that they challenge one another's stances as part of the collaborative knowledge building process, also (Dahlgren & Dahlgren, 2002; Evensen & Hmelo-Silver, 2000). One of the core principles of PBL is that learners *should* disagree with one another; that cognitive conflict is the key ingredient to the development of critical thinking, the expansion of the knowledge base, and the facilitation of new learning (De Grave et al., 1996).

As much as these pedagogical intentions are clear, however, as in the literature review (chapter 2), what is not understood is how disagreements *actually* unfold in PBL. Only one study (McQuade et al., 2018) has specifically investigated - at the fine-grained level - the occurrence of knowledge disagreements within tutorless PBL. What remains undetermined, then, is how students negotiate the act of disagreement - a central tenet of PBL, but a typically dispreferred conversational move (Pomerantz, 1984a) - alongside maintaining their position as fellow group members; that which demands adherence to social normative constraints (i.e. to avoid authoritative moves such as disagreement as much as possible). Without the tutor figure to facilitate students' knowledge disagreements - to manage this responsibility for knowledge generation on their behalf - students must self-manage this dilemma that exists between their pedagogical, and their social, goals.

As discussed in the previous analytical chapter, the co-constructed student identity is contingent on being seen as 'average' - as blending in with the rest of the PBL group - and as maintaining alignment with one's peers within the co-produced, informal learning space; all of which are at odds with the seriousness of 'doing disagreement' (e.g. Benwell & Stokoe, 2002). Given students' equal epistemic status,

therefore, how is disagreement achieved in tutorless PBL without speakers violating the implicit expectancies of the - academically detached - student identity, and the democratic conversational space? How does a speaker challenge another's knowledge stance without being positioned as a substitute for the absent tutor role? By examining the varying types of disagreement formulations adopted by students, it is these questions that this chapter seeks to address.

6.1. The simplicity of 'doing agreement'

As a preface to the analysis of disagreement formulations which take prominence in this chapter, given their sharp interactional contrast, it is necessary to first consider the unfolding of knowledge agreements. Whereas knowledge disagreements tend to spread themselves across a great number of turns, are accompanied by delays and hedging, and are, effectively, somewhat convoluted, knowledge agreements are both structurally simplistic and explicit in action (Rendle-Short, 2015):

Extract 6.1: Group 5

1	**Conor**	we might as well get high scoring marks in the things you
2		can do:: [without too much hassle
3	**Richard**	[ye::ah
4	**Eva**	definitely yea:h

In the opening lines, Conor makes reference to the group's collective organisation (the "we" personal pronoun) of the current PBL task, noting that they "might as well get high scoring marks in the things you can do:: [without too much hassle". Here, Conor's proposition requires only low investment from the group - that is, 'doing the minimum' - as though they are merely utilising the skills and knowledge they already possess, as opposed to actively striving for high performance. In turn, Conor's strategy is validated immediately by his peers, with Richard's turn ("[ye::ah", line 3) produced in overlap with Conor's (line 2), and Eva's strong agreement token ("definitely yea:h") in line 4.

As well as referencing the avoidance of task complexity (above) as a means of attaining group agreement then, across the data corpus, students regularly constructed academia as an informal affair within their proffers for agreement. This

is shown in extract 2 - as we revisit group 5 during a separate PBL session - with Eva sharing how she individually approaches assignments outside of timetabled hours:

Extract 6.2: Group 5

1	**Eva**	when I've got lab reports to write and stuff >I'll just
2		sit in front of the telly<-it'll take me so much longer
3		but I just sit and chi::ll out and have your dinner
4		[when you doin' i::t
5	**Conor**	[yeah exactly=
6	**Eva**	=I always get like SO:: much more done than if I was to
7		do like an hour in the library=
8	**Richard**	=mmhm::=
9	**Conor**	=ye:h yeah I agree

Although 'doing homework' is an inevitable part of university learning, equally, it is an activity which must be delicately managed when discussed in the presence of one's peers. To be seen as exerting too much time and effort into one's studies, for example, would be misaligned with the 'average' student identity, and might be suggestive that others should be doing homework as well; moves which could ostracise the offending speaker from the group (e.g. section 5.3 of chapter 5). Therefore, in formulating her utterances ("when I've got lab reports to write", line 1), Eva downplays her investment in the work at hand - see the repeated "just" discourse minimiser (Grant, 2011) - by constructing her private study as being informal in nature ("I'll just sit in front of the telly", lines 1-2). In this way, the studious connotations of 'doing academia' - and the fact that "it'll take me so much longer" (line 2) - are counterbalanced by Eva's simultaneous engagement in more pleasurable activities ("just sit and chi::ll out"; "have your dinner", line 3), thus opening her identity-friendly stance to agreement, as below. It is also notable that, in lines 3-4, Eva shifts her assessments from an 'I' to 'you' basis, reframing her actions as being a normal feature of the shared student identity, rather than a personal choice ("your dinner"; "when you doin' i::t").

In line 5 - and similar to extract 1 - Conor's agreement ("[yeah exactly=") is produced in overlap with Eva's turn (line 4), leading into the latched speech shown at the juncture of lines 5-6 ("=I always get like SO:: much more done than if I was to do like an hour in the library="). Here, following Conor's clear display of alignment, Eva

expands on her initial turn, marking out the distinction to be made between working from the comfort of one's home - a relatively casual activity - and the notion of physically attending the university campus itself - not only an overly 'official' act, but (according to Eva) less effective, too. This latched speech continues through lines 7-9, with further explicit agreement shown from Eva's peers (Richard's notable emphasis on "=mmhm::=", and Conor's unequivocal assurance in the form of "=ye:h yeah I agree") as her stance is validated.

To briefly summarise, then, what characterises agreement sequences are, primarily, their unmistakable agreeing components; that they are, unambiguously, 'doing agreement'. In addition to this, agreements are fast-flowing (e.g. overlapping/ latched speech), where their structure is - almost always - absent of silences of any significant length; an indicator of conversational trouble (e.g. Kuo, 1994) that, contrastingly, is central to the upcoming analyses of disagreement formulations. Generally speaking, the prevalence of agreement formulations tended to match the occurrence of indirect disagreements in the data corpus, in that they were both regular features of students' talk.

6.2. 'Doing disagreement' well

Similar to the studies presented earlier in the thesis, unlike the aforementioned straightforwardness of agreement formulations, knowledge disagreements were commonly presented in a softened form. Whilst the categories are not strictly discrete - there is, inevitably, some degree of overlap between them - the purpose of table 6.1, below, is to provide a basic overview of the varying - indirect - disagreement formats as identified in the data corpus, accompanied by research involving related formulations:

Table 6.1: Knowledge disagreement formulations from the data corpus and example references

Agreement-prefaced disagreements:
● 'yes, but then. . . no' (e.g. Antaki, 1994; Mulkay, 1985; Pomerantz, 1984a) ● Knowledge appreciations (e.g. 'I see what you mean. . . but') (e.g. Hayashi, 1996; Hosoda & Aline, 2015; Johnson, 2006) ● 'Doing unknowing' (e.g. 'I know it sounds stupid… but'; 'I don't know if I read it differently… but') (e.g. Waring, 2001) ● "well you can't…" (e.g. Aijmer, 2011; Jucker, 1993)

Referencing the expert tutor source:

- 'but she said it was X'

Referencing external (non-tutor) sources:

- 'Dan said there are X'
  (e.g. Pomeantz, 1984b; Sharma, 2013)

Invoking physical resources:

- 'but it says on the worksheet' (e.g. Sharma, 2012)

Although efforts have been made to highlight each of these disagreement forms in their own right within the forthcoming analytical extracts, given that students in naturalistic conversation tend to use more than one of these at any given time, this was not always possible. In light of this, the disagreement fragments of interest to each of the extracts are marked in bold for the purposes of clarity. Furthermore, it must be established that, here, the focus of these analyses are on the interactional design of the various disagreement formulations, and not on the sequential resolution of the disagreement (see Waring, 2001).

6.3. Agreement-prefaced disagreements

We begin the analysis of disagreements with the most frequently occurring formulation: the agreement-prefaced disagreement. As an example of this disagreement form in action - spread across multiple turns-at-talk - consider group 3, below, where the students are in the midst of arranging the location of the power plant they are to construct as part of the latest PBL task:

Extract 6.3: Group 3

1	**Annie**	has to be somewhe::re where people can ↑live
2		(0.6)
3	**Craig**	can you ↓not just bu::ild there ↓anywa::y? (.)
4	**Annie**	**yeah but** you ca:n't- (.) you ca::n't- (0.2) you ↓couldn't
5		build it in the middle of the ↓de::sert even if you found
6		a fan↑t::astic place to build it
7	**Sharon**	yeah
8		(0.6)
9	**Annie**	because no one could get there and no one would work
10		there::

11		(0.4)
12	**Linzi**	you could put o::n like: (0.2) buses
13		*((loud group laughter))*
14	**Annie**	like the school ↑bu::s (.) ↑AMMONIA ↑FERTILISER ↑BUS:::£
15		*((group laughter))*
16	**Linzi**	well you can't have the- (.) the: [↑houses next to it
17	**Craig**	[na::h I thi::nk-I::
18		(.) ↓yea:::h (.) I think it'd be the other ↓wa:y (.) I
19		think (.)↓you:: *((looking at Linzi))* were ↓ri::ght->it's
20		the other way ↓about<
21	**Linzi**	↓yea::h (.) **I know it sounded stupid to be fair but** it is
22		a good point£

Disagreement is first marked in line 3 when Craig - having raised the possibility of using the desert, shortly before the start of the extract - questions ("can you ↓not just bu::ild there ↓anywa::y?") Annie's assurance (line 1) that the plant "has to be somewhe::re where people can ↑live". In response, note how Annie first presents Craig with agreement ("yeah"), before any disagreement is made ("but you ca:n't"). In this way, Annie's agreement preface - brief as it may be - shows acknowledgement of Craig's stance, before transitioning into the act of disagreement (Johnson, 2006). That is, rather than Annie's "yeah" (line 4) serving as an authentic agreement, this minimal response orients to the conversational norms to save face, prior to any dispreferred discourse (Pomerantz, 1984; Stivers, 2005).

Despite Annie's (above) agreement preface, however, Craig offers no response, with only Sharon displaying any recognition of her turn ("yeah", line 7). This may stem from the apparent sureness which accompanies Annie's talk ("you ca:n't- (.) you ca::n't- (0.2) you ↓couldn't", line 4); that Craig's proposed plan of action - to build the power plant "in the middle of the ↓de::sert" (line 5) - is an impossible one ("even if you found a fan↑t::astic place to build it", lines 5-6). Throughout lines 9-10, Annie orients to this lack of uptake in the form of her - definitive - extended turn ("because no one could get there and no one would work there::"), but it is group member Linzi - rather than Craig - who then contributes to the discussions at hand.

In line 12, Linzi's proposition ("you could put o::n like: (0.2) buses") - that transport arrangements are put in place so that prospective employees are able to

travel to the power plant, *even* if it is based in the desert - is met with loud laughter from every member of the group (line 13). Interestingly, in spite of Linzi's (indirect) resistance against Annie's position, Annie herself does not treat Linzi's talk as a legitimate challenge, as shown by her open engagement in, and continuation of, the ongoing humour ("like the school ↑bu::s (.) ↑AMMONIA ↑FERTILISER ↑BUS:::£"). Further group laughter occurs in line 15, and in this way, the credibility of what Linzi actually suggests appears to be overlooked. Although, as we move to line 16, Linzi maintains focus on her agenda ("well you can't have the- (.) the: [↑houses next to it"), where the "well" token serves as a face-threatening mitigator to the dispreferred talk (Aijmer, 2011; Jucker, 1993); that, equally, it is impractical to have residents living too closely in proximity of the plant (as in Annie's proposal).

It is at this point, in line 17, that Craig returns to the conversation, with his overlapping agreement turn aligning with Linzi's ("I think (.)↓you:: *((looking at Linzi))* were ↓ri::ght", lines 18-19), thus reconfirming the initial opposition between him and Annie (">it's the other way ↓about<", lines 19-20). Here, though Craig quite plainly validates Linzi's argument - and in doing so, leaves Annie interactionally overpowered - Linzi continues to engage in face-saving work, nonetheless. In line 21, for example, Linzi downplays her epistemic knowhow ("I know it sounded stupid to be fair"), as though the group's prior laughter - in addition to Annie's contrasting views - was (almost) warranted. In this way, the preface works to neutralise each party's accountability for the actual occurrence of disagreement (so as not to exacerbate conflicts), whilst enabling a transition point within which Linzi is able to gently (e.g. her use of smiley voice) finalise the group agenda ("but it is a good point£"): to locate the plant in the desert, and to arrange workplace transport for employees.

Next, we consider a similar disagreement formulation involving another of the groups. In this instance, group 5 are clarifying the aims of the PBL task, and whether or not the provided values on the worksheet require further elaboration:

Extract 6.4: Group 5

1	**Eva**	length is pretty much the only thing that's: (.) the::re
2		(.) and we:: (.) ○can't change that I don't think○ (.)
3		that migh-that's just like the length of it

4	**Conor**	**I don't know if I- (0.2) have (.) read it (.) differently**
5		**but** I've got the impression that (0.2) the::se are the-
6		like the correct answers so you need to prove that
7		they're correct
8	**Jamal**	yeah that's what I was thinking

Throughout lines 1-3, Eva discusses the small amount of information provided by the PBL worksheet ("length is pretty much the only thing that's: (.) the::re"), marking the "length" measurements - of the product to be designed by the group - as fixed, and thus, nonnegotiable ("○can't change that I don't think○"; "that's just like the length of it"). In making these claims, however, there are elements of low modality ("I don't think"; "that migh-"), as well as reference made to the collective group ("we::"). Here, in typical 'average student' form, Eva states her position for approaching the current PBL task - that they simply accept the "length" as fact, proceeding with other aspects of the work - but ensures she is not seen as dictating to her peers what is to be done.

As we now move to Conor's responding turn (lines 4-7) - the place in which the knowledge disagreement occurs - much like Linzi in the previous extract, Conor hedges around his opposition by prefacing it with an unknowing stance ("I don't know if I- (0.2) have (.) read it (.) differently") (Heritage, 2012). Rather than explicitly disagreeing with Eva (e.g. "no, you're wrong!"), or projecting blame in her direction, then, Conor takes considerable ownership for their misalignment as a result of his (potential) misunderstanding ("I don't know if I- (0.2) have (.) read it (.) differently"). This is further demonstrated through an additional disagreement preface ("but I've got the impression that") in which he makes the subjective - as opposed to objective - nature of his perspective clear, before detailing his own rationale; that further work is required ("so you need to prove that they're correct"). In turn - and as was often the case across the corpus - it is another group member who corroborates the stance of their chosen party (here, Jamal's "yeah that's what I was thinking" in line 8).

As a summary of the agreement-prefaced disagreement forms, then, let us briefly reflect on some example extracts before proceeding with the rest of the formulations to be explored in the remainder of the chapter. In extract 6.5, Emily responds to her peer's statement that the group should be grateful that the reflective

assignment (attached to the PBL work) possesses some value (1% of the final class grade), as opposed to none at all:

Extract 6.5: Group 6

1	Emily	**I KNOW BUT-and that's ↑fine:: and I can understand tha:t**
2		**point of view but** I don't understand: (0.2) we're being-
3		**and I'm ↑NO:T saying just for me**::-I'm saying in ↓general
4		(0.2) ↓ho:w are you supposed to motivate people to: (.)
5		put a lot of effort in with the stuff and do something
6		about i:t (.) if they're gonna get one percent from it

Agreement-prefaced disagreements commonly comprised of strong sympathising elements. Here, for example, Emily shows explicit appreciation of her opponent's stance via the multiple-part agreement preface ("I KNOW BUT"; "that's ↑fine::"; "I can understand tha:t point of view but", lines 1-2) (Hayashi, 1996). What is also of significance is Emily's making her point relevant to the good of the entire group ("I'm saying in ↓general") - and "↑NO:T saying just for me::" (line 3). Additionally, throughout lines 4-6, Emily deflects from her being the root cause of the disagreement by projecting blame against the institution (e.g. "↓ho:w are you supposed to motivate people"; "if they're gonna get one percent from it"); that the real issue stems from the university's flawed grading system that they - as a collective group - are victim to.

Another routine method of prefacing disagreement was to appease the opponent by suggesting enactment of their agenda(s):

Extract 6.6: Group 5

1	Jamal	**we should ch-we should check DN but** like tha:t's (.) I'm
2		pretty su::re that's what it is

For instance, in line 1, Jamal raises the group's need ("we should") to consider their colleague's proposal ("we should check DN", where "DN" refers to a contrasting approach to conducting the PBL calculations at hand) prior to (quite definitively) establishing his own stance, once more ("but like tha:t's (.) I'm pretty su::re that's what it is"). This serves as a face-saving alternative to a more forceful approach (e.g.

'there is no worth in considering your perspective, because I am right, and you are wrong') which could be highly detrimental to the preservation of the 'average' student identity (and the adherence to basic conversational norms, too) (Sifianou, 2012).

6.4. Invoking supreme knowledge sources

This next subsection shows how speakers invoke superior external knowledge sources as a means of enacting disagreements: the second most frequently occurring formulation. By referencing the expert PBL tutor or students of supreme academic status outside of their own group, the subtly of disagreement is maintained (e.g. 'it's not me who's disagreeing with you, it's her'), in addition to offering an added layer of validity to what is being said. We see this in the following PBL session, for example, where - having divided the latest task amongst themselves the previous week - it is now Callum's turn to report the findings of his individual research to his fellow group members, but there are some difficulties in him actually doing so:

Extract 6.7: Group 3

1	**Craig**	did you find out where all the:ir places are:? (.)
2	**Callum**	YE::H (.)
3	**Craig**	li-w-where d'ya mean (.) like Asia?
4	**Callum**	yeah pretty much (.) ASIA: (.) 'cos BP have got a couple
5		in Europe (0.2)
6	**Craig**	°okay°
7	**Callum**	**I wa:s chattin' to a couple of guys li:ke in the other**
8		**groups and they were sayin'** what they've done so:
9	**Craig**	**I THINK DA:N said** there was like sixtee-HE found sixtee:n
10		sites in tota:l (.) around the world (.) think that is a
11		fa:ir
12	**Callum**	yeah=
13	**Craig**	=amount of places
14	**Callum**	there's a fair amount >but I didn't really know<

15	**Craig**	[E:MM (.) who's next? [*((Having shifted his gaze from Callum to Laura, Laura reaches for Craig's laptop, marking the beginning of the next part of the PBL task. Despite looking in the direction of his peers, no other group member makes eye contact with Callum.))*]

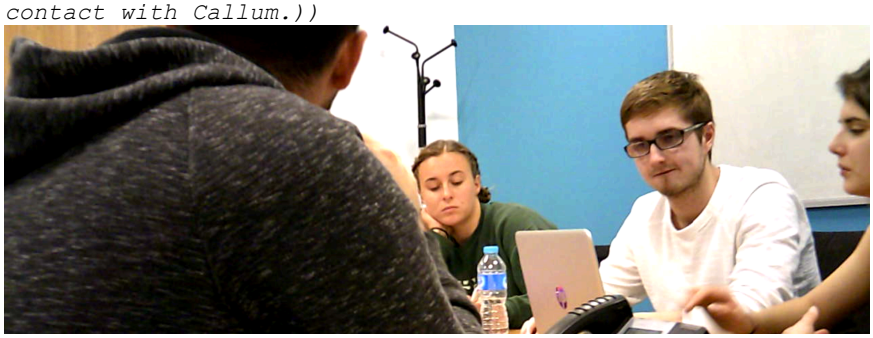


Figure 6.1: Callum (left) looks on at Annie (left), Craig, and Laura (none of whom offer any responding gaze).

In the opening line, Craig - serving as group leader on this occasion - asks whether Callum has completed the work that was required of him ("did you find out where all the:ir places are:?"). Note that the expectancies of Craig's question are rather extensive, as though Callum's answer should be an in-depth one. Despite the framing of Craig's request, however, Callum's subsequent turn ("YE::H", line 2) is by no means content rich, providing no clarification of the power plants in question in terms of "all the:ir places" (i.e. their locations).[4] Unsurprisingly, Craig - in line 3 - orients to Callum's minimal response as inadequate through his more direct call for information ("w-where d'ya mean"), alongside a descriptive proffer ("like Asia?"), which offers Callum some degree of assistance, in addition to Craig seeking reassurance that he has actually done what was expected of him; a significant concern for the entirety of the group in the successful competition of the PBL work.

Despite Craig's attempts to obtain the necessary knowledge from Callum, they prove to be unfruitful, with Callum - through lines 4-5 - offering little information, still (e.g. the vague confirmation in "yeah pretty much"; the repetition of Craig's suggestion in "ASIA:"; only loose reference being made to "BP" having a "couple in Europe" - all of which offer no real substance by way of knowledge displays). As a brief reflection of this extract so far, Callum's behaviour is unusual in terms of its

[4] Here, it is of note that Craig grants Callum with very little time to showcase his knowledge - as requested in line 1 - before intervening in line 3. Callum makes no physical gestures that could be indicative of his having trouble in satisfying Craig's proffers - in fact, the two speakers stare directly at one another throughout lines 1-4 - so it seems that, in this instance, Craig's swiftness might be triggered by Callum's recurring offences as a social loafer (addressed in depth within the next chapter).

place within the data corpus. Typically, upon being asked to provide evidence of their individual research, students would quite readily relay their preprepared notes (said knowledge displays were treated as unproblematic in these instances in comparison to those that are not spontaneous). In this case, it may well be that there are only a couple of countries and that it is Craig who is mistaken, but Callum provides nothing by way of creating a convincing argument. Consequently, Callum's failure to confront the task at hand is marked as interactionally troublesome, shown by Craig's quietened minimal continuer ('°okay°') in line 6 (Drew, 1997).

As we move to lines 7-8, Callum now works to address the ongoing interactional tensions by invoking students outwith his group to better substantiate his knowledge claims ("wa:s chattin' to a couple of guys"; "in the other groups"; "sayin' what they've done so:"). By referencing his consultation with "a couple of" classmates beyond the group in question, Callum establishes a source of knowledge through which he is able to construct his efforts as being perfectly satisfactory. Rather than bolstering his stance - and settling the disagreement - however, Craig retaliates by invoking his own external source; a classmate ("DA:N") universally known to the group (and repeatedly mentioned throughout the corpus) for his high performing status. Here, Craig's reference to both his source's name and the overall specificity of his talk ("HE found sixtee:n sites in tota:l (.) around the world") offers a level of clarity - and reference to what is 'fair' - that Callum does not.

Towards the end of the extract (the "yeah" agreement token, line 12; "there's a fair amount", line 14), Callum - having failed to amend his ambiguous stance - has no option but to accept his being interactionally overpowered by Craig (and his far superior external source). In addition to this admission (i.e. that there are considerably more countries required of the answer than he first stated), Callum also engages in some mitigatory work - his unknowing stance (Heritage, 2012) - so as to soften the lingering disagreement. By using interactional vulnerability (">but I didn't really know<"), Callum accounts for the discrepancies in knowledge (i.e. that he encountered difficulties whilst conducting his research, rather than the issue being his total lack of preparation) to avoid disagreement deadlock (Waring, 2001).

Although, as line 15 and figure 6.1 show, Callum's excuse appears to be disregarded, with Craig immediately calling for the next speaker to present their work ("E:MM (.) who's next?", and his shift of gaze from Callum to Laura). Here,

Craig's gaze is enough to prompt Laura's physical engagement with the group laptop, with his request also fulfilled by embodied - rather than vocal - means (see Rauniomaa & Keisanen, 2012). This initiation of the next task - and thus, the close of Callum's duties - in addition to no other group member reciprocating his gaze - marks an absence of mutual orientation with Callum, thus removing him from the participation framework (see Goodwin, 2000; Stivers & Sidnell, 2005). Issues of unequal participation will be revisited within the next chapter on social loafing.

As we turn to extract 6.8, we now explore students' use of the epistemically authoritative PBL tutor as they enact disagreement stances. Throughout the corpus, although the students received direct contact with the PBL tutor only intermittently, each of the groups frequently invoked the absent institutional figure as the most commanding interactional resource of all. As well as strengthening their knowledge claims, the PBL tutor was often used as the common enemy who, by default of their position, absorbed the blame for the presence of any disagreements themselves. Similar to a co-constructed culture identified in Chiriac's (2008) study of PBL groups, it seems that, by directing blame onto the institution (i.e. the university and its agents and counterparts), efforts can be made to uphold peer unity, even in the face of disagreements:

Extract 6.8: Group 4

1	**Matt**	you need to have the:: (0.6) [thickness quite th↓ick [*((pinching his fingers))*  Figure 6.2: Using his fingers, Matt (left) produces an enactment of the thickness of the heat exchanger that is to be designed as part of the current PBL task.
2		(.) >so it has to be-either be< two point ↓eight (.) or
3		or three point ↑two 0.2) I picked two point eight 'cos
4		it's cheaper ↓again
5	**Katie**	[yeah (.) [*((briefly looking at Matt))*

6	**Matt**	[*((making the same gesture as in line 1))* and the::n (.) [by using tha::t (.) it gives you a ta↑ble
7		(.) [and then it gives you like six foot which is like [*((again, Katie briefly looks at Matt))*
8		roughly two of us
9	**Katie**	○alright okay○ [[*((briefly looking at Matt, before looking down at the desk))*
10		[(1.0) [*((no group member makes eye contact with Matt, focusing on the objects in front of them, instead))*  Figure 6.3: Oliver, Yasmin, and Katie are pictured looking down during the silence.
11	**Katie**	**I used li::ke£ ↑si:x£ met↓res£**
12		*((Nick and Josh laughing))*
13	**Katie**	**↑that's ↑wha::t£ everyone else is ↑do::in'£**
14		*((Josh begins laughing again))*
15	**Katie**	well the people that ↑I:: ↓a::sked (0.2) ○so I just used
16		↓tha::t○ (.) >aw no: I used ni::ne ↓metres£< (0.2)
17	**Matt**	well-
18	**Katie**	**it said- (.) no it said ↑o::::n (.) see how that book**
19		**she gave us-she told us to look ↓a::t**
20	**Matt**	yeah
21	**Katie**	**it says on tha::t it should be between ○six and nine**
22		↓metres○ (.) [that could be normal length
23	**Matt**	[pf:::t *((shrugging))* a::ye it's-s-s:- (.)
24		something like ↓tha::t (.)
25	**Katie**	that's like normal length of a (.) heat exchanger (.) so
26		I just [di::d- (0.2)
27	**Matt**	[*((shrugging))*

28	**Katie**	○that○
29	**Matt**	sounds ↓fine

Throughout lines 1-4, and again in lines 6-8, Matt makes several knowledge claims regarding the dimensions required of the heat exchanger to be designed as part of the latest PBL task. Matt demonstrates a high degree of certainty in these assertions ("you need to have"; "it has to be"), relaying his step-by-step approach to successfully carrying out the calculations, having done so previously himself ("and the::n (.) by using tha::t (.) it gives you a ta↑ble"; "and then it gives you"). In addition to this methodical detail, Matt provides solid justification for this course of action (""cos it's cheaper"), thus making any potential disagreements on the part of his peers more difficult than normal. As shown in figure 6.2 and lines 1 and 6, note that Matt also uses his fingers to produce an enactment of the thickness that is key to his stance, so as to attract the gaze of his listeners (Streeck, 1994). Whilst Matt is not met with immediate disagreement, however, he fails to solicit any substantial agreement either. For example, even with this representation device - a common feature of the corpus - it is only Katie who provides (minimal) uptake of his stance, shown by her minimal continuer in line 5 ("yeah"), her quieted talk in line 9 ("○alright okay○"), her brief instances of eye contact (lines 5, 7 and 9), and the lengthy one-second pause in line 10 (in which no group member makes eye contact with Matt, as shown in figure 6.3). In this way, conversational trouble is marked out (Kuo, 1994), with Katie's utterances serving as face-saving agreement prefaces to the upcoming disagreement component, as we shall see.

In formulating disagreement ("I used li::ke£ ↑si:x£ met↓res£"), Katie's use of 'like' functions as a looseness marker which allows her to establish only low commitment to the knowledge shared (Androutsopoulos & Georgakopoulou, 2003). By sidestepping her exact findings, she avoids accenting the true extent of the disparity between the results of their individual research, thus making her disagreement much less threatening to Matt. This is further demonstrated through Katie's repeated use of smiley voice, as though there is potential for them to resolve their misalignment, as opposed to them being in interactional deadlock (Waring, 2001). Prompted, perhaps, by her own use of humour - or by her use of metres as measurement as opposed to Matt's use of feet - Katie's admission is met with

laughter from both Josh and Matt in line 12. In response, Katie maintains her smiley voice, but works to verify her epistemic access here, too ("↑that's ↑wha::t£ everyone else is ↑do::in'£", line 13). Similar to the previous extract, this was identified as a common analytical occurrence, where speakers sought to validate their knowledge claims by marking them as publicly agreed 'fact'.

However, as we proceed to line 14, the only response Katie receives is Josh's continued laughter. Although the lightheartedness of their interactions serves to avoid more serious conflicts in the face of disagreement, there is also a risk that Katie's knowledge is completely dismissed (i.e. 'laughed off') on the grounds of humour (much like the chapter's opening extract involving Linzi). Of top of this, in lines 15-16, Katie not only downgrades the universality of her initial assurances ("well the people that ↑I:: ↓a::sked"), but rectifies the findings of her individual research, too (">aw no: I used ni::ne ↓metres£<"). This is a vulnerable interactional point for Katie in that, coupled with the ongoing humour, her academic reliability has now been put into question; factors which may impede the convincingness of her argument, overall.

Katie, therefore, seeks to address this dilemma as a matter of urgency (lines 18-19), shown by her interjecting Matt's turn, and - most significantly - her invoking institutional power in the form of the absent tutor figure ("it said"; "it said ↑o::::n"; "see how that book she gave us-she told us to look ↓a::t". Through reference to the authoritative tutor's word ("she"), as well as prompting her peers to consider this shared official resource, Katie constructs a powerful argument, but does so without positioning herself as the authoritative one (e.g. Brown & Palincsar, 1989). For example, during lines 21-22 ("it says on tha::t it should be between ○six and nine ↓metres○"), Katie establishes her point - which, quite clearly, contrasts with Matt's - but holds no accountability for the act of disagreeing itself (i.e. it is the tutor, rather than Katie, who says so). This neutral interactional stance is further illuminated throughout the extract's remaining lines (e.g. the "just" minimiser, line 26; the low modality of "could be normal", line 22; the 'like' looseness marker in "like normal length", line 25) where Katie constructs herself as merely following the wisdom of the tutor-provided source (in contrast to stating plainly that Matt is wrong), thus rendering her blameless in matters.

From the respondent's perspective, it is rather striking that, following Katie's use of institutional power, Matt displays considerable epistemic backdown (e.g. "yeah", line 20; "sounds ↓fine", line 29) from the apparent sureness of his initial knowledge assertions. In succumbing to Katie's viewpoint, Matt hedges around any explicit acknowledgement of his wrongdoings (i.e. that his - rather than Katie's - values and method of measurement were completely incorrect), instead adopting a distant and minimally invested stance in his talk as a distractor from disagreement (e.g. "something like ↓tha::t", line 24; the repeated shrugging gestures, lines 23 and 27). Though, what is most fundamental here is that the use of institutional power - in this case, the absent tutor figure - was one of the most persuasive interactional strategies to be utilised by the students during disagreements, and across the entirety of the analyses. Whilst the previous extract certainly demonstrates the impact of non-tutor sources (i.e. out-group experts), they were not as impactful - or as frequently used - as the PBL tutor was: a central figure of authority and unrivalled source of credible knowledge, relevant to each group member. Sharma (2012, 2013) identified similar findings, but the current analyses are the first to illuminate the use of the absent tutor as a resource for disagreement management within the tutorless PBL context specifically.

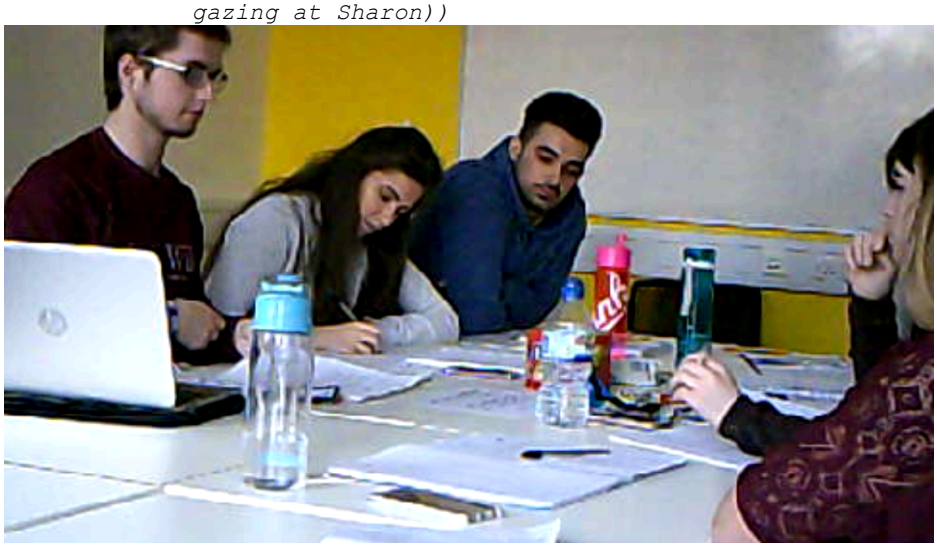
Students frequently utilised the credibility of tutor-provided resources (e.g. PBL worksheets, class textbooks, and lecture slides) both in enacting disagreements, and in neutralising their accountability for actually making these oppositional stances (e.g. 'that's what it says here', rather than 'no, that's wrong'). These interactional moves were usually accompanied by physical gestures to the communal objects themselves, serving as prompts for continued collaborative action (Day & Wagner, 2014) during disagreement. This is shown in the extract below, where the group mark disagreement with Sharon's lengthy display of information:

Extract 6.9: Group 3

1	**Sharon**	[*((reading from and pointing at the worksheet, whilst intermittently gazing at her peers))* [so you need to conside:r (.) basically can it be shipped
2		like: (0.2) wanting the port with the biggest one for
3		shipping i:n (.) crude o↑i::l (.) most↑ly (0.4) e:::mm
4	**Laura**	○**who will this be?**○ **(0.2)**

5	**Sharon**	>par↑don?<
6	**Laura**	**wh-what was that you ju:st sai:d? wha-was the [thing abo-**
7	**Sharon**	[aw l- (.) like
8		near ports=
9	**Laura**	=yeah=
10	**Sharon**	=so the crude oil can be shipped [in
11	**Laura**	**[so ↑u:mm (.) are we go:nna**
12		**suggest all that stuff like:? (.) we suggest you build**
13		○**he::re-because**○
14	**Sharon**	I think so-y[eh
15	**Molly**	[○mm○(0.2)
16	**Sharon**	[*((pointing at the worksheet again, and gazing at Laura))* [>if it's like goin' through ports then it can't be::< (.)
17		>too isolated because the fact that there's no road
18		transpo:rt to ↑i::t<
19	**Laura**	yea::h (0.2)
20	**Sharon**	[[*((reading from the worksheet again))* then you also: (.) for transport of raw material you and
21		things (.) transport fo:r (.) workforce: (.) it needs to be::
22		close enough to a population with good transport links (.)
23		but not so close that m-it's like:: (.)
24	**Laura**	**ho-how close is: like:: close enough? (.) or not? (.) like**
25	**Sharon**	>I mean::< a train ride: away I guess fro::m a city: (.) like
26		(0.4) 'cos (.) [Grangemouth is one of the: examples [*((pointing at the worksheet and gazing at her peers))*  Figure 6.4: Sharon points at the worksheet and gazes at her peers as she makes the case for her research.
27		that it's close to-the firs-the port (0.2) it's close to the
28		population (0.3) but it's-is still like out the way (0.2) ○I
29		think was one of them but e:m○ (.) >I don't really know 'cos

30		then Scotland and England< (0.2) the distances are gonna be
31		quite:: (.) di:fferent to say (.) China: (.) yeh
32	**Laura**	yeh
33	**Sharon**	>'cos they're so much smaller<
34		*((Sharon picks up her worksheet, reading this - and her own notes - aloud for 28 seconds. During this time, her peers glance at their own worksheets, intermittently glancing at Sharon.))*  Figure 6.5: Sharon reads from the worksheet for 28 seconds.
35	**Craig**	a point to also look at i:s like (.) you can actually just
36		get [your crude oil from a pipeline (.) [*((pointing at his worksheet whilst gazing at Sharon))*
37	**Sharon**	[mm: [*((lowering her worksheet onto the desk, and looking downwards at it))*
38	**Craig**	'cos see things like Grangemouth they get [theirs from there
39	**Sharon**	[yeah [(*(releases worksheet completely, and gazes at Craig))*

40	**Craig**	theirs is a [massive pipeline [*((holding and pointing at his worksheet, whilst gazing at Sharon))*  Figure 6.6: Craig holds and points to the worksheet in front of him whilst gazing at Sharon.
41	**Annie**	[mhmm [*((nodding))*
42	**Craig**	so::
43	**Molly**	ye:h
44	**Craig**	if we were-were in Scotland we probably wouldn't need to
45		take into account (0.4)
46	**Sharon**	yeh-the shipping yeah

Sharon's turn in the first three lines follows on from an extensive knowledge display (lasting approximately 40 seconds) in which she relayed the findings of her individual research for the PBL case - essentially, that selecting a plant location with a large enough port for "shipping i:n (.) crude o↑i::l" is necessary - to her peers. The first sign of any uptake, however, does not occur until line 4 of this extract ("○who will this be?○"). Rather than validating Sharon's proposal, here, Laura seeks out further clarification of the points being made, making a similar request in line 6 ("what was that you ju:st sai:d?"). Upon the confirmation (Laura's "yeah", line 9) of the subject matter at hand ("near ports", line 8; "so the crude oil can be shipped [in", line, 10), it is through lines 11-13 that Laura's use of repair-initiation (e.g. Pomerantz & Heritage, 2012; Schegloff, 2007) becomes clear ("are we go:nna suggest all that stuff"; "we suggest you build ○he::re-because?○"). By referring to "all that stuff", Laura questions the relevance of Sharon's knowledge, and indirectly marks out what is repairable; that the lengthiness of the work proposed by Sharon is problematic,

and one which impacts the collective (the repeated "we" personal pronoun) group. In this way, through her seemingly inquisitive stance, Laura resists the finalisation of Sharon's agenda without directly engaging in disagreement. Repair initiators were common features of the data corpus, used as distractive devices through which agreement (e.g. in approving a peer's agenda) and explicit disagreement (e.g. 'no, that plan won't work') could be avoided.

Throughout lines 16-18, note how Sharon works to promptly address Laura's repair-initiators by rationalising her original claims (e.g. the fast-paced assurance that ">if it's like goin' through ports then it can't be::< (.) too isolated"). Following a fairly minimal response from Laura in line 19 ("yea::h"), Sharon's efforts to justify her proposal continue into lines 20-23 (e.g. "it needs to be close enough to a population with good transport links"). As in her previous responding turns, however, Laura adopts another repair-initiator in line 24 ("how close is: like:: close enough?"), again distracting from approving Sharon's agenda, in addition to hedging around the act of disagreement. Consequently, Sharon - for the fourth time - expands on her stance, but this time attempts to better validate her approach by referring to an accredited source: an example provided by the tutor ("Grangemouth is one of the: examples", line 26) which forms the basis of her thinking. By directing attention onto this public document (the physical pointing gesture - also done in lines towards the PBL worksheet, figure 6.4), Sharon works to strengthen her claims, in addition to prompting the group's collaborative action. Despite these heightened interactional efforts, yet again, Laura withholds any authentic agreement, offering only a minimal continuer in line 32 ("yeh"). In this way, whilst Sharon appears to orient to Laura's calls for repair-initiation, she merely widens her original standpoint, rather than demonstrating any modification.

As we move to lines 35-36 of the extract - occurring after Sharon's uninterrupted 28 second account of her research notes (line 34 and figure 6.5), in addition to Laura having exhausted her proffers for refinement - Craig's contribution to the conversation (in which *he* now makes relevant *his* worksheet via his pointing gesture) also puts Sharon's proposal into question ("a point to also look at i:s like (.) you can actually just get your crude oil from a pipeline"). Rather than rejecting Sharon's claims, though, Craig offers an alternative - and more simplistic (e.g. the "just" minimiser) - course of action in his gentle enactment of disagreement.

Interestingly, in line 38, Craig works to maintain some alignment with Sharon - in spite of his opposition - by acknowledging her stance in referring back to the "Grangemouth" power plant example she raised in line 26. Alongside his raising this common ground, however, Craig's use of the tutor-provided example also serves to substantiate his argument. This is further demonstrated in line 40, where Craig emphasises the "massive pipeline" - as though it is more than qualified for the job - and again makes relevant the official PBL materials through his pointing gesture (figure 6.6). Craig's position, in turn, is bolstered by both Annie ("mhmm" and her nodding gesture, line 41) and Molly ("ye:h", line 43).

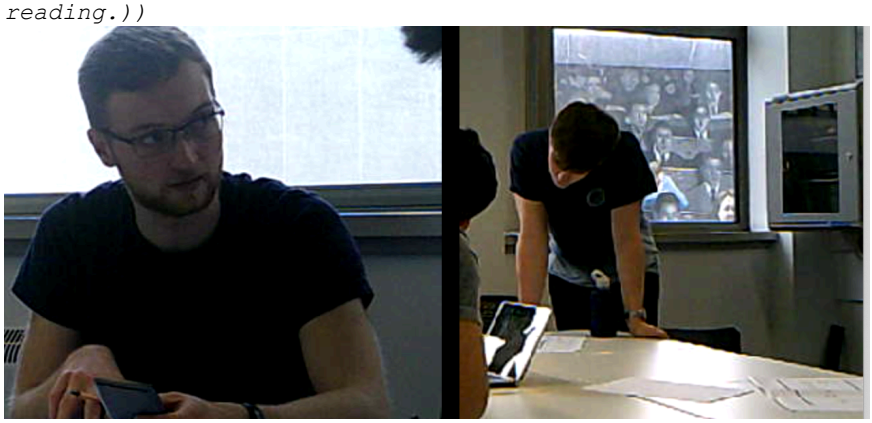
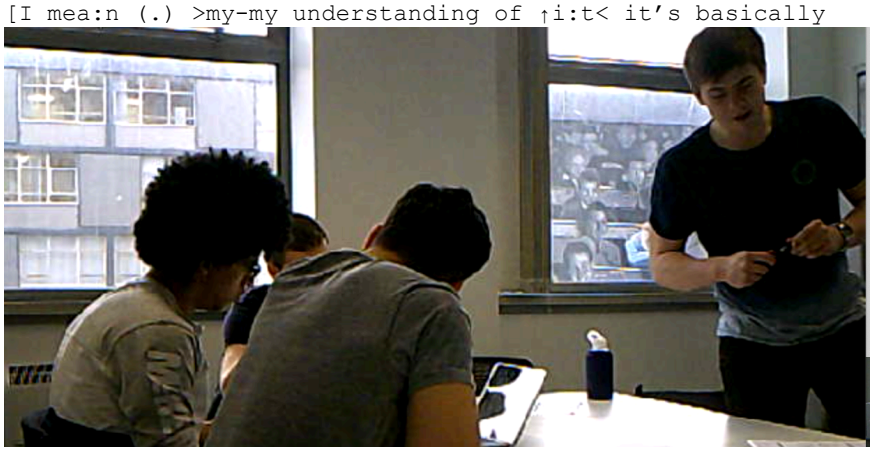
Similar to analyses conducted by Day and Wagner (2014), note that Sharon's gradual loss of conversational footing coincides with object release. Specifically, upon Craig's turn in line 35 - in which *he* begins to physically engage with his worksheet - Sharon (in line 37) lowers the worksheet down from her face and towards the desk, before releasing this object from her grasp completely (shifting her gaze to Craig, from line 39 onwards). Whereas the worksheet sustained her claim for the turn over numerous turns at talk during the extract (see Keisanen & Rauniomaa, 2012) - including line 34's 28 second account, in which she placed the worksheet at the level of her face, and in plain sight of her peers - here, her physical disengagement signifies her departure from the interactional floor.

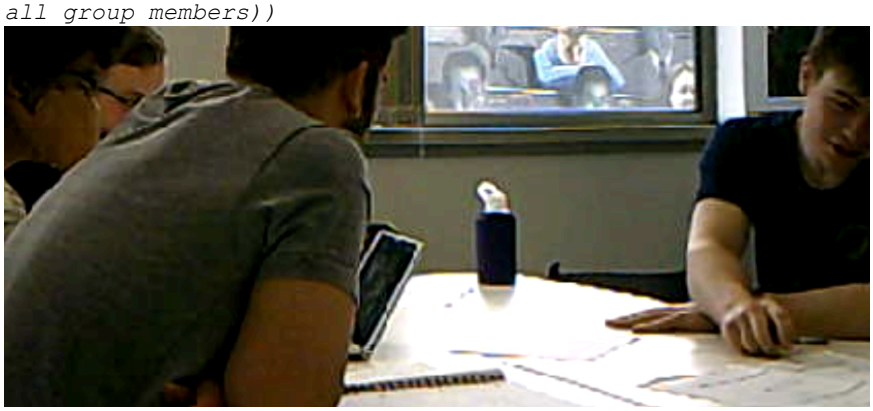
In consideration of the extract as a whole, then, Laura and Craig's resistance stems from Sharon's proposal unnecessarily inflicting a larger workload on the group. As Sharon's agenda is dependent on the shipping of crude oil, she requires that the group - in the design of their hypothetical plant - are limited to locations with sizeable delivery ports, thus demanding much more planning on their part. On the other hand, the use of a pipeline - which will enable the transportation of gas over a large distance - Craig notes, will override such complications. Although, in completing his disagreement, Craig maintains a low modal stance, where - despite the evident desirability of his more manageable approach to his peers - he presents his agenda on an optional basis, and only loosely refers to disregarding Sharon's ("if we were-were in Scotland we probably wouldn't need to take into account", lines 44-45). Instead, it is notable that room is given to Sharon in closing her initial proposal herself ("yeh-the shipping yeah", line 46), where she completes Craig's turn

in orientation to being interactionally overpowered, and in acceptance of the task's new direction.

In extract 6.10, we see another of the PBL groups making use of (official) tutor-provided materials in indirectly substantiating their claims. In this extract, Grant uses the class textbook in indirectly opposing Liam's continued proffers for validation:

Extract 6.10: Group 6

1	**Liam**	we maybe could just leave tha:t and it would ↓all:: (.)
2		be happy days£
3		[(3.1) [((*Liam gazes at Grant for the first second of this pause, whilst Grant's gaze does not leave the worksheet in front of him. For the remaining time of the pause, Liam then gazes at his worksheet, whilst Grant gazes at Robert and Adam, who do not look up from their own reading.))*  Figure 6.7: Liam (left) gazes at Grant (right), who does not look up from the worksheet in front of him on the desk.
4	**Liam**	I'm:: (.) m::ore than happy to be proved wrong though£
5	**Grant**	[*((Grant walks away from Liam, and back to his own seat))* [I mea:n (.) >my-my understanding of ↑i:t< it's basically  Figure 6.8: Grant walks away from Liam as he begins his turn.

6		**goes <u>enti:rely</u> just on: (.) like (.) what's:: (0.6) I-**
7		[I:: have like£ gone through the Coulson Richardsons [((*pointing at the worksheet, and keeping it in view of all group members)*)  Figure 6.9: Grant points at and positions his worksheet so that it is visible to all members of the group.
8		like: (.) [ste:p one (.)
9	**Liam**	[mhmm
10	**Grant**	step ↑two: (.) step three£
11	**Robert**	**was the: Coulson Richardson book ↓helpfu:l for this?**
12	**Grant**	yea:h (.) **without it (.) you would no::t be able to** do
13		that
14	**Robert**	mhmm (.) do you remember what ↓u:::m (0.2) section it was
15		in?

In the opening two lines, Liam's talk follows on from a rather longwinded portion of interaction (for brevity, not included here) in which he seeks to make the case for his perspective on an aspect of the PBL task - but does not succeed. Liam appears to make light of his inability to solicit agreement from his peers ("we maybe could just leave tha:t"), suggesting that the group opt for the more appealing option of simply overlooking their misalignment - and not prolonging their discussions - for the sake of "happy days£" (which is spoken in smiley voice). However, the resulting 3.1 second silence in line 3 is an explicit marker of the remaining speakers' resistance not only in following through with Liam's 'joking' suggestion, but in engaging with his humour, either. As shown in figure 6.7, during his turn, Liam gazes at Grant, but redirects his attention to his notepad when this move is not reciprocated. This is something which Liam orients to in line 4's expansion, now highlighting the negotiable nature of his position, and his openness towards alternative thinking ("m::ore than happy to be proved wrong though£", spoken, once again, in smiley voice). 6.8

In response, though the group's absence of consensus has been made abundantly clear, it is notable that, throughout the entirety of lines 5-8, not once does Grant directly dispute Liam's stance. Instead, he hedges around the disagreement, constructing his standpoint as being purely subjective ("my-my understanding of ↑i:t") - as opposed to being absolute - thus making his talk less threatening to its recipient (Liam). In addition to mitigating conflict, Grant - like Liam - makes use of smiley voice as a means of self-deprecation, where he downplays any methodical consultation with the "Coulson [Richardsons" class textbook ("I:: have like£ gone through"; "[ste:p one"). This is also shown in Grant's isolating the knowledge to one source alone ("goes enti:rely just on:"), rather than being the product of strenuous research, or his own advanced skillset - activities and traits which would be too excessive in nature for the average student identity. Furthermore, in his use of "it's basically", it could be that Grant attends to the potential abilities of his peers; that they could easily understand the material, too.

As much as Grant's avoidance of disagreement is evident, however, the pointing gesture (figure 6.9) which accompanies his speech (lines 5-8) makes relevant a highly reliable source: the digital copy of the class textbook made available to each group member by the PBL tutor. In fact, Grant's initial physical movements away from Liam (figure 6.8) represent a significant change in the participation framework; as Grant stepping away from his one-to-one conversation with Liam, and as him resisting being the singular participant to disagree with him (Schegloff, 1998). In turn, Grant's pinpointing of the textbook in full view of his peers appears to incite Robert's query ("was the: Coulson Richardson book ↓helpfu:l for this?", line 13) through which Grant is able to utilise the interactional opportunity to affirm the fundamental nature of the book ("without it (.) you would no::t be able to do"); that it is an official, and compulsory, resource. In doing so, Grant evidences his claims - in a way that Liam cannot - and the need to consult this source if they, as a group, are to arrive at the correct answer. Uptake of Grant's agenda is shown in the extract's final two lines, with Robert actively seeking out the parts of the book to be read ("do you remember what …section"), thus indirectly overpowering Liam's earlier proffers for alignment.

Although the use of tutor-provided academic materials functioned as powerful interactional tools in 'doing' disagreement (nicely) within the tutorless PBL context,

this is not to say that there was any guarantee of a resolution, or that the desired outcome of knowledge alignment was always achieved. As an example of this, let us consider another of the PBL groups, where similar disagreement formulations are adopted as the group fail to reach a consensus on the requirements of the PBL task at hand:

Extract 6.11: Group 4

1	**Josh**	suppose the:n (.) this would be like: *((pointing at the*
2		*PBL worksheet))* (.) the legislation difference (.)
3		betwee::n (.)
4	**Hannah**	°countrieso=
5	**Josh**	=countries [and *((inaudible muffled talk))*
6	**Katie**	[yeah but the way they've worded it in thi:s
7		is they're saying (.) use the legislative (.) framework
8		to make a lis:::t (.) of (0.2) like: (.) environments
9		that you can ↓ha::ve and why you would or wouldn't have
10		the:m (0.2)
11	**Josh**	↓o:h ok[ay
12	**Katie**	**[it's what tha::t's sayin' ↓there *((pointing at***
13		***the PBL worksheet which is in front of Josh))*** (0.2)
14	**Josh**	[°yea::h soo-
15	**Katie**	[d'ya know what I mean?-so I think tha:t new suction head
16	**Josh**	yea:h and we'll ask I ↓suppose
17		[(2.0) [*((Josh looks at Katie, whilst Katie gazes downwards))*  Figure 6.10: Katie gazes downwards at the desk, whilst Josh (middle) looks on at her.
18	**Katie**	we::ll
19		[(1.8) [*((Katie looks at her notepad))*

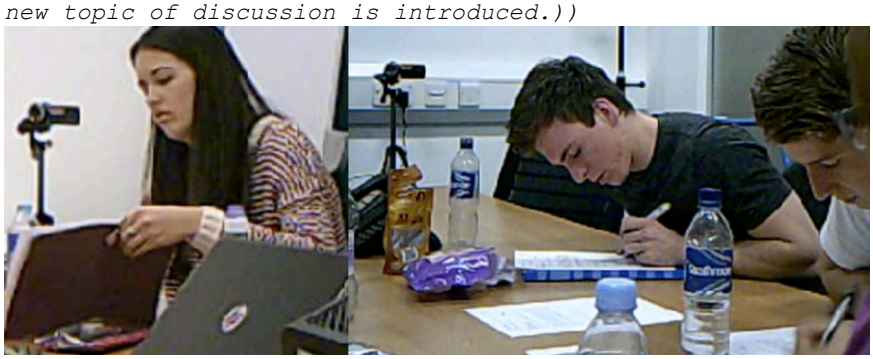
20	**Katie**	[>like I think **it's just gonna be based like we sai:d<** [*((Katie points at her notepad, but the other members offer no eye contact, instead continuing to write notes. The students continue writing for some minutes, before a new topic of discussion is introduced.))* 

Figure 6.11: Katie holds and points at her notepad. Josh and Matt (right) continue to write notes.

After a few minutes of discussing the demands of the current PBL task, Josh proposes a final agenda to his group; that their focus, in selecting a location for the plant to be designed, should be on "legislation difference" across the world. This is validated by Hannah's completion of Josh's turn ("○countries○", line 4), and then appears to be finalised via Josh's repetition ("countries") and in line 5. Before a consensus is reached, however, Katie interjects (see the overlapping speech) with a classic agreement-prefaced-disagreement ("yeah but") as an opposition to what has been said by her peers (i.e. that it is not a case of assessing the legislative differences between countries). In doing so, Katie makes use of the standard interactional resources for managing disagreement, positioning the institution as the source of blame ("the way they've worded it in thi:s"; "they're saying"), thus allowing her to establish her contrasting stance that further analysis is required of the group, beyond what Josh and Hannah first noted ("use the legislative (.) framework to make a lis:::t (.) of … environments that you can ↓ha::ve and why you would or wouldn't have the:m").

In line 11, Josh's "↓o:h" token, coupled with its falling intonation, appears to reflect a 'change of state' which emphasises the incongruence between Katie's display of knowledge, and what was stated previously (lines 1-5) by Josh and Hannah (Heritage, 1998). Though, before Josh has any opportunity to make use of holding the conversational floor, Katie promptly intervenes in the shape of her overlapping turn ("it's what tha::t's sayin' ↓there", line 12), this time invoking the PBL worksheet that is currently situated in front of Josh (also shown through her repeated pointing

gesture, lines 12-13). In this way, Katie forces Josh to re-examine the worksheet, and further demonstrates that her instructions are sourced directly from this tutor-provided, official document, which cannot possibly be wrong. Josh's quietened response, however, is produced with a 'cut-off' sound ("○yea::h so○-", line 14), owing to Katie's overlapping - and continued - proffers for alignment ("d'ya know what I mean?", line 15), as in the previous instances discussed above.

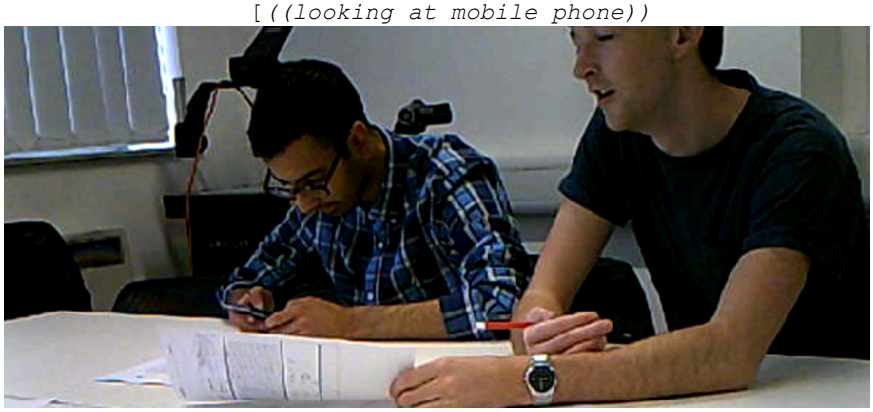
Consequently, in line 16, Josh has little option but to acknowledge Katie's perspective ("yea:h and we'll ask I ↓suppose"), but rather than his "yea:h" being indicative of authentic agreement, instead, it appears to function as a minimal continuer (Fellegy, 1995), prefacing his need for the PBL tutor to provide sufficient confirmation. Katie's orientation to this - that her assurance is not enough on its own - is demonstrated through the prominent two-second pause (and her downward gaze, in spite of Josh's, as in figure 6.10) in line 17, before she offers any response to Josh's motion. Line 18's "we::ll" token - a face-threat mitigator (Jucker, 1993) - is followed by another pronounced moment of pause (1.8 seconds in line 19), prior to Katie's reiteration of her aforementioned points (line 20). Here, it is intriguing that Katie packages her turn as though agreement had previously been established; that she, Josh, and Hannah were on the same page ("it's just gonna be based like we sai:d"). This collaborative stance is bolstered via Katie's pointing gesture towards - and her making visually accessible to her peers - her notepad, as in figure 6.11.

In spite of Katie's proffers for unity, and her utilisation of the tutor-provided PBL worksheet, no response is offered by Josh, nor Hannah. Whilst some movement is made during the earlier phases of the conversation - that is, Josh and Hannah's agenda being thwarted before finalisation - unlike the previous extract, no uptake of either speakers' agendas are shown in the end, with a lengthy period of silence ensuing before other PBL matters become the new focus of the group (not included here). In this instance, then, it seems that Katie's invoking of the tutor-provided academic resource is overpowered by Josh's call for the PBL tutor's validation; an interactional deadlock between two sources of institutional power.

The chapter's final extract - which is divided into two parts - builds upon the conversational patterns which underpin the previous two extracts (i.e., making relevant the tutor-provided materials as a means of indirectly bolstering one's knowledge claims in the face of misalignment), as well as illuminating more

specifically the practice of projecting blame upon the institution as a route for navigating disagreements. At the centre of their discussions is whether or not peer-reviewing is required of the latest task:

Extract 6.12A: Group 5

1	**Richard**	do ↑we need to:: (0.2) peer:: a:ssess (0.2) each o:ther
2		in the groups-did she say tha:t? (0.2) I can't remember
3	**Conor**	na::h (.) like it says peer (.) review (.) [but in the-
4	**Richard**	[>I know but<
5		it's [actually-(.) we're asking other (.) ↓groups
6	**Conor**	[in the-i:n-in the instructions (.) and then it says
7		instructions but it doesn't-it just says (.) upload what
8		[*((holding worksheet and pointing pencil at it))* we [did for case [↓zero
9	**Richard**	[↓right [*((looking at mobile phone))*  Figure 6.12: Conor handling the worksheet, whilst Richard looks at his phone.
10	**Conor**	ºdoesn't actually say peer review on itº
11		[(0.8) [*((Richard looks at his phone, whilst Conor looks at his worksheet))*
12	**Richard**	[*((still holding his phone, but now looking at Conor))* [no-I ↑kno:w we have to::: (0.4) ↓ma::rk (0.2) two other
13		groups' ºwo:rkº
14	**Conor**	yeah [*((not looking up from the worksheet))*
15	**Richard**	e::mm (0.6) but:: (.) I don't ↓kno::w (0.2) .hhh
16		*((coughing))*
17		(0.6)
18	**Richard**	[e::rm *[((looking at his mobile phone again))*

19		(0.6)
20	**Conor**	**honestly who:: ↓knows?**
21		[(2.0) [*((Richard continues to look at his phone, whilst Conor stands up from his seat, and places his bag on the desk))*
22	**Richard**	**she: (.) gave us no:tes-**
23	**Conor**	**[that's he:r notes** [*((takes his lecture notes from his bag and places them in front of Richard))*
24		[(0.6) [*((Richard glances at the notes, but does not handle them. Conor remains standing, looking down at Richard.))*
25	**Richard**	↓o::n (0.2) case one and two as ↓we:ll (0.2) **like she**
26		**marked them**
27		[(11.2) [*((Richard gazes at Conor for the first four seconds of this pause, then looks at his phone. During this time, Conor remains focused on unpacking the contents of his bag, not looking at Richard once.))*  Figure 6.13: Description.

In the first two lines of the extract, Richard seeks clarification from his colleagues ("do ↑we need to::") regarding the tutor's ("did she say tha:t?") supposed request that they "peer:: a:ssess" the PBL case submissions of other groups within the class ("each o:ther in the groups"). In response, Conor acknowledges that, whilst the PBL worksheet is titled "peer (.) review" (line 3), on the contrary, the instructions themselves do not ("na::h", line 3) specify that such an activity is to take place ("but it doesn't-it just says (.) upload what we did for case [↓zero", lines 7-8). Interestingly, although Richard initially constructs himself as needing reminded of these facts ("I can't remember", line 2), upon Conor's confirmation that peer assessment is not required, Richard interjects (lines 4-5) his turn, and is prompt with his agreement-prefaced (">I know but") assurance that peer assessment is required ("we're asking other (.) ↓groups"). Rather than being an authentic request for clarification, then,

this may have been Richard's approach to indirectly raising the group's need to confront the PBL session's elements of peer assessment (i.e. without being seen as 'too knowing').

As we move to line 9, Richard offers very minimal response (the lowered intonation of "↓right"), focusing on his mobile phone, as opposed to making eye contact with Conor. In turn, Conor - albeit in a quietened voice - reaffirms his stance that the worksheet "○doesn't actually say peer review on it○" (line 10). Despite Conor's assurances - and his upfront request for input at the beginning of the conversation - however, Richard asserts his own position on matters in lines 12-13 ("no-I ↑kno:w we have to::: (0.4) ↓ma::rk (0.2) two other groups' ○wo:rk○"); moves which are suggestive of him needing no convincing, owing to this being solid fact. Richard's turn is met with Conor's minimal continuer ("yeah", line 14), and no other uptake from the rest of the group (Fellegy, 1995). As a result of this growing knowledge misalignment, Richard exhibits some hesitance in taking forward his stance which disproves Conor's thinking (e.g. the prominent pauses, hedging ("e::mm"; "but::"; ".hhh"; "e::rm") and his unknowing stance ("I don't ↓kno::w") scattered throughout lines 15-19).

In line 20, Craig attempts to generalise Richard's unknowingness (above) to the entire group ("honestly who:: ↓knows?"); a subtle hint to their confusion being the product of the unsupportive institution as a distraction from the disagreement (though, as shown by the two-second pause in line 21, this is to no avail). At the risk of the group's academic business stalling - a likely concern within the tutorless PBL context - Richard spurs matters ahead - and seeks to strengthen his case - by referencing the tutor's providing each of them ("she: (.) gave us") with "no:tes" (line 22). In response, in line 23, Conor offers an immediate attempt (note Richard's 'cut-off' speech in line 22) to satisfy Richard's requests - and to validate his own stance - by providing him with a physical copy of "he:r notes" (i.e. the PBL tutor's). Here, in standing up from his seat, Conor makes himself noticeable amongst his non-moving peers in drawing attention to the official documentation, which he portrays as the solution to their problems (Mortensen, 2009). However, as shown by Richard's assessment ("case one and two as ↓we:ll"; "she marked them", lines 25-26), and his lack of physical engagement with the provided documents, these "notes" do not resolve the disagreement at hand, leading into an 11 second pause within which

Conor offers Richard no eye contact (despite Richard's attempts in the first four seconds, as in figure 6.13, line 27).

Extract 6.12B: Group 5

1	**Conor**	[*((still standing, he continues to unpack the contents of his bag onto the desk))* **[↓sti::ll (.) >don't really under↓stand< (0.4) what**
2		**this:: (0.2) course is about£(0.2) course is about£**
3	**Richard**	↓aha:: (0.2) heat exchang[er
4	**Conor**	[the life in the ro:le [*((still standing/unpacking his bag))*
5		(0.4)
6	**Richard**	ri:ght ↓so:: (.) team contra:ct we need to ↓do:: (0.2)
7		erm *((looking at his phone))*
8		[(0.5) [*((Conor sits down))*
9	**Conor**	ha:: (.) I ha::te tha: we£ *((laughing briefly))* have to
10		do a team ↓contract
11	**Richard**	[*((pointing his phone in the direction of Conor and reading from it))* [ye::ah each submission will be reviewed by two other
12		teams (.) please en°sure°
13		[(1.0) [*((Richard gazes at Conor, whilst Conor looks at the documents in front of him, instead))*
14	**Conor**	time to ge::t some he::at£ excha:nger£ design (0.2)
15	**Aaron**	so is tha:t (.) is that document in our: (.) group forum
16		↓then?
17		(0.3)
18	**Richard**	yes:
19	**Aaron:**	°okay that's fine-I'll do that afterwards°<

This uncomfortable point in the interaction is eventually addressed by Conor, who - in deflecting from their ongoing disagreement - broadens his earlier unknowing stance (line 20 in extract 6.12A) to the course as a whole, marking the institution as the common problem here (">don't really under↓stand< (0.4) what this:: (0.2) course is about£", lines 1-2). In line 3, Richard engages in Conor's stance (albeit minimally, as shown through the lowered pitch of his humour token - "↓aha::"

- which builds upon Conor's smiley voice), before modelling Conor's approach in making his own interactional diversion ("heat exchang[er"), away from the disagreement area. What is notable, however, is that Richard remains focused squarely on the academic business, rather than furthering Conor's institutional critique. This is shown again as the conversation develops (line 6), with Richard - quite swiftly - pursuing a second educational agenda ("team contract we need to ↓do::"), and Conor showing little uptake of this (nor the topic of the heat exchanger) as he continues to display his resistance to the institution ("I ha::te tha: we£"; "have to do a team ↓contract", lines 9-10).

During lines 11-13, having spent considerable time using his phone throughout the course of the conversation (e.g. figures 6.12 and 6.13), Richard finally locates the tutor's instructions (most likely in the form of an email, or a post on the module homepage) which confirm ("ye::ah") the group's need to undertake peer review ("each submission will be reviewed by two other teams", which is read, word for word, from his phone), just as he had hypothesised. Rather than this finalising the disagreement - and even with his direct gesture towards Conor using his phone (line 11) - however, after line 13's one-second pause, Conor shows no uptake of this official word (nor Richard's gaze). Interestingly, although Conor showed no acknowledgement of the heat exchanger topic when it was first raised by Richard in line 3 - owing to, one might assume, his being distracted from unpacking his bag (line 4) - it is now (line 14), following the validation of Richard's position, that Conor latches onto this agenda, as though he did, in fact, hear the suggestion in the first instance ("time to ge::t some he::at£ excha:nger£ design"). Coupled with his use of smiley voice, it seems that Conor lightly hedges around being proven wrong, but compensates for this by aligning with the second best option (i.e. Richard's earlier call for the heat exchanger research).

It is at this point, in lines 15-16, that Aaron - another member of the group - intervenes in the conversation, providing Richard with some acknowledgement of his newly validated information ("is that document in our: (.) group forum ↓then?"), and therefore, overriding Conor's distractive move (line 14) towards the heat exchanger topic. In this way, though Conor - by now, having even rejected several of Richard's noticeable physical prompts (Mortensen, 2009) - shows no amendment of his stance, Aaron displays promise of taking forward Richard's guidance in his practice, at least

("I'll do that afterwards", line 19). However, at the risk of too forcibly emphasising his point in the direction of Conor - which could strain the entire group's relations with one another - in the interactions that follow on from the final line, Richard casts aside the matter of peer review. Additionally, as the group's discussions quickly shift to upcoming assignment deadlines across the course (i.e. non-PBL chat), Conor withdraws from the interaction, and instead engages privately with his phone. It is some four minutes later - when the subject pertains to the inadequacy of the teaching - that he engages in the conversation once again (though, the peer review process is not mentioned by any of the speakers again during the remainder of this PBL session).

6.5. Chapter summary

The opening of this chapter demonstrated the straightforwardness of 'doing agreement' in PBL, where the agreeing components of these preferred actions were explicit in form (e.g. prompt, and often overlapping positive assessments which clearly established alignment with the stance in question) (Pomerantz, 1984a). The simplicity of agreement stood in stark contrast with the rest of the chapter, which was allocated to the intricacies of 'doing disagreement'. In fulfilling the expectancies of PBL that participants *should* question one another's knowledge stances in the quest for deeper understanding (De Grave et al., 1996), like other pedagogical research research (e.g. Hüttner, 2014; Tainio, 2011), students' disagreements were indirect, and often convoluted in nature, as they battled the pedagogical expectations of PBL alongside the social demands of working with peers. That is, students negotiated conflicts with respect to the content, as well as with each other's face wants, too (Brown & Levinson, 1978; Goffman, 1967; Paramasivam, 2007). This chapter is evidence of the learning that took place via disagreement, and will be useful to tutors and alike in understanding how disagreement is done in PBL.

Attention was given to students' indirect strategies for self-managing disagreements within the tutorless learning setting. In what was the most frequently occurring formulation throughout the data corpus, students' oppositional stances were regularly coupled with agreement particles to soften the act of disagreement (e.g. Pomerantz, 1984). These agreement-prefaced disagreements involved the use of 'yeah… but no' formulations, knowledge appreciations (e.g. 'I see what you mean…

but'), and students' 'doing unknowing' (e.g. 'I don't know if I have read it differently… but') (e.g. Heritage, 2012; Waring, 2001). Through these conversational strategies, students gently negotiated knowledge misalignment, as opposed to outrightly rejecting or challenging their peers, in what would have been major face-threatening moves (Marra, 2012) - especially for the (publicly) neutral student (e.g. Benwell & Stokoe, 2002). This neutrality was also achieved through the use of repair-initiators (e.g. 'say that again?'), minimal responses, and laughter in lightening the seriousness of the situation.

Another familiar occurrence in the data corpus - and a powerful, original analytic observation of this study - involved students' use of the absent tutor figure during the enactment of disagreements. By referencing the tutor (e.g. 'but she said it was X'), and by calling on tutor-provided resources (e.g. 'but it says here on the worksheet'), the groups invoked institutional power not only in making disagreement, but in neutralising their involvement in demonstrating this opposition against their peer's knowledge stance. Students recurrently projected blame upon the institution in preserving their cohesion as peers *whilst* engaging in disagreement (e.g. 'I'm not the one who's saying it, it's her') (e.g. Chiriac, 2008). In their investigations of peer interactions in small groups, Sharma (2012, 2013) also identified similar disagreement strategies (e.g. where the tutor identity was invoked in resolving disagreements, and where reference was made to academic resources in supporting one's disagreeing claim), but this study is the first to illuminate the use of the absent tutor figure within a tutorless context. Similarly, Leyland's (2020) analysis of writing tutorials involving second language English speakers showed how writing tutors deferred to non-present specialists - academic tutors - when they could not satisfy students' requests for advice; making clear alternative avenues of support, rather than failing to satisfy their requests, altogether.

In addition to their use of the absent tutor, there were several instances of the speakers invoking epistemically supreme - and, apparently, universally known - students outside of their respective groups, again in indirectly bolstering their disagreements (e.g. 'that's what everyone else is doing'; 'I think Dan said there was'). However, these formulations were neither as successful, nor as commonplace as the former, because, even with their 'exemplary' intellectual credentials, they could not match the institutional power possessed by the tutor.

7. SOCIAL LOAFING

de Grave et al. (2001) mark the presence of a social loafer (see Latané et al., 1979) - also referred to as a 'freeloader' or 'slacker' - as a critical incident in PBL, with Kindler et al. (2009) noting that social loafers, ultimately, lead to dysfunctional PBL groups. In floating facilitator PBL - that is, a predominately tutorless setting - the demands on students' self-regulatory skills are further amplified, in that they are not granted with the luxury of having the presence of the tutor to resolve (or at least assist in resolving) such problems on their behalf (Allen et al., 1996; Lee et al., 2015; Woods, 1996).

Much like students' self-management of disagreements in PBL (chapter 6), given their (assumed) equal status as fellow student members, and the damage such confrontational - or even vaguely authoritative - moves could inflict on their maintenance of alliances (Benwell & Stokoe, 2005) - the notion of straightforwardly confronting a social loafer is out of question. Equally, however, this is not to say that students have *no* capacity to self-manage social loafing - a common misconception surrounding student groups (Clouston, 2007; Elder, 2015) - only that we know very little about *how* the management of social loafing might be done, particularly within tutorless contexts. This aim of this chapter, then, is to begin to address this very question.

The majority of the chapter is dedicated to students' lighthearted confrontations with 'one-off' offences (e.g. a lack of preparation, and lateness). From examination of the seven PBL groups in total, there was just one longstanding occurrence of social loafing, and so, the second part of the chapter is allocated to the case of Callum. Some insight is given into how Callum himself presents his continuous lack of engagement with the shared PBL workload to his peers, but the primary focus of these analytical discussions are to reveal students' interactional strategies for dealing with his behaviours in a way that does not violate the boundaries of the average student identity.

7.1. Humour & the 'one-off' social loafer

The chapter's first subsection will document the interactionally lighthearted treatment of one-off instances of social loafing, as well as how offending speakers

account for said failures to adequately participate in the shared PBL workload. Across the data corpus, at least one or two members within each of the groups exhibited social loafing behaviours, and as we will see in the upcoming extracts, these solitary offences - whilst acknowledged by the speakers involved - were not positioned as major issues, nor were they shown to be detrimental to the social loafer's stance as a fellow group member. This was not the case for recurrent instances, as will be addressed in the chapter's finale.

Below, in extract 7.1, for example, we see how the students' jointly produced PBL contracts - containing the prearranged punishments for those members failing to contribute to the workload - were often invoked in the humorous confrontation of these one-off slacking behaviours. Prior to the opening lines (i.e. not on camera), Craig - the present session's chair - was made aware of Sharon and Linzi's lack of preparation for the PBL session:

Extract 7.1: Group 3

1	**Craig**	did anyone else do anything (.) did anyone even do their
2		research?
3	**Linzi**	I've already [said
4	**Craig**	[outside now £Linzi£
5	**Linzi**	I'll accept a verbal warning=
6	**Sharon**	=so will I accept a verbal [warning
7	**Craig**	[actually it's a
8		£written warning no:w£
9	**Annie**	e:m no but how can we: what can we improve on as a team?
10	**Craig**	£do: the research£
11		*((group laughter))*

In lines 1-2, then, his proffers for uptake are broad in nature, as though he is receptive to any knowledge display, from any other member of the group, so as to move beyond a potential stall in conversation ("did anyone else do anything"; "did anyone even do their research?"). Rather than these proffers being satisfied, in line 3, Linzi references her original admission that she has already been candid about her failure to conduct the required individual research for the case ("I've already [said", line 3). In response, Craig's overlapping talk ("[outside now £Linzi£", line 4) jokingly

reprimands Linzi, where he imitates the teacher-student dynamic in demanding that she leaves the classroom.

Craig's utterances - specifically, his use of smiley voice, and his 'command', which goes against the non-authoritative student identity - are representative of the data corpus, and also align with the classic markers of teasing (Clark, 1996), where the provocativeness of his talk serves to construct a playful, and non-serious, working environment (Keltner et al., 2001; Yu, 2013). Similarly, Hendry, Wiggins, and Anderson (2016b) showed how psychology students in PBL used teasing in the discursive construction of group cohesion, and this lightheartedness appears to be especially important within the self-managed pedagogical context, given the members' fight to each maintain their equal student status. Here, for example, as the present session's allocated chair, and as someone who has completed their homework, Craig uses teasing to neutralise what may be interpreted as his authoritativeness; implying that he is merely performing his leadership duties as a consequence of their unavoidability, and that his peers are not answerable to him. This elucidates the contradictory disposition of the student identity that is typically overlooked; that whilst one may be accountable for doing their share of the group work, equally, they can be made accountable for being the only member to have completed their work when others have not. In tutorless PBL, this is a troublesome position to be in, as it could elevate Craig's status beyond average student, leaving him at odds with his peers.

Further evidence of Craig's teasing is shown in lines 5-6, when both Linzi and Sharon readily take forward his humorous stance in their prompt acceptance of punishment ("I'll accept"; "so will I accept"), where they draw upon the exact contents ("verbal warning") of the group's preexisting PBL contract (pertaining to the agreed repercussions of lacking engagement). Consequently, in lines 7-8, Craig builds upon his peers' invoking of the shared contract, stating - again, in smiley voice - that their loafing behaviours are - "actually" - deserving of more serious punishment ("£written warning now£") than they have noted they are willing to accept (lines 5-6). In this way, Craig indirectly makes relevant the increasing levels of warnings in place, should loafing behaviours continue beyond the one-time offence. That is, whilst Linzi, Sharon and Craig all engage in co-constructed humour in the face of the incomplete academic work, the PBL contract is used informally to signify

the presence of there being group rules in existence - and, thus, the need to acknowledge one's lack of preparation - but in a non-threatening way for each of the parties involved. Therefore, the use of teasing was not exclusive to the function of maintaining cohesion; it occurred as a response to violations of group norms, too. Though by nature teasing is humorous, additionally, it works to confront misbehaviours, thus leaving some stain on the offending member's stance in the public domain. For this mockery to cease, these misdemeanours must not continue (Fine & De Soucey, 2005).

Interestingly, in line 9, Annie's involvement in the conversation showcases a more stern tone than the other speakers thus far ("e:m no but"), with no engagement in the ongoing teasing or humour made, and focus directed explicitly on their collective need to "improve as a team", and to 'do education' once more. In his responding turn, Craig's continued use of smiley voice - his third instance in the extract alone - shows recognition of Annie's position, but also downgrades its seriousness, so as to avoid the development of any tensions ("£do: the research£", line 10). Here, Craig's forthright assertion - put simply, that the individual research must be completed, and that Linzi and Sharon must not exceed this one-off instance of social loafing - is softened by its accompanying smiley voice which, in turn, builds into the shared group laughter - now involving Annie - as in line 11.

The next extract further exemplifies students' co-constructed culture of humour when negotiating the business of one-off social loafing events. Though, even with the use of teasing, accusations surrounding one's (un)equal participation must be accounted for. Here, group member Kadisha is being asked to take on the role of session chair as a substitute for an absent group member:

Extract 7.2: Group 7

1	**Kadisha**	AM I: THE PER-LISTE:N (.) I've done it TWO: times now:
2		(.) okay (.) I think some BITCHES£ [in here haven't done
3		it once:
4		[*((Lily laughing))*
5	**Ronald**	↑who ↑ha:sn't done it once?
6	**Kadisha**	what?
7	**Ronald**	who hasn't done it once?
8	**Kadisha**	let's find-

9	**Carrie**	WE'VE ↑A:LL DONE I::T£
10	**Ronald**	yeah
11		(0.4)
12	**Carrie**	it's just your second time unfortunately [Kadisha
13	**Kadisha**	[this is my
14		thi:rd time:
15	**Bella**	it's 'cos [it's 'cos you:-you stepped in when-Norman
16	**Ronald**	[who did you step in fo:r?
17	**Carrie**	A::W
18	**Kadisha**	yeah I stepped in-remember that da::y? I stepped in
19		for someone
20	**Lily**	but Norman's not here toda:y
21	**Kadisha**	so Norman was supposed to do it
22		(1.0)
23		*((Lily laughing))*
24		(2.0)
25	**Kadisha**	it's fine (.)
26	**Bella**	there's Oreos tho:ugh£
27		*((group laughter))*

In extract 7.2, having consulted their schedule of roles, the group have established that it is Kadisha's turn to be leader for the week's PBL sessions; something which Kadisha herself disputes in the opening lines ("I've done it TWO: times now:"; "I think some BITCHES£ [in here haven't done it once:"). Although it may well be the case that Kadisha is - quite simply - frustrated at being burdened with the role of group leader on numerous occasions when - according to her - some of her peers have never undertaken such duties, here her talk also works to safeguard her average student status. By raising issue with her repeated allocation as leader, Kadisha treats her responsibilities as undesirable, and emphasises her resistance towards authority. As established in chapter 5, to be seen as too eagerly embracing a position of leadership, Kadisha could be substituted as the absent tutor figure. Relatedly, Jefferson, Sacks, and Schegloff (1987) note that profanities ("BITCHES£", line 2) are indices of intimate interactions (i.e. a space in which it is acceptable to make such moves). This ties in with the notion of the 'non-serious' student within the

informal PBL environment, and (seemingly) allows Kadisha to oppose her peers in a non-threatening way.

Although Kadisha uses a laughing voice in presenting the above claims - that some members “haven’t” even served as leader “once:” - given she addresses the entire group, her peers (besides Lily’s apparent affiliative laughter in line 4) are prompt in their turns to resolve the accusations made (joking or not). With the matter of group participation at stake, note how Ronald’s speech increases in pitch in an apparent display of disbelief ("↑who ↑ha:sn’t done it once?”, line 5), whilst Carrie's assertion - though delivered in a laughing voice - is loudened and explicit (“WE’VE ↑A:LL DONE I::T£”, line 9). This is followed by their rationalisations from line 15 onwards, where - upon her noting that “this is my thi:rd time:” (lines 13-14) - the responding speakers assure Kadisha that they have not slacked on their duties, and that this situation has arisen only because she "stepped in when-Norman” (line 15) was - and continues to be ("but Norman’s not here toda:y”, line 20) - absent. There are prominent pauses in both lines 22 and 24 before Kadisha eventually shows acceptance of her position as being inevitable (“it's fine”, line 25). In line 26, however, Bella’s reference (in smiley voice) to the snacks on the table (“there’s Oreos tho:ugh£”) reintroduces humour to the group by diverting from the source of tension - the issue of leadership - which leads into shared group laughter (including Kadisha) in line 27.

The above interactions, therefore, illustrate the complex conditions that surround the average student that were first discussed back in chapter 5; that whilst it is problematic to be seen as too involved (e.g. by taking on the role of leader too frequently), so too is being seen as failing to contribute to the group business at the required minimum level (hence the group’s resistance to Kadisha’s accusations) (Stokoe et al., 2013). The next extract - involving the same group within a different PBL session - again demonstrates the somewhat playful negotiation of social loafing as a group issue, with reference made once more (as in extract 7.1) to the PBL contract and the enactment of punishment. Coincidentally, we join the group as they are in the midst of designing their contract, where they use its contents to teasingly address Ronald’s nonattendance at a supporting lecture to the present PBL session in response to his bringing to light their lateness:

Extract 7.3: Group 7

1	**Kadisha**	we need to like make the contract because we didn't do it
2		(0.6)
3	**Carrie**	yeah
4		(4.0)
5	**Kadisha**	right so: (2.0) so far we had no briberies *((reading from*
6		*the groups' incomplete notes from the previous week))*
7		(2.0)
8	**Ronald**	is that £it?
9		*((Ronald and Lily laughing))*
10		(0.4)
11	**Kadisha**	*((continues reading from notes))* U:M and we also didn't
12		want a lack of commitment or participation-you want
13		honesty: and we don't want anyone to be consistently late
14		(.) and the:n-
15	**Ronald**	he:y-I was a bit-yo-you: guys took your time:
16		(0.4)
17	**Kadisha**	well we came from a lecture so=
18	**Bella**	we didn't patch class [Ronald
19	**Kadisha**	[yeah
20		*((Lily laughing))*
21	**Ronald**	eh-I-I was studying the whole of this morning
22	**Bella**	so why did you not come to cla::ss?£
23	**Ronald**	'cos I was studying
24		*((Carrie, Lily and Norman laughing))*
25	**Carrie**	why?£
26	**Ronald**	[I'm more productive
27	**Bella**	[logic£ ↑logi::c
28		(0.6)
29	**Kadisha**	and we also said tha:t (0.4) if we <u>are</u> late we should
30		bring treats-but we said no briberies >which would
31		include ↓this<
32		*((loud group laughter))*
33	**Kadisha**	and then we say like:-a:sk for forgiveness and be like::
34		(0.2) and give like emotion: (.) when <u>you're:</u> asking for
35		forgiveness *((reading from worksheet/gazing at Ronald))*

36		*((group laughter))*

In the opening line, Kadisha positions the finalisation of the group's PBL contract as the session's next order of business ("need to like make the contract") owing to its lack of completion during the previous week ("because we didn't do it"). In organising the contract's design, Kadisha reads from the group's shared notes and, throughout lines 5-14, makes continual reference to the initial expectancies that were raised collectively in the last session (e.g. "we need"; "we didn't"; "we had"; "we also didn't want": "we don't want") - moves which avoid too authoritative a stance. Although these interactional practices were commonplace in the introduction of any educational agendas across the groups, a gentle approach - that which hones in explicitly on speakers' joint responsibilities to do PBL - was shown to be especially important in the management of more formal matters (i.e. those unrelated to the PBL content), where there lies a higher risk of being thrust into a singular leadership role (i.e. a substitute for the absent tutor figure).

Upon Kadisha making relevant the issues of engagement ("didn't want a lack of commitment or participation"), "honesty:", and punctuality ("don't want anyone to be consistently late"), Ronald's interjection (see the 'cut-off' sound in Kadisha's speech, line 14) appears to reprimand his peers ("hey-I was a bit") for their violation of the PBL contract by failing to arrive on time for the current session ("you: guys took your time:", line 15). However, as we move to the responding turns (lines 17-19), it becomes clear that Ronald's talk is only teasing in nature. By Ronald making such a move, it (inevitably) transpires that - unlike his peers - he failed to attend the supporting lecture which ran immediately prior to the current PBL session (e.g. "well we came from a lecture"; "we didn't patch class", where - in Scottish slang - to "patch" is to opt not to do something). It could be that Ronald - orienting to the ongoing discussions around (un)acceptable group behaviours - confronts the issue himself to ensure the joking treatment of his nonattendance, as opposed to risking being made accountable for this by another speaker. Relatedly, this may explain his repair work ("I was studying the whole of this morning", line 21), where - as documented in the identity chapter - a rather uncharacteristic display of academic engagement is provided to justify his being the only member not to attend the lecture (i.e. he violates the implicit norm against being a swot as compensation for slacking,

and so, restores the interactional equilibrium).

What is most analytically significant within this extract, then, is the lightheartedness of the students' interactions as they tackle the 'official' organisational elements associated with self-managed group work. For example, note how laughter (lines 20 and 24) and the use of smiley voice are distributed throughout the discourse as the speakers collaboratively engage in the teasing of Ronald's 'slacking' ("why did you not come to cla::ss?£", line 22; "why?£", line 25; "logic£", line 27) (Clark, 1996; Tholander & Aronsson, 2002). This humour is also carried into the reference made to the group rules, where - instead of declaring any strict sense of punishment - the consequences of violating the PBL contract are acknowledged from a joking stance only. For instance, Kadisha notes that, "if we are late" (line 29), the offending member(s) "should bring treats" (lines 29-30); though, as an excusal for their present lateness and failure to provide such "treats", she notes that, additionally, the group agreed upon "no briberies" (line 30) which, coincidentally, "would include ↓this<" (lines 30-31) current situation at hand - a point which is met with loud laughter from the entire group (line 32). This jocularity is further illuminated in Kadisha's projection of the PBL contract's components onto Ronald's 'wrongdoings'; that it is Ronald (e.g. "you're:", line 34; Kadisha's gaze) who should be taking punishment by displaying "emotion:" in "asking for forgiveness" (lines 34-35) - again, leading to a moment of shared group laughter (line 36).

Despite the continual laughter and, consequently, the lack of explicit disciplinary voice throughout the interaction, however, in what was characteristic of the data corpus in its entirety, the speakers do make orientation here to the need for some form of regulation in tutorless PBL. Whilst these expectancies were almost always packaged within humorous talk - allowing group cohesion and the equal (average) student identity to be maintained - acknowledgement of there being ground rules, and thus, a need to account for violations of these was made, nonetheless. In the next extract - which builds specifically upon the issue of lateness raised by group 7, above - we see how the focus of the groups' implicit regulation of group processes was predominately focused on participation, with timekeeping relegated to much less of an interactional concern. The group have been in the room for just short of ten minutes when, in line 1, Aaron first raises Conor and Eva's absence (">where's Conor and ↑Eva?<"):

Extract 7.4: Group 5

1	**Aaron**	>where's Conor and ↑Eva?<
2		(0.2)
3	**Richard**	↑hmm?
4	**Aaron**	>where's Conor and ↑Eva::?<
5	**Jamal**	sh-Eva ↑we:nt- (0.4) to ge::t (.)
6	**Richard**	[she went
7	**Jamal**	[ho::me to pick something up
8	**Richard**	yeh
9		(0.4)
10	**Jamal**	○and I have ↓no: idea wh[ere Conor ↓is○
11	**Richard**	[>I don't know where Conor<
12		Conor's probably like
13	**Jamal**	tra:in late£=
14	**Richard**	=looking for£ a ○toilet○
15	**Aaron**	↑mm: *((gazing at Jamal who then smirks))*
16		(0.5)
17	**Aaron**	↓train's late£ (.) ↑tra::in from floor ↑fi::ve (0.2) to
18		level four is la::te£
19		(3.0)

Upon the eventual uptake of Aaron's turn, there is a clear contrast in treatment received by the absent parties. For example, until this session, Eva had not been late for any of the meetings, and this is exemplified in her peers' prompt response to her absence ("Eva ↑we:nt- (0.4) to ge::t", line 5; "[she went", line 6; "ho::me to pick something up", line 7) which is accounted for, and thus, is not deserving of further discussion. On the other hand, consultation with the data corpus showed Conor's flawed punctuality to be a consistently occurring issue, and it is treated as such in his peers' responding turns which are infused with teasing, and the use of smiley voice, throughout ("tra:in late£", line 13; "looking for£ a ○toilet○", line 14; "↑tra::in from floor ↑fi::ve (0.2) to level four is la::te£", lines 17-18). As the group had collectively attended a lecture - within the same university building as the current meeting - just prior to this PBL session, both Jamal and Aaron's talk is marked as sarcastic in nature, where they mockingly use travel complications in the

speculation of Conor's whereabouts.

Although lateness is typically seen as going hand in hand with social loafing, within this analysis of floating facilitator/tutorless PBL, tardiness on its own was not constructed as a major concern for any of the groups - unless it was accompanied by a lack of engagement with the shared PBL workload. In the case of Conor, for example, there were no instances where he attended meetings without completing the required preparatory work, and so, his track record for lateness was largely overlooked - touched upon from a humorous angle, only. Similarly, if we briefly cast ourselves back to extract 7.3 and group 7's PBL contract, whilst lateness was raised as a significant wrongdoing - with consequences arranged in the event of its occurrence - the recordings show that, in actuality, it was never treated as such. As another example of the students' relaxed dealings with lateness, let us now consider group 6. On this occasion, the majority of group 6 have been in the room for approximately five minutes, having arrived one minute early for the current PBL session, when Emily arrives:

Extract 7.5: Group 6

1	**Nick**	alr↑i:ght
2	**Emily**	he:y *((sitting down at the table))*
3	**Robert**	what's happening
4	**Emily**	I walked right past it and I was like ↑oh I hope nobody
5		notices£-sli::de in
6		(0.2)
7	**Nick**	if Grant's not here in six minutes I'm gonna give him a
8		bollocking£
9		*((Emily and Adam laughing))*
10	**Emily**	your turn to turn to shame h↑im£
11	**Nick**	he's only got si:::x£ minutes *((looking at/tapping his*
12		*watch as he speaks))*
13		*((Emily laughing))*

In the opening lines, Emily is greeted by her peers ("alr↑i:ght", line 1; "what's happening", line 3) as she offers a brief excusal (that she accidentally "walked right past" the room) for being four minutes late ("I was like ↑oh I hope nobody notices£ sli::de in", lines 4-5). In typical form, the students do not dwell on the business of

Emily's punctuality, with Nick (lines 7-8) promptly diverting attention onto Grant's absence, instead ("if Grant's not here in six minutes I'm gonna give him a bollocking£", where 'bollocking' is used as British slang to refer to the act of reprimanding someone). Similar to extract 7.2 earlier in this chapter, the use of profanity ("bollocking£", line 8) - and the accompanying smiley voice - furthers the notion of this being an informal space in which authoritative moves are not welcome; that this is a provocative joke that serves as a tease, as opposed to genuinely telling him off (Jefferson et al., 1987). In consideration of line 9's laughter and Emily's responding turn ("your turn to turn to shame h↑im£", line 10) which - like Nick's (line 8) - is presented in smiley voice, Nick's "bollocking£" appears to be a playful, retaliatory move owing to the teasing he received from Grant - who is now the 'offender' - for being late himself some weeks ago. Through lines 11-13, Nick advances his humorous stance ("he's only got si:::x£ minutes"), tapping his watch in an exaggerated manner to signify his meticulous monitoring of Grant's timekeeping. His repeated reference to "six minutes" seems to be reflective of the countdown to Grant's being ten minutes late: the point at which Nick arrived when he was late.

Rather than Nick seeking to make Grant accountable for his transgressions, then, this conversation sheds more light on students' construction and management of lateness as a relatively low priority dimension of social loafing behaviours in tutorless PBL. Though it may be surprising that even persistent lateness was not formally penalised within any of the groups, the analyses showed that participation - given its direct impact upon the groups' ability to complete the PBL tasks and, ultimately, to make possible one's receiving a decent grade - was positioned as the most pivotal of social loafing behaviours. Therefore, it could be that, so long as the late offender was committed to confronting the collective workload (which was not the case with Callum, as in the upcoming analytical section), to be seen as the disciplinarian by calling out their punctuality would unnecessarily put risk to one's average, and non-authoritative, identity (i.e. work oneself into the substitute tutor role).

7.2. The case of Callum

This section of the chapter now centres on Callum: the only student whose social loafing spanned the entirety of the recordings. Whereas the chapter's discussions

until this point have shed light on students' one-off social loafing offences, the present section details the interactional negotiation of Callum's recurrent participation issues, and how this is done within the bounds of the average - and non-authoritative - student identity. The section also shows how Callum himself accounts for the insufficiency of his efforts in confronting the shared PBL workload.

7.2.1. Gossip talk about the absent loafer

After being exposed to his social loafing behaviours over the course of several PBL sessions, group 3 began to engage regularly in gossip talk during Callum's absence at the meetings (i.e. during his complete nonattendance, or prior to his late arrival) (Tholander, 2003). By using mockery to co-construct Callum as the outsider, the speakers addressed their diminished manpower, and bolstered their cohesion as a group (Brewer, 1979). That is, by aligning in their negative evaluations of Callum, the remaining speakers established their solidarity *with* one another, and *against* Callum (Bergmann, 1993; Thornborrow & Morris, 2004). This enabled the students to maintain a hold on their collective pursuit of both the educational business, and Callum's violations of core group norms. Let us consider an example of this in the form of extract 7.6, below.

Although the previous section demonstrated how - in their humorous treatment of lateness as a low priority matter - workload participation was constructed by each of the groups' as the primary concern, there were instances in which Callum's lateness *was* managed as a critical offence. In the following extract, during the group's gossip talk, Callum is chastised for his absence - whilst another speaker's nonattendance is completely disregarded - on the basis of his repeated failures to fully contribute to the academic work:

Extract 7.6: Group 3

1	**Craig**	e:::h (.) I dunno if you want to jus::t start this: (.)
2		case-get it out the way so we can start the design
3		pro:ject
4	**Sharon**	yea:h we can get the-
5	**Molly**	wha:t case was it last week-si:x-five:?
6	**Craig**	I'll-I'll get it up on my pho:ne
7	**Sharon**	I should have it in here some↓whe::re

8		(0.4)
9	**Molly**	is Callum coming to↓day?
10	**Sharon**	I bet he's gonna be late::
11	**Craig**	he's saying five:: minutes ↓la:te *((holding his phone up*
12		*to his peers, before putting it down and rolling his eyes*
13		*whilst gazing at Sharon))*
14		(0.3)
15	**Laura**	is Annie::?
16	**Craig**	that'll be a::nother verbal warning £for ↓Callum£
17	**Laura**	£ANOTHER:£

Having been in the room for around 15 minutes and engaging in nothing but off-topic chat, in the opening lines, Craig suggests that the group proceed with the work ("I dunno if you want to jus::t start this:"), even though two of their peers - Callum and Annie - have yet to arrive. Craig's turn is designed as expected, where he hedges gently ("e:::h (.) I dunno") into the transition towards the educational talk, justifying his doing so as being for the greater good of the group ("get it out the way so we can start the design pro:ject"), and thus, providing a solid rationale for their progressing without the full team. Through lines 4-7, Craig successfully attains uptake from Sharon ("yea:h we can get the-") and Molly ("wha:t case was it last week") in departing from their informal chat, and in no longer postponing the work until their peers' arrival.

The initiation of gossip talk can be conversationally dangerous in that the initiator could be met with resistance from the recipient(s), and thus, positioned as an instigator of group trouble. Fundamentally, the act of gossiping comes at the expense of another - in this extract, a fellow teammate - and whilst it serves to maintain loyalty structures, simultaneously, it breaks them (see Bergmann, 1993). In maintaining face, then, gossip-initiation is typically led by a question or by a declarative observation pertaining to the absent party that is to be the subject of the gossiping (Thornborrow & Morris, 2004). In this extract, the initiating question is set in the form of Molly's turn in line 9, in which she makes relevant Callum's absence to the group's discussions ("is Callum coming to↓day?"). Sharon's response ("I bet he's gonna be late::", line 10) offers immediate speculation as to Callum's whereabouts, and satisfies the declarative observation phase of gossip-initiation. Sharon's

assumption is confirmed in the ensuing lines (11-13) when Craig refers to Callum's message which has been sent to the group's social media space ("he's saying five:: minutes ↓la:te"). In an apparent display of frustration, Craig's talk - which is lowered in intonation - is followed by him placing his phone on the table, and then rolling his eyes as he gazes in Sharon's direction.

Intriguingly - and despite Laura's direct request for clarification in line 15 ("is Annie::?") - no attention whatsoever is given to the absence of Annie during the conversation. Instead, Annie herself is given complete freedom to account for her lateness upon her arrival to the meeting, some two minutes after the extract ends. In this way, Annie - with her proven track record for being a reliable contributor to the group - is interactionally bypassed. In turn, this makes Callum the sole recipient of the speakers' co-produced mockery which draws upon the contents of their PBL contract. For example, Craig's "that'll be a::nother verbal warning £for ↓Callum£" (line 16), followed by Laura's loudened upgrade ("£ANOTHER£", line 17), which illuminate the longstanding nature of Callum's social loafing, and the inconsequence of these threats. It is of note that the critique directed at Callum's lateness even orients to punishment, given that, in the data corpus it was reserved exclusively for instances of slacking, alone (e.g. failing to complete one's individual research). What distinguishes Callum's lateness from that of his peers, then, is his unequal participation, making him more susceptible to criticism at all levels of social loafing.

The next extract is situated within a separate PBL session in which Callum is absent, once more. On this occasion, the gossip talk centres on Callum's ineffective excusals in relation to his social loafing:

Extract 7.7: Group 3

1	**Annie**	she made tha::t (0.2) <rea:lly> (.) <cle:ar> I think
2		*((looking at Linzi))* (.) she gri:lled us about that in
3		the::: (.)
4	**Laura**	wait ↑wha::? ↓u:::h ○↓no:::○ *((covering her face with her*
5		*hands))*
6	**Annie**	it was ↑us four-wasn't it? *((looking at Linzi and*
7		*then pointing at Sharon and Molly))*
8	**Linzi**	ye:ah *((nodding))*

9	**Craig**	oh did ↑Callum go to that ↓the:n?
10		*((Annie rolls her eyes and smirks; group laughter))*
11	**Sharon**	he was ↑WORKI::NG
12		*((Craig smirks/raises his eyebrow; Laura laughs))*
13	**Craig**	the boy must be minted ma:n
14		*((loud group laughter))*

This extract opens as Annie discusses a lecture she recently attended in conjunction with the PBL class ("she made tha::t (0.2) <rea:lly> (.) <cle:ar> I think"; "she grilled us about that", lines 1-2) in which the class leader emphasised the importance of the groups sufficiently completing the reflective modes of assessment. Laura - who did not attend this lecture - responds in a way which positions Annie's turn as both newsworthy ("wait ↑wha::?", line 4), and as a point of concern (e.g. "↓u:::h ○↓no:::○", and placing her hands in front of her face, lines 4-5). Annie calls upon her peers - gazing at Linzi, and then pointing at Sharon and Molly - as verification of the tutor's dissatisfaction with these elements of the workload ("it was ↑us four-wasn't it?", lines 6-7), which Linzi confirms in line 8 (e.g. "ye:ah", and her nodding gesture).

The most relevant part of the conversation, however, occurs in line 9, when Craig references the present meeting's only absent member, Callum ("oh did ↑Callum go to that ↓the:n?"). Although the intent of Craig's question cannot be determined - a sarcastic move in light of Callum's history of failing to partake, perhaps - what is of interest here is its role in the initiation of gossip talk, with Callum being constructed as the group's object of ridicule over the coming lines. In line 10, for instance, Annie's responding facial expressions (i.e. her eye rolling and smirking), as well as the resulting group laughter, mark the concept of Callum attending this supporting lecture - when he does not properly participate in the mandatory PBL sessions - as a ludicrous one. Furthermore, Sharon's loudened assertion that "he was ↑WORKI::NG" (line 11) appears to mock the authenticity of Callum's overused excuse, given that just a few seconds after 'coming to his defence', she loudly engages in the group laughter (line 14) prompted - as we shall see - by Craig. In line 13, for example, Craig's assessment that Callum "must be minted" (an informal term used in British English to refer to someone as being wealthy) brings to

attention the regularity of Callum's use of his employment as (an inadequate) justification for his various social loafing behaviours.

In summary of this analytical subsection, the above extracts highlight the role of gossip talk in group 3's maintenance of social relations when they were, essentially, one member down. In their affiliative stances against an absent Callum, this moral balancing act worked to repair the students' dented cohesion as a group, allowing them to power through the PBL work in the midst of their social difficulties (Bergmann, 1993). Although, as mentioned previously, gossip-initiation is not without its risks, in that it has repercussions for both the initiator, and the target of the gossip, too (Thornborrow & Morris, 2004). In light of this, it is thus notable that the speakers did not launch immediately into their gossip talk in the first instance of Callum's absence. Instead, the gossiping occurred several weeks after they had each experienced Callum's social loafing behaviours (i.e. a lack of participation, lateness, and absence), meaning that their collaborative action against him was both carefully coordinated, and warranted.

Although the next extract does not involve the use of gossip talk, it is nonetheless a fitting close to the subsection which further details group 3's interactional practices for managing Callum's social loafing during his absence. As shown below, extract 7.8 - which follows immediately on from the students receiving a very disappointing grade for their PBL report - nicely demonstrates the speakers' direct emphases on the need for the group to function as a cohesive unit:

Extract 7.8: Group 3

1	**Annie**	I:-we said in our reflective:: (0.4) ↓the ↓essays:: (0.4)
2		tha:t (.) we can't let this happen again (0.2) and I think
3		we just need to address that ↓no:w
4	**Molly**	ye:p
5	**Annie**	so I think we need to sa::y (0.4) before we meet-so:: (.)
6		if Callum's not gonna be here (.) in ↑these ↑meetings (.)
7		we need to- (.) get a ti::me where we can make it to: (.)
8		if we can't make a meeting (.) then like (.) let us know
9		and send your stuff befo::re the meeting
10	**Molly**	mhmm
11	**Annie**	becaus::e

12	**Laura**	we ↑have got all weekend to do a week (.) we should be able
13		to do oka:y=
14	**Annie**	=yeah=
15	**Laura**	=in the weekend
16	**Annie**	yeah ↓basically because:: (0.2) we are probably far behind
17		al↓ready
18	**Molly**	mhmm

What is most intriguing about this extract is that the usual rigidity of the average student identity is somewhat relaxed. For example, rather than working to diminish their role in receiving a poor mark for their latest PBL submission (e.g. by projecting blame upon the unsupportive or overly harsh institution), Annie draws attention to the group's responsibility ("we can't let this happen again", line 2) to "address" their efforts as a matter of urgency ("we just need to address that ↓no:w", line 3). Furthermore, whilst the students continually treated the reflective essays (pertaining to their experiences of/associated struggles with the week's PBL case, and how they would address these within the following week's session) as rather meaningless, here, Annie states the group's need to utilise these in their practice ("we said in our reflective:: (0.4) ↓the ↓essays::", line 1), as pedagogically intended. This is also shown in the authoritative undertones of Annie's utterances (lines 5-9) in which she highlights the importance of following procedure ("we need to- (.) get a ti::me where we can make it"; "send your stuff befo::re the meeting") and maintaining communication with one's peers ("if we can't make a meeting (.) then like (.) let us know"). Relatedly, whereas chapter 5 showed how the groups would go to great lengths to publicly protect their free time from work-based intrusions (often, the incentive to 'do education' was to ensure the PBL workload was contained within its allocated hours), in this instance, Laura (lines 12-13) straightforwardly commits the group to weekend working - thus, going the extra mile - to rectify the current state of affairs ("we ↑have got all weekend to do a week", which refers to a week's workload.

The formal nature of the students' interactions and their open displays of academic investment in this extract are driven by the critical tutor feedback on the prior week's PBL report submission, in addition to the strain of Callum's ongoing non-participation ("if Callum's not gonna be here", line 6; "↓basically because:: (0.2) we are probably far behind al↓ready", lines 16-17). In consideration of these factors,

the group's need to confront the educational business is marked as a more pertinent interactional issue than is their usual adherence to social constraints (i.e. to be seen as an average student who does no more than the minimum). Annie, for example, makes relevant the group's heightened interdependence in efficiently confronting the educational duties if they are to overcome Callum's lack of participation. Similarly, by volunteering for weekend working, Laura clearly establishes the group's willingness to 'do education', in line with Annie's proffers. Normally, these moves would signify the presence of overly keen group members, but in these circumstances, owing to their greater obligation to collaborate (see the recurrent use of 'we' throughout the entirety of the extract), they are not treated in such a way.

7.2.2. Withholding interactional privileges

Unlike the previous few extracts, the encounters in this next analytical subsection are ones that Callum *was* party to. Although the reallocation of his workload - and, more generally, the strain of confronting the PBL cases minus one member - imposed an undeniable weight upon the group, it could be argued that the interactional business of managing Callum's recurrent social loafing behaviours *in his presence* was even more demanding for the speakers than before. Whereas in the prior section, group 3 engaged in cohesion-building gossip talk - and explicitly formulated a plan for powering through Callum's sporadic attendance and participation - to make such moves in his presence would be damaging to the group's sense of face (Sifianou, 2012), and would be sorely misaligned with the discursive conditions of the neutral student identity (Benwell & Stokoe, 2002).

Instead, whilst Callum was never plainly confronted about his behaviours within the recorded data (e.g. 'why haven't you done your share of the work?'), as the forthcoming extracts show, there was a pronounced shift in the overall interactional design. This involved the total abolishment of lighthearted teasing and humour, as though Callum's conversational privileges had been withdrawn. In extract 7.9, below, for example, we visit group 3 at a later stage in the academic year, where - in addition to the nearing deadline for the group project report which is worth 45% of the final class grade - Callum's lack of participation in the shared academic load has worsened:

Extract 7.9: Group 3

1	**Callum**	I dunno I found it quite: difficult to actually find
2		information on this-found the main suppliers (0.2) you
3		know obviously you've already written about it *((points*
4		*to Sharon))* you've written about it *((points to Craig))*
5	**Sharon**	E:MM a bit of crossover's not bad
6	**Callum**	yeah
7	**Sharon**	like (.) as long as you're not doing the same thing twice
8	**Annie**	yeah BUT there will be-you'll be able to rea:d (.) the
9		stuff on the forum
10	**Callum**	yea:h
11	**Sharon**	mhmm
12	**Annie**	should be able to read theirs ove::r and (.)
13	**Callum**	I know (.)
14	**Craig**	Linzi's up next

Prior to the beginning of this extract, Callum was asked to outline the results of his individual research for the current PBL case, but - in lines 1-4 - stalls the process of doing so by confiding his supposed struggles to his peers ("I found it quite: difficult to actually find information on this"). However, Callum does not completely downplay his capabilities, demonstrating that he has, at least, "found the main suppliers", and that the topic's core knowledge base has, thus, been covered adequately. Given his profile by this stage as the group's singular (enduring) social loafer, to have failed in completing the bare minimum of the academic work would be extremely detrimental, both to his - already frayed - standing as a team member, and to his public ability to 'do education' within even the confines of the 'average student' (as damaging as having been seen as doing too much) (Stokoe et al., 2013). Relatedly, Callum skirts around any negligence on his part by constructing his actions as being the most logical in avoiding the unnecessary repetition of work that has already been sufficiently confronted by his peers ("you know obviously you've already written about it"; "you've written about it").

Despite Callum's hearer-specific appeals - where he uses eye gaze and pointing gestures to initiate some degree of affiliation with Craig and Sharon - and his attempts to best communicate his 'strategic' method - that the process issue of repetition is the source of his hindered participation - Sharon, in line 5, withstands

Callum's position in her assurance that "a bit of crossover's not bad", as though some integration of knowledge is - in contrast to his stance - desirable, thus rendering Callum's excusal as flawed. In line 7, Sharon also emphasises the overall distinctness of their individual research ("as long as you're not doing the same thing twice"), which explains each member being set with different duties in the first place, and - essentially - their work not being as closely related as Callum's excusal portrays it to be. Annie aligns with Sharon in lines 8-9 by referring Callum to the group's shared online space, allocated to them by the class leader ("you'll be able to rea:d (.) the stuff on the forum"). That is, had Callum's concerns been genuine, he could have checked his peers' research documents - uploaded in advance of the PBL session - for "crossover" with ease.

Following his initial formulation of excusal, notice how Callum makes orientation to the co-constructed resistance against him - and his position as being indefensible - offering only minimal agreement responses throughout the remainder of the extract ("yeah", line 6; "yea:h", line 10; "I know", line 13). Callum's 'back down', in turn, leads to his being discursively dismissed by Craig in the final line ("Linzi's up next"). Having been granted ample interactional opportunity to share the products of his research - but instead using this to (unsuccessfully) account for his failure to obtain the relevant breadth of information - here, Craig swiftly redirects the focus of the conversation towards another group member who *has* completed the required work. In this way, the group do not linger on the insufficiency of Callum's preparatory work, nor his persistent transgressions until this point, continuing their efforts to tackle the remaining academic business at hand, in spite of these factors. Though, prior to doing so, what is most pertinent about the interaction is that Callum - regardless of his history - is at least granted the space to present his knowledge, before being diplomatically released. Without giving him the room to do so, conflicts could arise, and the policing members could be constructed as too authoritative to sit within the boundaries of the student identity.

In the next extract of this analytical subsection, we see how Callum downplays the need to account for a group member's absence from the PBL sessions, and how such thinking is resisted by his peers:

Extract 7.10: Group 3

1	**Sharon**	should I write like: (.) fa:mily emergency next to
2		↓Mollie?
3	**Callum**	yeh
4		(0.8)
5	**Callum**	doesn't really-
6	**Craig**	just say like an-ap:ologies-family emergen↓cy
7	**Callum**	she's not gonna ↓sa:y anything-not gonna say sh::it
8		↓anyway
9		(0.6)
10	**Craig**	○£u::h£○ *((smirking as he gazes at Annie))*
11	**Sharon**	just if I ↓do:n't write something she'll moan
12	**Annie**	*((turning to Callum))* we::ll 'cos she was saying in
13		the ↓la:st lecture that there was a::
14		(0.5)
15	**Annie**	[↓problem
16	**Craig**	[attendance
17	**Annie**	with attendanc::e
18	**Laura**	↓really?
19	**Craig**	↓ye:ah
20	**Laura**	>we've all been quite::< (0.8) ○good○
21	**Callum**	it's like one of the boys in my lab group says there's
22		like about three people in his group-just do:n't turn
23		up ○so○
24		(2.0) *((every speaker - except for Callum - looks down*
25		*at either their notepad/phone/laptop))*
26	**Sharon**	so:: *((lifting the PBL worksheet))* material balance
27		equation->we've got material ba:lance equation-energy
28		balance<
29	**Laura**	let me see *((looking at the PBL worksheet))*

As a result of personal circumstances, Mollie is absent from the current meeting, and in the opening lines, Sharon asks how she should record this on the PBL worksheet to be submitted at the end of the session ("should I write"; "fa:mily emergency next to ↓Mollie?"). After initially confirming her suggestion ("yeh", line 3), following a moment of pause (line 4), Callum begins to downplay the importance of offering the tutor an explanation ("doesn't really-", line 5), before Craig interjects with his response to Sharon's query ("just say like an-ap:ologies-family emergen↓cy",

line 6). Then, in lines 7-8, Callum resumes his earlier assertion (line 5) that excusing one's absence is unnecessary, as it will be inconsequential to the tutor who is "not gonna say sh::it ↓anyway" (in this context, "sh::it" is used as English slang to establish that the tutor will not act upon/care about the issue of absence).

Callum's turn is first marked as problematic in line 10, when Craig responds in a smiley voice ("○£u::h£○"), and smirks in the direction of Annie. This builds into Sharon's responding turn - in line 11 - which indirectly challenges Callum's relaxed stance, as though accounting for absence is not optional: it is compulsory ("just if I ↓do:n't write something she'll moan"). Note how Annie, in lines 12-13, specifically turns in the direction of Callum as she better substantiates Sharon's reasoning, referencing last week's lecture in which the entire cohort's attendance at the PBL sessions was raised by the class leader as a major point of concern - for example, the "we::ll" face-threat mitigator (Jucker, 1993) prior to the dispreferred discourse ("'cos she was saying in the ↓la:st lecture") and Annie ("[↓problem", line 15) and Craig's overlapping talk ("[attendance", line 16). In this way, it becomes evident that, unlike Sharon, Annie and Craig, Callum did not attend this lecture, and thus, his justification is flawed.

In line 20, Laura's assurance that ">we've all been quite::< (0.8) ○good○" appears to be face-mitigating - defending against the institutional criticism that she has just been made aware of ("↓really?", line 18) - given that Callum has been absent on several occasions by the time of this PBL session, and thus, has not technically been a part of this "good". This may explain Laura's use of "quite", as well as the quietened "○good○", as she hedges around the fact that there has been considerable nonattendance within the group, without explicitly naming Callum as the offender. Regardless of this matter, however, what Laura does not do is question the group's need to account for absences in the way that Callum does. Here, the primary issue is that, as a member who has recurrently failed to satisfy even the minimal standards required of 'being an average student' (Benwell & Stokoe, 2005), Callum's display of institutional resistance - that which typically drives the student identity in 'doing education' as a necessity, and in ridding themselves of this burden - further emphasis his outsider status. This could stem from Callum not being a cohesive or fully fledged member in the first place, thus meaning he has different conversational rights from his peers.

For example, through lines 21-23, Callum diverts attention towards another PBL group within which multiple (“about three people”) members “just do:n’t turn up”. In referring to an out-group, Callum works to neutralise the tutor’s chastisement that he has recently been made aware of, as well as the threat towards his own reputation as the group member who has been absent the most. By drawing on the existence of more severe cases of absence that have - according to Callum - gone unnoticed by the tutor, Callum finalises his carefree stance; that, ultimately, the group's situation could be much worse. Callum’s rationalisation, however, is completely disregarded by his peers in the ensuing lines (i.e. the extensive two-second pause through lines 24-25 in which no member offers even minimal acknowledgement of his turn). Instead, Sharon - who picks up the PBL worksheet - interactionally overrides Callum in lines 26-28 by quickly - note the fast paced talk - formulating a new agenda - the “so::” marker (Bolden, 2006) - which redirects the group’s (“>we’ve”) focus onto the academic work ("material ba:lance equation-energy balance<”), and thus, disallows Callum’s conversational footing. Laura, in line 29, makes clear her willingness to engage in Sharon’s educational agenda (“let me see”/lifting the PBL worksheet), and the issue of absence is not raised again in this PBL session. Here, it is through their embodied practices that the speakers gloss over Callum’s talk and resist the behaviours that he condones, without explicitly confronting him, in standard non-authoritative student fashion (Attenborough & Stokoe, 2012).

The chapter’s final extract continues the speakers’ dry interactional approach in confronting Callum’s social loafing. In this instance, Craig emphasises the need for each member to complete their individual research in full, noting the added burden that has fallen on him as a result of Callum’s failure to do so for the current task. Similar to chapter 6’s extract 6.4, Callum uses interactional vulnerability (Heritage, 2012) as a device to relieve the tensions arising from his slacking, but these excusals are quashed by his peers, once again:

Extract 7.11: Group 3

1	**Craig**	see my section is nowhere near completed (.) because: (.)
2		see for me to find numbers I’d have to research your
3		whole section (.) so like: I made a lot of changes to it

4		(.) BUT like see your section for the distillation
5		column? *((gazing at Callum and pointing at PBL report*
6		*draft throughout))*
7	**Callum**	yeah
8	**Craig**	you'd have to find the numbers yourself
9	**Callum**	do you want them?
10	**Craig**	yea:h
11	**Callum**	cos I-didn't know-I was gonna talk to you about that-
12	**Craig**	yeah it's like a JUDGEMENT CALL (.) but see for ME: 'cos
13		to-I'd have to like redo your whole research again
14	**Annie**	YE:AH *((whilst nodding))*
15	**Craig**	like: (.) Annie read it as well (.)
16	**Callum**	I didn't even think you wanted to like (numbers in) (.)
17		and then everybody would be like what are you doing?
18	**Craig**	AWW like: definitely

In the previous week's PBL session, Craig took on the role of compiling each group members' individual research into the final report for submission. Though, owing to Callum's inadequate efforts, and his incomplete documentation, the initial simplicity of Craig's volunteering to assemble the group's PBL report has escalated quite significantly, even impeding his own productivity ("my section is nowhere near completed", line 1). In this opening turn, Craig establishes the gravity of Callum's slacking, leaving him unable to confront his own allocated section ("for me to find numbers I'd have to research your whole section", lines 2-3), and making the production of the group's assignment impossible - both stemming specifically from Callum's avoidance of conducting crucial engineering calculations, pivotal to the PBL case. Craig also positions Callum's submission as being far from the necessary standard for submission, emphasising the extent of the extra work ("I made a lot of changes to it", line 3) involved in his making amendments on Callum's behalf. Alongside his utterances, Craig makes his target clear, maintaining his gaze on Callum, whilst making repeated pointing gestures towards a printed draft copy of the PBL report in question.

In line 7, Callum offers very little in the way of accounting for his findings, opting for a minimal response ("yeah") to Craig's prompt ("see your") regarding his "section for the distillation column" (lines 4-5), only. Craig, in turn, furthers his blunt

approach into line 8, establishing Callum's (missing) calculations as being central to the resolution of the entire PBL case, and thus, marking their inclusion as nonnegotiable ("you'd have to"). Consequently, Callum offers some uptake in terms of progression ("do you want them?", line 10), but rather than serving to alleviate the tensions, Craig's response - produced again with stress ("yea:h", 10) - treats Callum's 'proffer' as inconsequential, as though Callum's completion of the calculations is an obvious expectation, which should not require his prompting in the first place. Given Callum's vulnerable interactional position, in line 11, he works to better justify his contributions by adopting an unknowing stance (Heritage, 2012), where his understanding of the task's expectancies are to blame, as opposed to him being disengaged with his duties ("'cos I-didn't know-I was gonna talk to you about that", as though it was always his intention to gain the insight of his peers on this matter within the current meeting at hand).

Nonetheless, Craig casts over Callum's appeals throughout lines 12-13, emphasising the conducting - and inclusion - of the calculations for the purposes of the report as an obvious (and by no means optional) part of Callum's job, here. Given the fast approaching deadline - which impacts every member of the group - Craig (loudly) centres on the importance of one's own "JUDGEMENT CALL", and the fact that Callum should not require this level of micromanagement from his peers to ensure his contribution. Craig also states that the alternative to Callum's participation would involve having to "redo your whole research again"; that it is he who would be left to face the brunt of what would be an extremely demanding task that is not his in the first place. Bolstering his argument, Craig - in line 15 - invokes Annie ("Annie read it as well"), following on from her clear display of alignment (the loudened "YE:AH" and the accompanying nodding gesture, line 14). This not only provides the grounds for Callum's excusals to be interactionally overpowered - that Callum's lack of participation is damaging to the productivity of the whole group - but also neutralises Craig's singular role in confronting Callum.

In light of his being outnumbered, Callum - in lines 16 - 17 - adopts an unknowing stance (Heritage, 2012) again ("I didn't even think you wanted to like (numbers in)"), stating his - apparent - concerns in committing this 'nonsensical' act which could result in backlash from his peers ("then everybody would be like what are you doing?"). Although, in the final line, Craig is firm in his assurance that

Callum's calculations are - beyond any doubt - an integral part of the overall PBL case, and in this way, the issue is put to rest. Relatedly, by this late stage in the semester, each member's individual research should be ready for submission - albeit, after some light polishing - rather than (Callum's) requiring such major changes. Though, much like the previous extract, Callum is at least given the chance to account for his actions, before losing interactional footing, as the group progress with other business (not included in the extract).

7.3. Chapter summary

Where social loafing concerned a student's lack of participation in the PBL workload, one-off offences were addressed playfully, with humour serving as a crucial interactional tool through which orientation could be made to the expectancies - and the agreed punishments for violations of these - raised within each of the groups' PBL contracts; a gentle reminder that said behaviours must not arise again (and they did not). In this way, the offender was made accountable for their actions within the public space, but in a subtle and non-threatening way for all parties involved (i.e. without more serious conflicts arising, and without the confronting speakers being positioned too authoritatively). Intriguingly, students' repeated tardiness was never chastised by any of the groups in the way that recurrent failures to participate were. It appears that, despite lateness being raised as a violation of protocol within their PBL contracts, this was done as a matter of procedure (i.e. 'of filling space') only. Instead, what was constructed as the sole matter of interest within each of the groups' talk was the assurance of equal participation to the workload.

Given Callum's longstanding social loafing behaviours, it was important that sufficient attention was given in the chapter to how he accounted for such offences, and how his peers dealt with these challenges - time and time again. Gossip talk was used to display affiliative stances against Callum (in his absence) as means of maintaining group cohesion - important, given their reduced manpower. Group 3 also asserted the importance of taking the educational demands seriously, which was slightly off tangent from their usual interactions as 'average students', but warranted in facilitating a unified sense of powering through PBL *without* Callum's input. However, what made Callum's case all the more troublesome for his colleagues was his intermittent attendance at the PBL sessions. By (randomly) showing up without

having completed any (or just a fraction) of the necessary preparatory work, Callum's peers were forced to navigate around his social loafing. Had he opted to remain absent for the meetings - and, thus, made clearer his non-commitment to the group - it might have been easier for the group to divide the remaining workload amongst themselves, and to avoid the interactional burden of managing face-to-face communications with Callum's (flawed) excusals. Nonetheless, the speakers did exhibit conversational strategies for interactionally policing Callum's social loafing in his presence (i.e. by withholding the use of teasing and humour, as in section 7.2.2), without adopting too confrontational an approach.

In conclusion of the analyses, then, although the identity chapter established students' interactions as being underpinned by a rigid adherence to the co-constructed boundaries of being seen as average, and as educationally 'carefree', the notion of 'being an average student' in itself requires that students fulfil *some* degree of academic engagement. That is, rather than being a culture of anything goes, as much as students displayed resistance to embarking on authoritative or expert-like positions as an avoidance of the absent tutor role, orientation was frequently made to the institutional demands of the PBL session, and the need for the group to 'do education' in order for them to progress. Consequently, repeated failings to 'do education' - and to, thus, partake in the group workload - were marked as major wrongdoings, and then acted upon (though, in subtler interactional means than the tutor would, perhaps, respond).

8. DISCUSSION & CONCLUSIONS

The final chapter of the thesis summarises the main findings from the three analytical chapters, considering how they fit with other research in the field, and their implications for the practice of PBL; notably, the need for users of PBL to be exposed to the - sometimes tangled - ways in which it is actually 'done'. Having acknowledged the limitations of the thesis, suggestions are made for future research; specifically, the need to further the microanalytic and naturalistic study of PBL 'in the wild'.

8.1. Analytical summaries

Using conversation analysis (CA), this study is one of the first to examine students' self-managed interactional practices as they engage in PBL without the fixed presence of a tutor. The central point of investigation was *how the learner-centredness intended of PBL is enacted by students in self-managed PBL (if at all).* To address this question, CA was used to examine methodically the actual interactional practices of student groups as they engaged in PBL without tutor participation; to document students' interactional strategies for self-managing disagreements and social loafing in PBL; and, finally, to shed light on how students' (above) conversational strategies were steered by institutional norms and identities (e.g., what does 'being a student amongst other students' in tutorless PBL actually look like?). That is, how do students balance their newfound authority for their learning, alongside the usual social expectancies that come with interacting with one's peers?

The opening analytical chapter showcased the discursive complexities of operating within the institutional environment as an integrated team player. Each of the groups clung to the co-constructed interactional boundaries of the average student identity in which expert-like moves were avoided, and academic credentials downplayed at all costs. The speakers closely moderated one another's talk, responding to any violations of average status with mockery, and forcing offenders to account for such transgressions (e.g., positioning oneself as too keen or as too knowing about PBL, as in chapter 5). The practice of PBL, therefore, appears to

contradict the very purpose of the university learning space, in which we would assume that it is acceptable to 'be smart' amongst one's peers (cf. Benwell & Stokoe, 2002; Moncada-Comas, 2020; Olinger, 2011; Stokoe et al., 2013; Attenborough, 2011).

As much as 'playing it cool' was pivotal to maintaining one's stance as a fellow, 'regular' group member, however, a significant barrier to such maintenance was that, without the presence of the tutor, the students *had* to demonstrate at least some willingness to 'do education' - or fail the PBL module altogether. The resulting identity work involved continual emphasis being placed on the collective responsibility of all members to contribute to the PBL workload, academia being treated as an unavoidable burden to be eliminated (as opposed to inciting enjoyment), and the use of institutional mockery in downplaying the organisational and leadership roles that come with group work (i.e. the official business). These opposing social and educational demands - that is, being seen as uninvested in their educational endeavours, without being *completely* disengaged in practice - also dictated students' self-management of disagreements and social loafing, as in chapters 6 and 7. In this way, the notion of empowerment (e.g., shown in students' construction of their own agendas, and in their negotiation of knowledge as means of building consensus) appeared to be enacted, but in gentler (and *highly* democratic) interactional ways (Barrett & Moore, 2010). These findings also demonstrate the need to treat identity as a negotiable and interactional achievement (Haugh, 2008).

One of the core principles behind PBL is that disagreement must occur in order for cognitive change - and deeper understanding of the material - to be achieved (e.g. De Grave et al., 1996; Savery & Duffy, 1995). Students appear to perceive disagreements - and having a heterogenous group - as desirable, and as assisting in attaining their learning goals (e.g. Almajed et al., 2016). The current analyses, however, are some of the first to show how the art of 'doing disagreement' is *actually* achieved in PBL. Although agreements were readily and straightforwardly achieved (section 6.1), disagreements were not. A microanalytic lens demonstrates the ways in which students not only self-navigated conflict at the content level, but at the face level, too (and that they did so successfully) (Brown & Levinson, 1978; Goffman, 1967; Paramasivam, 2007).

As outlined in table 6.1, disagreements were shown to be intricate actions (cf. Hüttner, 2014; Leung, 2002; Sifianou, 2012; Tainio, 2011) that required delicate interactional management. Much like Hosoda and Aline's (2015) study of the L2 classroom environment, disagreements were regularly prefaced, accounted for, and accompanied by physical gestures, as opposed to being presented explicitly (e.g. 'no, you're wrong'). As well as the inclusion of agreement particles alongside disagreements (e.g. Pomerantz, 1984a), like Pomerantz (1984b), when challenging the accuracy of another speaker's stance, the students frequently referenced their source of information as means of evidencing the claim(s) being made. This worked not only to substantiate their arguments, but to neutralise their involvement in the dispreferred act of disagreement itself. For instance, in extract 6.8, the epistemically authoritative tutor was invoked via the tutor-provided PBL worksheet in formulating disagreement, and in interactionally overpowering the recipient in a face-saving way (see also Leyland, 2020; Sharma, 2012, 2013). A further example of this was extract 6.7, where 'Dan' - a non-tutor, but credible and universally known 'expert' source, nonetheless - was invoked in indirectly managing disagreement.

In the final analytical chapter (7) we saw how students self-managed instances of social loafing. One-off offences (e.g. section 7.1) were met with teasing, where humour was used to make orientation to the PBL contracts in a subtle and non-confrontational way. That is, whilst the average student identity involved constructing oneself as generally unbothered by academia, the groups also made clear the need for some level of regulation to make possible the completion of the PBL tasks. Intriguingly, recurrent lateness appeared to be overlooked, so long as the latecomer was committed to their fair share of the PBL workload (e.g. see Conor - extract 7.4 - versus Callum - section 7.2).

The case of Callum offered rich insight into the management of recurrent unequal participation in PBL. Just like the avoidance of explicit disagreements, this involved giving room to Callum to present the results of his individual research endeavours - even if they were flawed or incomplete - as opposed to confronting him directly about his wrongdoings (in what would be too much of a 'tutor-like' move). There were, however, more subtle shifts in the group's interactional treatment of Callum; most notably, his being positioned as ineligible to partake in their lighthearted teasing and humour (section 7.2.2). Group 3 instead engaged in gossip

talk during Callum's absence, which appeared to bolster their cohesion as a group (Hendry et al., 2016b; Tholander & Aronsson, 2002). Again, during his absence, the group also emphasised the need for *their* continued (equal) contributions to the workload, using the burden of Callum's incomplete workload as special justification for 'doing education' (and being seen as slightly less of the uninvested and average student that characterised the entirety of the data corpus). Such findings are (rare) evidence of PBL students' abilities to adapt to unpredictability; to embrace empowerment, and to be accountable for the educational business (but in a face-saving way), which is a common concern for PBL educators (Woods, 2000). Similarly, this work supports the stance of other PBL literature that calls for students to be given the freedom (as much as is possible) to manage their own social dynamics (e.g. Azer, 2009; Öystilä, 2006; Wood, 2003), taking this one step further, by showing how this happens, in action.

Overall, as much as the disagreement formulations were, overwhelmingly, indirect in form, the act of disagreement *was* common across the dataset, and was central to the progression of learning. Relatedly, whilst group 3 never explicitly confronted Callum about his social loafing behaviours, they *did* navigate around his lack of participation without the support of the tutor. Students' persistent neutral stances catered to the social expectancies of being an average - and non-dominant - student, but this did not appear to negatively impact their pedagogical goals (given that all students, besides Callum, passed the module). In this way, it seems that the students were able to self-manage the primary social complaints associated with tutorless models of PBL (de Grave et al., 2001; Woods et al., 1996). Therefore, it may not be that students perceive conflict as something to be avoided completely, or that they are altogether ineffective at managing such social difficulties (see Levi, 2007); only that this is done in much gentler conversational ways, in which there is a balancing act between the social and educational demands that are often overlooked in student-managed group work.

In sum, the current analyses provide convincing evidence that students' communication, teamwork, and problem-solving skills were put to the test by PBL, as intended (e.g. Loyens et al., 2015). Within the walls of PBL, 'successful learning' generally refers to whether students have effectively collaborated with one another in confronting complex and industry-relevant tasks; whether they have shown

adaptability and innovation in their problem-solving; and whether they have constructed shared understandings (Hmelo-Silver et al., 2007; Saqr et al., 2020; Strobel & Van Barneveld, 2009), as demanded of the 21st century skillset (see chapter 2). Intriguingly, the interactional work of Koschmann et al. (1997) showed how the PBL tutor steered students towards the generation of learning issues, prompting them to think critically, and to locate their knowledge deficiencies. Quite impressively, the current analytical findings demonstrate similar interactional patterns, but with one major difference: it was the students themselves - with only intermittent tutor support - who identified their knowledge deficiencies, the research to take place, and the core learning issues at hand (albeit in less direct ways than did the tutor in Koschmann et al., 1997). As much as each of the groups successfully completed their collaborative projects, and whilst the learner-centredness of PBL appeared to be brought to life in their social interactions, however, there is no escaping the fact that students were 'thrown in at the deep end'; that there were significant institutional deficiencies inflicted upon them that, undoubtedly, made their experiences with PBL all the more difficult. It is these limitations that are the subject of the remainder of this chapter.

8.1.1. Challenging old habits

Upon reflection of the analytical findings - and, particularly, each of the groups' distinct resistance to educational matters - it could simply be that the students disliked PBL. Research certainly has shown how - even with PBL enabling higher learning gains - students reported that it did not ground them sufficiently in basic concepts, and that they, thus, learnt more from the lecture format (Yadav et al., 2011). In their case study of biomedical engineering students, Warnock and Mohammadi-Aragh (2016) also showed how students' problem-solving, written communication, and self-directed learning skills were significantly improved through the use of PBL, yet students regarded the traditional lecture to be of superior value, nonetheless.

The reasons as to why students may feel shortchanged by PBL are understandable. In traditional engineering programmes, students are submissive learners by default, reliant on the word of the epistemically superior lecturer (Almeida et al., 2020). In contrast, PBL forces students to become accountable

learners, withdrawing the security blanket that comes with the lecturer being responsible for the delivery of knowledge, and students being recipients of their wisdom (Delaney et al., 2017). The university in which data collection took place for this study involved students in the third year of their undergraduate degrees within a traditional engineering programme, meaning that their exposure to PBL conflicted with the lecture-based format adopted by the rest of the course (involving only minimal group work, and no elements of active learning at all). Unsurprisingly, by this late stage in their studies, students develop attachments to specific styles of learning (e.g. working individually), making the introduction of PBL all the more difficult (Hirshfield & Koretsky, 2018; Lima et al., 2017; Mills & Treagust, 2003).

PBL cases are vague in nature - with no single route to their resolution, nor one fixed answer - and demand the deliberation of diverse viewpoints, prior to conclusions being drawn (Hmelo-Silver, 2004). In this way, PBL disrupts the norm; defying students' mindsets in terms of the ways they have been taught previously. In fact, Woods (1994) - the pioneer behind the tutorless PBL approach - likens the transition from teacher-directed learning into active learning to the psychological processes of dealing with trauma and grief. Take the current setting, for example, in which the students were not only experiencing PBL for the first time, but had only intermittent access to the tutor due to resource restrictions.

Furthermore, Warnock and Mohammadi-Aragh (2016) note that, whilst students typically encounter around 2000 problems during the course of the conventional (i.e. non-PBL) engineering degree, they "are preconditioned to think that every problem has a correct answer", and that, contrary to students' assumptions, "in reality they are being trained to compute an answer using a formula" (p. 9) as opposed to confronting authentic engineering problems. In light of such misunderstandings, the novice student's introduction to PBL can be a difficult one, given that gains in knowledge and understanding are far less immediate than when the student is ingesting the lecturer's knowhow. The process of PBL is illogical, and requires that its participants linger in a state of uncertainty, as it is from these cognitive conflicts that long-term knowledge acquisition occurs (De Grave et al., 1996; Savery, 2006). But, it is also from this unfamiliarity and complexity that students' confidence as learners can be dented, resulting in their pedagogical

dissatisfactions (Yadav et al., 2011) - hence the need for effective PBL scaffolding informed by interactional insights of how PBL is *actually* done.

8.1.2. Democratisation of PBL discourse

Whilst students' initial resistance is said to be a natural part of the shift from teacher-centred learning to active, student-centred learning (Felder & Brent, 2003; Woods, 1994), from the meticulous examination of the seven PBL groups recruited in the present study, rather than being a temporary issue, students' resistance - not isolated to the PBL method, but to *all* things educational - spanned the entirety of their meetings together. Additionally, the previous rationalisations - presented in section 8.1.1 - less readily explain other aspects of the identified interactional trends, such as students' stringent policing of expert-like behaviours (that violated the average student identity), their use of institutional blame in dealing with the 'serious' academic business, and the sophistication of their varying disagreement strategies. The fact that such consistency in interactional mechanics was found across *all* of the groups suggests that other conversational work was being done, beyond novice students' apprehensions about - or dislike for - PBL alone.

Therefore, it is important to now reiterate the methodological principles that have guided this work. Primarily, rather than seeing students' talk as reflecting their internal attitudes or personality traits, the interaction was considered in terms of its context, and of the discursive function that it serves (i.e. what students' actions *do*, as opposed to what they mentally represent). In light of this, it is necessary to delve a little deeper into the interactional patterns than to simply conclude here, as to do so would be to overlook the intricacies of the student talk. On the basis of the students' credentials - as individuals who *willingly* undertook university entrance examinations at secondary school, and then *voluntarily* applied for a place on a competitive engineering degree programme - their apparent disengagement from academia is perplexing. This is made all the more unusual given that, at the time of data collection, they were - again, through choice - in their third year of university study. Why would students go to such lengths to undervalue the intellectual talents that speak for themselves when the university setting is one which - we would assume - is welcoming of such admissions; of straightforwardly being a keen and thoroughly engaged student?

Prior conversation analytic research involving British university tutorials also showed how students resisted academic identities - even though, by very fact of being at university, it is inevitable that they would have possessed at least some intellectual qualities (e.g. Attenborough & Stokoe, 2012; Benwell & Stokoe, 2005, 2010; Benwell & Stokoe, 2002; Stokoe et al., 2013). The co-construction of 'doing being a student' - the preferred stance - entailed continued displays of educational detachment, and the maintenance of 'average' status in blending in as another 'normal' speaker with one's peers. Violations of these expectancies - positioning oneself as overly keen, and as thus, too studious - were policed discursively by the speakers, in that they were made accountable for making such dispreferred moves. In explanation of these findings, Benwell and Stokoe (2002) refer to this democratisation of institutional discourse as resulting from the relaxation of teaching structures in the delivery of student-centred learning. That is, without the tutor's governance of the learning environment - as is traditionally the case - 'being a student' naturally becomes much less of a formal affair, where the cultural values that lie outwith the university context become more relevant, and casual conversation more commonplace. Such thinking is also reflected in recent discursive analyses by Hendry et al. (2016b) which demonstrate the role of off-topic (i.e. non-academic) chat in PBL tutorials in facilitating students' constructions of group cohesion.

As the analytical chapters made clear, these interactional trends strongly align with the current analyses, in which orientations towards academic identities were treated as problematic, whilst resistance against such identities were held as preferred actions. The students in this data corpus displayed minimal investment in academia, and continually projected blame upon the institution as a means of simultaneously satisfying the social *and* educational demands of working in a group (e.g. the disagreement excerpts which locate blame with the tutor for the act of disagreement, but also allow knowledge refinements and the work to progress, as commanded by the institutional setting). In this way, it appears that the students' disengaged stances served as strategic moves to bridge the mismatch between the opposing ideals of their educational and social lives. For example, in everyday conversation, to be labelled as a 'swot' can be socially undesirable in that it risks being othered for such 'abnormal' behaviours. Although the tutorial environment *seemingly* provides a safe space in which being seen as clever is publicly embraced,

the present analyses show otherwise. The thesis demonstrates that group work comprises much more than the mere transaction of knowledge on its own; that, education is done publicly, and thus, demands compliance to wider social and cultural values, also.

The level of interactional work involved in students' adherence to social norms - in maintaining sameness with their peers - as they navigated PBL was intensified within the tutorless pedagogical context. To be seen as too keen, or as too authoritative, would not only be detrimental to their social standing, but could thrust the offending speaker into the position of substituting for the absent tutor figure, too. To make matters more difficult, owing to this very absence of a permanent tutor fixture, students *had* to demonstrate some willingness to 'do education', or face jeopardising their academic progression. It is this interactional predicament which distinguishes this work from other studies on group work in universities. Whereas Stokoe, Benwell, and Attenborough (2013) showed how "students minimise or reject entirely the importance of preparing for university work" (p. 88), in the present data corpus, there was no tutor to conduct such business on their behalf. In this way, although they downplayed their individual preparations for the PBL tasks, at no point did the students *completely* dismiss the importance of their preparatory efforts, nor did they shy away from their educational responsibilities, altogether.

Tending to this unavoidable academic business required delicate negotiation if the groups were also to maintain their 'uninvested' stances as socially compliant interactants. As in the analytical chapters, this was achieved by treating the PBL workload as a necessary evil; as an unavoidable burden which could be eradicated *only* through the efforts of the collective group, as opposed to any one individual member. It was often the case that the students' confrontations with academia were positioned as a case of 'just getting things done', so as to utilise the allocated PBL time, and to shield their social lives from educational intrusions. In this way, it was interactionally troublesome to construct the PBL experience as a source of satisfaction, with even loose connotations of academic enthusiasm in one's talk being policed by other speakers. As before, another resourceful discursive strategy was the projection of blame upon the absent tutor figure and the wider institution, which allowed students to maintain a distance from authority - even when in the midst of

'doing education', and managing the organisational business that the tutor would normally (i.e. outwith the PBL setting) be responsible for.

8.2.Pedagogical implications

The student groups examined in this study divided the PBL tasks amongst themselves, with each member responsible for resolving a specific piece of the puzzle for the overall gain of the group. Whilst the idea behind PBL is that the cognitive load is distributed across the group (Hmelo-Silver, 2004), true collaboration in PBL (and group work in a broader sense, as in chapter 2) involves careful preparation, and is much more than the mere division of labour (Dolmans & Schmidt, 2006). That is, for students to be able to participate fully in PBL (e.g. by formulating meaningful probing questions that lead to deeper understanding) - although they may largely be responsible for specific learning issues individually - *all* members must have an understanding of the tasks as a whole, and not just their own section. The realities of PBL in practice thus appear to challenge the wholly collaborative construction of knowledge that it rests on. Instead, whilst the students oriented to the shared goal of completing the PBL tasks (e.g. '*we* need to get this done'), the work was very much treated individualistically in their organisational talk (e.g. '*your* section' or '*my* part').

Throughout the data corpus, students positioned themselves as confronting only what was absolutely necessary (i.e. the bare minimum, and *their* fair share of the workload), meaning that, to go beyond one's allocation would be to overstep the average student boundaries (i.e. by constructing oneself as overly keen, or as epistemically superior) (see Stivers et al., 2011). If we remind ourselves of the deviant case involving Annie in section 5.3, for example, we saw how Annie was positioned as interrogative - as opposed to helpful - when contributing to Laura's attempts to relay the findings of her individual research to her peers. Annie's (non-normative) interjections were treated as intruding on Laura's conversational footing - as though she was claiming expertise in her peer's domain - and resulted in Laura withdrawing from the conversation altogether, even after Annie's work to downgrade her stance (i.e. that she was simply curious about the PBL task, as opposed to 'checking up' on Laura).

As much as the students did not appear to immerse themselves in every facet of the PBL task, however, it was never a case of 'anything goes'; that no fact-checking occurred upon findings being relayed to the group. As per the disagreements chapter, knowledge recipients regularly had enough knowhow to (indirectly) challenge information they treated as being incorrect or incomplete on the part of the first speaker. Rather than representing a major pedagogical flaw in tutorless models of PBL, then, it seems that the students navigated the PBL work as a division of labour at the surface level only. Although in 'doing the minimum' they claimed not to have invested their time in aspects of the tasks beyond their allocation, it is interesting that they were in a position to disagree, and to contribute to the processes of conceptual change expected of PBL, nonetheless. Unlike Annie, such assessments were achieved most subtly; by first allowing the speaker to present their knowledge to the group in full, and *then*, for example, invoking the tutor as justification for the presence of disagreement (rather than making explicit their fact-checking, or the fact that they had ventured into another member's workload in their individual research). In this way, it seems that collaboration was simply manifested in different ways than it being the case that students opted for a *cooperative* stance (in opposition to the principles of PBL) (see chapter 2).

Furthermore, in response to the weekly call for a group leader - standard procedure in PBL - the speakers skirted around the arising issue of authority with resistance and mockery, making the undesirability of the leadership role clear, and marking its redundancy within the 'relaxed' and 'democratic' space. Similarly, whilst students' production of PBL contracts - in addition to schedules for the weekly rotation of PBL roles - were mandatory, these self-regulatory guides were regularly dismissed, and only loosely adhered to by the groups. This was also exemplified in phase 3 of data collection, where the students (fiercely) guarded their individual Belbin (2010) scores, as though to publicly unmask members' strengths in leadership would threaten their equality as peers. It appears, then, that the scaffolding intended

to support students' self-management instead acted as another point of formality to be avoided by the average student.[5]

Although, amongst this resistance - and much like their treatment of the educational business as an inescapable part of the institutional setting - orientation *was* made to the need for some level of governance, given the absence of the tutor's facilitation. Students frequently countered the authority that naturally comes with undertaking the role of leader by emphasising the neglect inflicted on them by the institution. By constructing the university system as the common enemy (i.e. in giving them no option but to self-manage their learning), students worked to preserve their cohesion as equal members, even when acting as 'leader' (Chiriac, 2008). It is also notable that, via their co-constructed educational agendas - including extensive clarification talk (cf. Koschmann et al., 1997) - the groups downgraded the responsibilities of the leader to basic organisational issues alone (e.g. whose turn it was to relay their individual research, and which section of the report was to be confronted next). In turn, the accountability for governing the session was dispersed amongst the group, thus making 'being the leader' a somewhat superficial - and average-student-friendly - affair.

8.2.1. Generating support for PBL

As discussed earlier in this chapter, often, PBL is highly unfamiliar to all parties involved - this was certainly the case in the current works - meaning that there is a need for a 'PBL socialisation' on the part of the institution in which it is being implemented (Perwitasari & Surya, 2017). Even when students recognise that they learn more via PBL, the standard lecture format is, nonetheless, frequently cited as their preferred approach (e.g. Monrad & Mølholt, 2017; Warnock & Mohammadi-Aragh, 2016). Relatedly, prior negative experiences with group work, as well as a lack

[5] Hmelo-Silver and Barrows (2006) hold that the use of whiteboards serve as 'external memory' for PBL students as they negotiate joint avenues of investigation, and put their hypotheses to the test. The subsequent 'clearing of the boards' is said to be representative of group agreement, and of the resolution of the PBL task. However, McQuade et al. (2018) - involving the same dataset as in this thesis - showed how one PBL student's use of the whiteboard was treated as an overly formal move; as though she was attempting to position herself as a substitute for the absent tutor figure (i.e. as violating her average student status). This could be the reason as to why the (tutorless) PBL groups so rarely made use of the whiteboards during their collaborations.

of willingness to go beyond traditional learning, can be damaging to the proposed benefits of PBL (Amaya Chávez et al., 2020). Such findings demonstrate the power of - and the need for - a positive narrative surrounding PBL. This transition towards acceptance of the PBL - or student-centred - mindset is a gradual, rather than an immediate, process. Kocaman et al. (2009) showed that students' levels of self-management, as well as their desire to learn, were not at their highest until the fourth and final year of their PBL programme (cf. Heaviside et al., 2018). In this way, the approval and encouragement of school administration - in pushing both students and teachers to embrace PBL - is pivotal its success (Lapuz & Fulgencio, 2020). Unfortunately, however, such support it not always so readily granted.

As has already been made clear, within the current study, the usage of PBL was at odds with every other module in the degree programme. This lack of consensus in pedagogical approach can negatively impact students' participation in their learning (Stevens et al., 2010). Whereas in medical education, PBL is the 'gold standard' approach, the same cannot be said for all disciplines (even at the advice of engineering accrediting bodies). Additionally, rather than having four years to integrate them with the principles of PBL (as in Kocaman et al., 2009), here, the students were approaching PBL for the first time, and as part of a one year module, only. On a related note, the process of gaining departmental approval for the PBL-based module was a difficult one, but this has been shown to be the case within disciplines where content sits at the top of the hierarchy, and the assessment and pedagogical decisions are more tightly guarded (thus making endorsement of PBL less likely) (e.g. McPhee, 2002). In turn, and like many others, effectively this study reports on 'PBL on a budget'.

With this in mind, the students' achievements are all the more impressive. And, despite the aforementioned challenges, this should not mean that all hope is lost. Where institutional backing is in short supply, an alternative means of establishing PBL as a viable approach to both educators and students is by facilitating meaningful communications with professionals in the field at hand (Compton et al., 2020; Winning et al., 2004). Take, for example, the 'Civil Engineering 4 Real' PBL workshops which take place outside of the standard university curriculum (see Murray et al., 2020). Each session is led by a professional from various civil engineering companies, setting industry-based problem tasks to

the students alongside the class leader, and exposing them to the ways of professional life. The initiative has been so successful that the PBL is now being integrated within the - very much conventional - engineering programme. It could be that bringing in industry professionals is more likely to manage resistance and discomfort against PBL; a more powerful way of drawing attention to the PBL cause on the part of students, educators, and those involved in decision making in the educational institution at hand (Lopes et al., 2020).

8.2.2. A plan of action

Following on from earlier discussions in the thesis - regardless of the PBL model - and despite the lack of consistency in clearly defining the role (Maudsley, 1999; Neville, 1999) - the tutor is integral to the PBL process (Leary et al., 2013). Successful facilitation in PBL, however, is difficult to achieve, and depends on rigorous training that grounds the tutor in its core pedagogical values (e.g. Haith-Cooper, 2000; Papinczak et al., 2009). As in Williams (1992), there is a danger that tutors misinterpret student-centredness for passivity, thus stepping too far from the learning process. Similarly, Kaufman and Holmes (1998) found that PBL tutors who rated themselves as content experts were, in practice, more likely to struggle with the role of facilitator in PBL - and to revert back to a more didactic approach - whilst Kassab et al. (2006) showed how tutors who saw themselves as collaborative, were actually seen by students as being more authoritative (cf. Dolmans et al., 2002). This is problematic, as the PBL tutor should be the perfect mix of content *and* facilitative expert; both knowledgeable about the PBL cases, as well as being able to teach students to learn (Chan, 2008). Studies have also shown that students often struggle to grasp the role of the facilitator (e.g. Barrow et al., 2002; Biley & Smith, 1999; Williams & Paltridge, 2016), and that there is a need for improved tutor feedback, overall (Anderson & Reid, 2012).

For that reason, PBL tutors require extensive - and continued - practice and training before they can be deemed equipped for the role; they require the opportunity to self-evaluate, and to be supported in doing so (Papinczak et al., 2009). Tutors are expected to be experts in group dynamics (Johnson, 2021), and to know precisely when to intervene in students' interactions (Lee et al., 2009). If the

PBL experience is to be a cohesive one for students, the approach of tutors should be largely homogeneous (Wosinski et al., 2018). Tutor workshops, role plays, seminars, and even mentoring have been suggested as means of bridging this gap between content and pedagogical expertise (e.g. Lapuz & Fulgencio, 2020; McKendree, 2010; Nesargikar, 2010).

Without doubt, the most significant recommendation to be offered by this study is not only the need for regular tutor training, but the need for educators - and learners - to be immersed in the *actual* practices of PBL. Rather than relying on tidy textbook guides, or engaging in training based on invented group scenarios, the current analytical findings provide much needed insight into self-managed PBL as it unfolds (see Attenborough & Stokoe, 2012). Prior work has involved students and tutors reviewing footage of themselves engaging in PBL (e.g. Barrett, 2004; Lee et al., 2009), but there is great potential to utilise such recordings pre-PBL, too. Here, the central objective would be to document the realities of the PBL space; chiefly, to showcase the complex - and sometimes convoluted - ways that students interactionally navigate the social with the educational. To enlighten its users - ranging from seasoned PBL users, to novice students and educators - on the interactional intricacies that have long been overlooked would, at this stage, be a powerful enough goal on its own.

Therefore, rather than seeking to rectify students' social interactions, efforts must be channeled into strengthening the scaffolding that surrounds PBL. The present analyses give rare insight into students' collaborations in the wild; of their interactional adaptability to the social and educational norms that are deeply engrained in the self-managed PBL context - and there is still much to be learnt from these. It is pivotal that educators are willing to embrace the chaos of PBL; that students are given the chance to approach the process of PBL in their own diverse ways (Wong et al., 2021). As mentioned earlier in the chapter, these analytical findings give credit to prior research in PBL that emphasises the importance of students confronting group conflict themselves; of allowing them the freedom to establish their own group dynamics (e.g. Azer, 2009; Öystilä, 2006; Wood, 2003). In fact, Kindler et al. (2009) found direct tutor feedback in response to PBL group dysfunction to be more damaging than helpful. With these points in mind, the

following pedagogical recommendations are made for advancing future practices in PBL, but from 'behind the scenes':

- **At the heart of all PBL training should be the *actual* social processes themselves.** Participants must be made aware that, in practice, PBL may not operate in the tidy ways described by textbook guides (i.e., those that tend to overlook the extensive conversational work that comes with managing social dynamics). Primarily - and on the basis of the current data corpus - tutors need to know that students' displays of academic resistance regularly served as strategies for confronting two opposing facets of PBL group work: its social elements (i.e., being seen as an equal group member who does not stand out), and the newfound authority for their learning that had been thrust upon them (i.e., confronting the educational business, without positioning oneself as a substitute for the absent tutor figure). Their - longwinded, but effective - discursive strategies for managing the likes of workload participation, disagreements, and group membership are evidence of students embracing some degree of empowerment, but in more muted ways. Such findings - and an appreciation that all is not as it seems - could reduce the chances of premature interventions by PBL tutors (Kaufman & Holmes, 1998).
- **The compilation of naturalistic PBL recordings could be a more economical way of tackling resource restrictions in training, than are traditional approaches.** Owing to limitations in staff and financial resources, for example, the institution in which data collection took place for this study involved a few informative, but very brief, tutor training sessions, only, which were unlikely to have grounded tutors fully in the PBL mindset. This is not uncommon (e.g. McPhee, 2002; Ribeiro & Mizukami, 2005; Shanley, 2007; Woods, 1996), and is most worrying, given that tutors commonly hold damaging misconceptions about the student-centredness of PBL (e.g., wrongly viewing themselves as redundant within the PBL process) (Barrett & Moore, 2010; Maharg, 2015). Instead, providing tutors with carefully constructed training sessions based on authentic analytical findings, and alongside supporting recordings, could be highly informative in showing them how students actually confront the business of PBL, and in correcting their misunderstandings about

the tutor role (of whom serves as the 'guide on the side'). After all, if the tutor is to convince students that PBL is worth the investment on their end, then they *themselves* need to understand its mission (Yumatov et al., 2017). There is also room to consider how such training might be delivered via online platforms, or as a digital reference point that tutors can revisit with ease.

- **The use of naturalistic PBL recordings can meaningfully inform the improvement of support structures for learners.** Are the PBL cases provoking discussion and disagreement, as intended? Are the tutors asking the right questions? Are they too directive, or are they, perhaps, too distant? (see Mabley et al., 2020). Such insights could also allow for the adjustment of the finer aspects of PBL. Take, for instance, the chastisement that came with simply standing up in front of one's peers to make use of the whiteboard to record their ideas; where one single physical movement risked breaching adherence to one's 'non-expert' status. It could be that, if the tutor was to initiate the usage of the whiteboard - and other tools designed to support their learning - then this would be more openly embraced by students; as though they had been instructed to do so *by the authority figure*, rather than initiating this activity *by themselves* (i.e., where *they* risk being seen as authoritative). Although such 'minor' amendments may appear to be somewhat inconsequential, the analyses showed that *all* interactional moves - whether big or small - were continuously policed by the students for any violations of group norms.

Whilst the findings of this study, as well as its (above) recommendations, are specific to floating facilitator PBL, in many ways, they are also of relevance to PBL (across disciplines and models), and to collaborative practices more broadly within the context of Higher Education, where research into the social processes of group work is also much needed (e.g. Shimizu et al., 2021). Relatedly, given that similar questions have been raised about its implementation - notably, the management of conflicts, and the impact of social relations on knowledge sharing (Wang & Lin, 2021; Wong et al., 2021) - this work could also inform certain elements of online configurations of PBL .

8.3. Limitations of the study

It is important to be mindful of the limitations of the thesis - some of which were first raised in chapters 3 and 4 - so we shall now consider these below.

8.3.1. Critiquing the method

The participant sample within this study was purposive, in that only students within the Chemical Process Design and Advanced IT class - a module led by my PhD supervisor - were eligible to take part. Therefore, although the students were assured that my supervisor - their lecturer - would not view the footage until after the module had been completed, knowing that she would eventually see them in action could have altered some of their behaviours. That is, rather than being true to themselves, due to the presence of cameras, there is a risk that the groups played up to the role of 'the good student' in satisfying what they perceived to be the lecturer's expectations of them. There is also the issue that, as individuals who volunteered to partake in this educational project, the participants were more engaged than the non-participating students in the class (see Gregerman et al., 1998), thus making them an inaccurate representation of the 'normal' PBL group.

However, the analytical findings demonstrated clearly that being positioned as 'the perfect student' was actually the antithesis of the 'regular student'. The speakers, in fact, went to great lengths to be seen as *un*exceptional students in safeguarding themselves from the absent tutor figure. On these grounds - and given the fact that nothing was to be gained from the lecturer witnessing the students' resistance - the argument to be made here is that such patterns are, in fact, reflective of the 'normal' PBL group; that these *are* the complex social and educational realities encountered by students facing PBL for the first time, where *they* are responsible for self-managing the group business.

Additionally, there were several episodes within the data corpus in which the students appeared to lack an awareness of the cameras, given certain topics of discussion (e.g. the use of profanities in reference to academics within the department; being reminded of the presence of cameras by another group member following an 'outburst' of what could be classed as inappropriate behaviour). Although it is not possible to be certain about students' consciousness of the cameras - and whether moves were intentional or not - it does appear that there were at least

some instances where they had forgotten about being recorded. On a related note, whether students' opposition to the 'intellectual' identity was truthful, or whether they were playing up for the cameras, or not was - from the ethnomethodological perspective - irrelevant, with the only concern being how such stances served as interactional strategies for navigating tutorless PBL (i.e. relevant to context and the given point in time).

8.3.2. Generalisability

From a positivist viewpoint, the researcher's prime goal is to demonstrate the generalisability of a study's findings via statistical significance, quantification, and representative samples. CA, on the other hand, has much different objectives - chiefly, to detail speakers' normative practices in organising their interactions - and this has led to some criticisms regarding the (supposed lack of) validity of the research findings it produces. There are, however, good reasons why CA is less concerned about the issue of generalisability (Greatbatch & Clark, 2018).

For example, to model Hoey and Kendrick's (2017) thinking in the present context, whilst hundreds of indirect disagreement occurrences were identified across the data corpus, quantification on its own does not illuminate the normative expectation that students' disagreement formulations should be indirect - as opposed to explicit - in form. Instead, normativity could only be shown through the detailed analysis of deviant cases. When students made direct disagreement turns, such moves were treated as problematic by the other group members (e.g. in the form of repair-initiators and pauses), prompting the offending speaker to account for their non-normative actions (i.e. those which work against the notion of the average and neutral student). That is, "whereas in the positivist paradigm the value of research is judged by the degree to which results can be generalised to the wider population through probability sampling and statistical analysis, in CA it is judged by the extent to which findings describe normative practices, which are observably oriented to by participants in the details of their interactions" (Greatbatch & Clark, 2018, p. 3).

Furthermore, CA does not fit comfortably within a qualitative or quantitative classification (Stokoe, 2020). There are major conflicts in how they each conceptualise the construction of knowledge, with CA situated squarely within speakers' actual interactional practices, whilst qualitative and quantitative research

typically take participants away from the place of action. In total, this study involved 39 participants, with almost 100 hours of student group interactions recorded. In qualitative terms, these are respectful figures. Even though CA is commonly categorised as a qualitative method, however, a CA-based study involving recordings of five PBL sessions is *not* the equivalent of a qualitative study comprising five student interviews about PBL. More specifically, as a single conversational instance (e.g. a recording of one PBL meeting) in CA "delivers lots of instances of any given phenomena" (e.g. continual pauses and hedges within disagreement formulations), it cannot be seen as straightforwardly representing one 'unit' of data (Stokoe, 2020, p. 13). Therefore, whereas a single interview, for example, could be deemed inadequate for the purposes of a meaningful qualitative analysis, for the conversation analyst, a single case is brimming with detail, and thus, holds *much* power, still. Take the initial naturalistic studies of PBL interactions back in the 1990s (section 2.4) as examples of single case analyses; pivotal work which, at the time, made use of limited video-recordings.

Ultimately, generalisability was never a direct objective of this study; only to shed light on the *actual* pedagogical practices of PBL that have been neglected throughout the years. Although, as noted by Goodman (2008) - whilst it is rarely the case that discursive analysts specifically aim for generalisability - rather than generalisability being "sacrificed in favour of a rich and detailed understanding of the subject being investigated, discursive psychologists should be able to claim both a detailed analysis and a level of generalisability" (p. 272-273). For this to be possible, then, the notion of generalisability must be aligned with the indexical nature of language. Therefore, rather than seeing it in its normal quantitative terms (e.g. pertaining to the measurement of significance values), in CA, generalisability is dependent on whether a discursive strategy 'works' across different contexts.

On these grounds, it would seem that the current analytical findings are likely to be found in related contexts (e.g. floating facilitator PBL groups in British universities). Additionally, given the strong similarities with the interactional patterns identified in the works of, for example, Stokoe et al. (2013), there appears to be potential for this work to inform university group work beyond the immediate pedagogical context of PBL, too. However, as one significant limitation of this study is that the data is restricted to a UK context only, any claims of generalisability

cannot go beyond this. It would be of much interest to examine students' interactions in PBL outside of UK Higher Education, as it is likely that the disagreement strategies, and the management of group work more generally, vary in light of differing cultural norms. Furthermore, the current work involves students who are encountering PBL for the very first time, so it would insightful to examine the conversational practices of those students who are accustomed to PBL - such as in Sweden, where PBL is standard practice - in terms of how it is 'done' (suggestions of which are further explored in section 8.4).

8.3.3. Too much talk?

Concerns have been raised about CA and the (undivided) attention it gives to talk-in-interaction, thus leading to the neglect of wider sociological topics such as power, age, and gender (Billig, 1999; Wetherell, 1998). Parker's (2005) critique is particularly harsh, warning of CA and its excessive empiricism, as though it restricts itself to mere fragments of text, producing only a partial image of the interactional scene (Greatbatch & Clark, 2018). CA, however, does *not* outrightly deny the existence of such categories; rather, it does not see them as fixed aspects of social interaction, meaning that their examination is only possible when there is actual evidence of their use within the talk (Benwell & Stokoe, 2006).

An integral part of the current analyses was my approaching the data without imposing predetermined categories on the speakers (although, the researcher's neutrality in CA has been put into question; Billig, 1999), as has been done so much before in PBL research. This allowed full room to be given to recurrent instances in which students *themselves* made relevant the business of (e.g. institutional versus social) identities to their group interactions; to the meanings that *they* attached to the categories raised in talk, and how such constructions were tied to the accomplishment of certain actions (e.g. self-managing disagreements and social loafing). Without CA - and being situated squarely within the 'doing' of PBL - it would have been impossible to target the research gaps that have long plagued PBL (i.e. how it actually takes shape).

8.4. Directions for future research

PBL tends not to be commonplace in the teaching of engineering at UK universities. In the case of the present study, though in their third year at university, the participating students were complete novices to the approach. On these grounds, it is likely that the interactional management of both knowledge disagreements and social loafing unfold quite differently when students *are* well-versed in the practicalities of PBL. Relatedly, in contemporary UK Higher Education policies, students tend to be characterised as vulnerable (Brooks, 2018; Leathwood & Read, 2020), and it is likely that such thinking trickles into the enactment of active learning approaches such as PBL. In the current study, for instance, the use of PBL was met with hostility from other academics in the department, who noted their fears in breaking traditions, and in inflicting too much pressure on students. It would be of interest, therefore, to look beyond the UK Higher Education context to better understand the PBL experience when students are positioned as empowered learners, and where PBL is more fully embraced by all stakeholders.

Building on this need for explorations outwith UK universities, future interactional research should consider the disagreement strategies adopted by students in other PBL contexts (e.g. where English is not the native language). Analysing the enactment of disagreements across different classroom settings involving English, American, and Israeli students respectively, Netz and Lefstein (2016) identified the presence of potential culture-specific discursive patterns, whilst Kobayashi and Viswat (2010) noted incompatibilities between the disagreement styles of Japanese students with intermediate English skills, and American English speakers. Such cultural insights - in 'doing disagreement' appropriately - could make for a more inclusive PBL experience (see chapter 2 regarding similar discussions).

As the objective of the present analysis was limited to cataloguing students' disagreement formulations, it would also be of worth to consider the sequential resolution of disagreements within PBL. Hüttner (2014), for example, examined disagreement episodes in L2 examinations, and was able to mark a distinction between students' arguments in terms of being 'superficial' or 'meaningful'. Having a fuller understanding of effective versus ineffective disagreement endings could better prepare students for the interactional delicacies that come with PBL. Relatedly, there is room to contribute to work on group dynamics by delving into how students' disagreements unfold across multiple turns and multiple speakers, which is hinted at

in extract 6.3 of chapter 6 (e.g. how group members' disagreements 'influence' others). As explored in chapter 3, these avenues of investigation could be driven by a more interventionist approach to applied CA, in which pre-existing interactional problems are targeted (as opposed to shedding light on institutional matters alone, as was the case here) (Antaki, 2011).

Other potential analytic avenues of interest include furthering work on students' detached stances towards academia - as there is still much to be understood in this respect - as well as engaging in more detailed explorations of students' embodied conduct in relation to their maintenance of identities, similar to that of Moncada-Comas (2020). Further to this, explorations of PBL students' pro-social behaviours - for example, in supporting one another with limited tutor availability, and in forming a cohesive group bond - could shed more light on the intricacies of the student experience.

As established throughout the thesis, the tutor is key in making possible the achievement of PBL milestones (e.g., Ali, 2019). Whilst they make up a much smaller proportion of the data corpus, the author thus plans to examine the interactions taking place between the students and their tutor. Where the tutor in PBL is 'floating', there is an even greater need for their communications to be effective, so this could provide unique interactional insight in terms of 'what works' (and what does not). Finally, spurred on (in part) by COVID-19 (e.g. Haslam et al., 2021), a pressing point of investigation is the use of PBL in online contexts (covered earlier in the thesis). In particular, there is a need to better understand how PBL is conducted with the support of social networks, as this is a common place of information gathering for today's students (Phungsuk et al., 2017).

8.5. Conclusions

At a first glance of the analytical findings, the groups' detached stances against academia could be seen as painting a worrying picture of the student of today - as an example of student-centred learning gone wrong. However, the take-home message of this thesis is that, despite their (apparent) reluctance to commit fully to 'being a university student', each of the students (except for Callum) successfully completed the PBL module. These microanalyses, therefore, show that floating facilitator PBL

unfolds much differently from the ways we might expect, but that these deviations - from its official guidelines - may not be as problematic as first suggested.

It appears that students' co-constructed 'uninvested' stances served as effective coping mechanisms through which they adapted to the shift in authoritative dynamics that PBL brings. Although the intention behind student-centred learning is to place power in the hands of its students (Davidson & Major, 2014), this was navigated interactionally in complex ways. A byproduct of student-centred learning can be the democratisation of institutional structures and discourse (Benwell & Stokoe, 2002), and whilst this can make the educational endeavour less formal, the loosening of such boundaries also allows outside cultural norms to percolate through. In this way, matters became *more* - rather than *less* - complicated for the examined student groups, as wider social values (e.g. *not* being seen as 'academic') were made relevant, and had to be managed in addition to the educational demands (i.e. their newfound learner autonomy). In tending to this interactional dilemma (and, for example, 'doing disagreement'), the analyses showed how students (cautiously) worked between institutional and social identities.

Added to this, many students take a consumeristic stance on education, viewing learning as a service to be delivered to them by an expert, as opposed to them striving for the production of knowledge themselves, as in PBL (Benwell & Stokoe, 2006; Leathwood & Read, 2020). Therefore, it could be that, here, the students saw themselves as consumers, and that this resulted in their rejection of the empowerment granted by student-centred learning, and their treatment of PBL group work as a democratised affair (i.e. where authority is opposed), instead. In doing so, this may have allowed them to power through PBL without the tutor, *and* as a cohesive group (i.e. with no one member being substituted for this absent role). This is not to say, however, that students engaged sufficiently with *all* aspects of PBL on their own. As in chapter 5, in working away from potential interactional troubles, certain aspects of the PBL experience may have been compromised (e.g. those that are not directly observable from the completion of PBL tasks alone). There is, thus, a definite need to improve the training received by students *prior* to engaging in PBL (Wondie et al., 2020), and it is the position of this study that such training must be informed by students' *actual* group practices (in all of their intricacies).

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APPENDICES

Appendix A: Information and consent forms

Participant Information Sheet for CP-306 Process Design and Advanced IT class –tutorial meetings

Name of department: Chemical and Process Engineering
Title of the study: Professional skills development through collaborative tasks: student interactions and performance management

Introduction
My name is Robert McQuade and I am a PhD student in the Chemical and Process Engineering Department at the University of Strathclyde. I am conducting this research project, under the supervision of Dr. Esther Ventura-Medina and Dr Tony Anderson in collaboration with Dr Sally Wiggins and Seren Mabley, to investigate the processes of student learning within group interaction.

What is the purpose of this investigation?
The purpose of this investigation is to examine student group interaction and skills in order to provide practical guidance for students and staff in this learning environment.

Do you have to take part?
No, you do not have to take part. It is entirely your decision to take part in the investigation and your participation is voluntary. If, whilst participating in the recorded group sessions, you decide you want to withdraw from the study, you will be given the option to move to another (unrecorded) group, and recordings from the group you leave, which you appeared in, will be destroyed. Regardless of whether you take part in the study or not, your education will not be affected in any way.

What will you do in the project?
You will be asked to video-record your group meetings for the CP306 class (every week, two hours per meeting). You should act as you normally would while in the groups as the aim is to understand what normally happens in student group work. Each of these recorded sessions will take place in university buildings (room tbc).

Why have you been invited to take part?
You have been invited to take part as you are a student in CP306 *Process Design and Advanced IT*. Not all students need to take part: only four groups of students will be recorded for this project.

What are the potential risks to you in taking part?
There are no potential risks to you in taking part in the project.

What happens to the information in the project?
The information gathered via video recordings from you, your group and other participants will contribute to my PhD project, which is focused on understanding how students work in student groups and how learning takes place across the semesters. The data from the project will also be used for subsequent related projects by Drs Anderson, Ventura-Medina and Wiggins, but confidentiality will be maintained at all times. Pseudo-anonymity (where names are changed in order to make participants unidentifiable in transcripts) is assured to all participants in video transcripts. However, stills from video footage may be used in academic presentations or publications, and therefore your visual appearance will be visible in such pictures. Short video clips may also be used for

academic presentations, where it is important to understand the visual and verbal aspects of social interaction in group work. All recorded data will be securely stored on the university password-protected and encrypted university data storage facility, and any hard copies of data (e.g. video recordings) will be kept in a locked drawer in a locked office. The data will be kept for up to 5 years following the Good Practice Guidelines for the conduct of psychological research. Only the investigators involved in the project (myself, Dr Anderson, Dr Ventura-Medina and Dr Wiggins and Seren Mabley) will have access to the raw data.

The University of Strathclyde is registered with the Information Commissioner's Office who implements the Data Protection Act 1998. All personal data on participants will be processed in accordance with the provisions of the Data Protection Act 1998.

Thank you for reading this information – please ask any questions if you are unsure about what is written here.

What happens next?
If you are happy to be involved in the project, please complete the consent form to confirm this.

If you no longer wish to be involved with the project, thank you for your attention thus far.

Once the project is completed, if you are interested, I will be happy to inform you of the findings by way of posting or emailing you my report.

Researcher Contact Details:
Robert McQuade
PhD student
Department of Chemical and Process Engineering
University of Strathclyde, James Weir Building
75 Montrose Street
Glasgow G1 1XJ
Email: robert.mcquade@strath.ac.uk

Chief Investigator details:
Dr Esther Ventura-Medina
Department of Chemical and Process Engineering
University of Strathclyde, James Weir Building
75 Montrose Street
Glasgow G1 1XJ
Email: esther.ventura-medina@strath.ac.uk

This investigation was granted ethical approval by the Departmental Ethics Committee (DEC).
If you have any questions/concerns, during or after the investigation, or wish to contact an independent person to whom any questions may be directed or further information may be sought from, please contact:

Convenor of the Ethics Committee
Department of Chemical and Process Engineering
University of Strathclyde
75 Montrose Street
Glasgow G1 1XJ
Email: contact-chemeng@strath.ac.uk

Consent Form for CP-306 Process Design and Advanced IT class

Name of department: Chemical and Process Engineering
Title of the study: Professional skills development through collaborative tasks: student interactions and performance management

- I confirm that I have read and understood the information sheet for the above project and the researcher has answered any queries to my satisfaction.
- I understand that my participation is voluntary and that I am free to withdraw from the project at any time up until the return of the video equipment, without having to give a reason and without any consequences.
- I understand that any information recorded in the investigation will remain confidential and no written information that identifies me will be made publicly available, though I understand that it is not possible to anonymise any audio or visual details on the video and that myself and the other group members may be recognised visually or orally.
- I consent to being a participant in the project.
- I consent to being video recorded as part of the project.
- I consent to video images or audio/video extracts being used in presentations or published material and for the purposes of teaching and/or research *(tick as appropriate)*. Yes☐ No☐
- I consent to still images from the video being used for academic presentations or published reports *(tick as appropriate)*. Yes☐ No☐

(PRINT NAME)	
Signature of Participant:	Date:

Appendix B: Jefferson (2004) transcription system

(.) – A dot in a bracket indicates a pause of less than two-tenths of a second.
(0.2) – Numbers in brackets refer to pauses in tenths of a second.
CAPITALS – Indicates a sound that is louder than the surrounding speech.
°quieter° – Degree signs indicate talk that is noticeably quieter than the surrounding talk.
Underline – Indicates emphasis on speech.
↑ – Pointed arrows indicate a marked rising or falling in speech intonation. Placed *before* the change in intonation.
£ – A pound sign indicates talk that is suppressing laughter or leading into a 'laugh'.
[ ] – Square brackets indicate the beginning/end of overlapping speech.
Cut- – A dash following a word indicates a cut-off sound in the speech (usually as another speaker interjects).
= – Equal signs indicate continuous talk between speakers.
(()) – Words in double brackets and italicised reference non-verbal aspects of the interaction. In the present analysis, reference to physical gestures and objects are also labelled here.
>< – 'More than' signs enclose speech which is noticeably faster than the surrounding speech; 'less than' (<>) signs label slower speech.
.h – A dot before 'h' indicates an in-breath. More 'h's = longer in-breath.
h – 'h's *without* a dot before them indicate an out-breath.
:: – Colons indicate an extension of the preceding (vowel) sound. More colons = greater the stretching.
(estimation) – Words in brackets label unclear speech, where estimations have been made by the analyst.

CP306- Process Design evm-v.fac.

Case 9: Golden rule No. 3

Inbox

From:les@kul-engineering.com
CC:lee@kul-engineering.com

Subject: Project CD-7689456-2016 -Everything must be balanced....

Dear team

You have been doing well and the project is on time. At the moment I need you to produce a calculation sheet template for material and energy balances -using a common basis. This template will be used across all teams involved in this design and therefore clear instructions are essential. This has to be accompany by another calculation sheet template for scaling-up to the chosen capacity so that we can input the results into the Design basis sheet later.

One last point, you need to provide a capital costing based on production capacity -that is the last cost we need at this point. This is something that Lee,copied here, needs by next week.

Les

Process Engineer
Conceptual Engineering Department | KUL Engineering

Case 2: The fundamentals...

Inbox

From:les@kul-engineering.com
CC:lee@kul-engineering.com

Subject: Project CD-7709553-2017 -Everything must be balanced....

Dear team

Time to check some calculations. You need to check the values for mass flowrates a compositions on the attached Process Flow Diagram (PFD) for the Acetic Acid proje before we go into the Basic Engineering Design stage. Team B (led by Lee, copied he who produced this PFD will need your calculations with highlighted required changes as w as equations used described in general terms.

Below is the latest information about the process as the current version of the PFD.

Les

Process Engineer
Conceptual Engineering Department | KUL Engineering

++

Production rate	100kton per annum
Reactions	
R1	Methanol + CO → Acetic acid
R2	Acetic Acid + Methanol → Methyl Acetate + H_2
R3	Methyl Acetate → Propiaonic Acid
R4	CO + H_2O → H_2 + CO_2
Overall conversion of methanol	99%
Methanol conversion in R-101	75%
Methanol conversion R-102	96%
Water feed	5% w/w in R-101 inlet
Methyl Acetate	21.0% w/w in R-101 outlet
Separator S-101 target	Recovery unit for catalyst
Column T-101 separation efficiency	89.5%
Column T-102 separation efficiency	90%
Other Separators efficiency	100%
Note 1:	Water produced in R2 assumed to be unreactive i
Note 2:	For unknown conversions stoichiometric ratios ass

This case builds from previous knowledge on Material and Energy balances and Process Diagrams from years 1 and 2.

Issues identified and Problem definition

The brainstorming could have words such as:

balance	material	energy
instructions	definitions	heat of reaction
enthalpies	component flows	design basis
feedstock	raw materials	capital cost
capacity	relationship	scale-up
moles	mass	previous
basis	ratio	mass per time
how to	steps	heat
work	heat of reaction	latent heat

with the following categories:

- material balances terms
- energy balances terms
- scale-up relationships

Broad Problem definition

The problem here is to carry out material balances around all items in this PFD and verify those against the current values provided in the PFD.

Intended Learning Objectives

from this the team might want to learn or recall:

- what is the general equation to be used for **material** balances including description of each term?,
- how to carry out mass balances in reactive systems?
- based on a material balance that has a basis, how to do the scale-up for the production capacity?
- based on the production capacity, how to estimate the capital cost of the plant?

Possible outcomes of the research

For a general case: