

The Interpreted Curriculum: Students' Constructions of Problem-Based Learning Groups

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Table of Contents

Supervisors.....	xi
Declaration.....	xi
Acknowledgements.....	xiii
Abstract	xv
List of Tables.....	xvii
Chapter 1. Introduction.....	1
Chapter 2. Conceptions of PBL: <i>What is an ideal group?</i>	7
Chapter 3. Research in PBL: <i>What do we know about groups?</i>	29
Chapter 4. Methodology	59
Chapter 5. Group structure and function: <i>Finding a niche</i>	89
Chapter 6. Group dynamics and function: <i>Getting on with each other.</i> ..	111
Chapter 7. Groups and work: <i>Assembling knowledge</i>	131
Chapter 8. Groups and learning: <i>Transmitting knowledge</i>	155
Chapter 9. PBL groups in Dublin: <i>PBL groups in another School</i>	175
Chapter 10. The interpreted curriculum: <i>The students' ideal group</i>	201
Chapter 11. Conclusion	235
References	245
Appendices	257

Table of Contents (detailed)

Supervisors	xi
Declaration	xi
Acknowledgements	xiii
Abstract	xv
List of Tables	xvii
Chapter 1. Introduction	1
Chapter 2. Conceptions of PBL: <i>What is an ideal group?</i>	7
2.1 Introduction	7
2.2 Defining PBL: <i>Positioning the group</i>	8
2.2.1 PBL at McMaster: <i>The multi-potential group</i>	8
2.2.2 PBL in other places and times: <i>Context vs. means of learning</i>	10
2.2.3 Defining PBL: <i>Summary</i>	15
2.3 Theorising PBL: <i>Explaining the group</i>	16
2.3.1 The McMaster explanation: <i>Justifying outcomes</i>	17
2.3.2 Constructivist learning theories: <i>Locating learning</i>	18
2.3.3 Constructivist explanations of PBL: <i>From individuals to groups</i>	20
2.3.4 Collaboration in PBL: <i>Adding a social dimension</i>	22
2.3.5 Theorising PBL: <i>Summary</i>	25
2.4 Conceptions of PBL: <i>Summary and conclusions</i>	25
Chapter 3. Research in PBL: <i>What do we know about groups?</i>	29
3.1 Introduction	29
3.2 PBL as curriculum innovation: <i>Implementing and evaluating PBL</i>	29
3.2.1 Student outcomes: <i>Does PBL work?</i>	30
3.2.2 Tutor selection: <i>Does expertise matter?</i>	30
3.3 PBL as a constructivist learning environment: <i>How does PBL work?</i>	33
3.3.1 Facilitating group function: <i>What makes an effective tutor?</i>	33
3.3.2 Constructivist learning: <i>How do students learn in PBL?</i>	37
3.3.2.1 Group as background: <i>How does individual knowledge develop?</i>	38
3.3.2.2 Group as context: <i>How does shared knowledge develop?</i>	39
3.3.2.3 Group as learning team: <i>How does scaffolded learning occur?</i>	45
3.3.3 Group dynamics: <i>What underpins group function?</i>	48

3.3.4 PBL as a constructivist learning environment: <i>Summary</i>	52
3.4 PBL as interpreted curriculum: <i>How do students implement PBL?</i>	52
3.5 Research in PBL: <i>Summary and Conclusion</i>	55
Chapter 4. Methodology	59
Part 1: Planning and doing research	59
4.1 Introduction	59
4.2 Quality and reflexivity.....	59
4.3 Genesis of a research question	62
4.4 Planning research	63
4.4.1 Methodology and methods	63
4.4.2 Research plan.....	65
4.4.3 Participants	66
4.4.4 Ethical considerations	67
4.5 Putting plans into action	69
4.5.1 Recruiting participants.....	69
4.5.2 Observing in Adelaide	70
4.5.3 Interviewing.....	73
4.5.4 Analysis	77
4.5.5 Dublin	79
4.5.6 Writing.....	81
4.6 Planning and doing research: <i>Summary and conclusion</i>	82
Part 2: The research context	83
4.7 Curriculum structure.....	83
4.7.2 PBL format	85
4.7.3 Group format	86
4.7.4 Student orientation to PBL	87
4.7.5 PBL problem content.....	87
4.7.6 Assessment format.....	88
Chapter 5. Group structure and function: <i>Finding a niche</i>	89
5.1 Introduction	89
5.2 Group development: We didn't set specific roles to people	89
5.3 Group roles: <i>Official and Unofficial roles</i>	90
5.4 Leaders: <i>We definitely had a leader</i>	92

5.4.1 Blue leaders: <i>A couple of dominant people</i>	93
5.4.2 Red leaders: <i>Motivating the group</i>	94
5.4.3 Yellow leaders: <i>No one stamped their authority</i>	96
5.4.4 Explaining leadership: <i>Natural leaders</i>	97
5.4.5 Group leaders: <i>Summary</i>	99
5.5 Member roles: <i>People's ways of behaving</i>	100
5.5.1 Contributors	100
5.5.1.2 Knowledge people	100
5.5.1.2 Researchers	101
5.5.1.3 Involvers	101
5.5.1.4 Jokers	101
5.5.2 Non-contributors.....	102
5.5.3 Explaining member roles: <i>People have it in them</i>	103
5.6 Group dichotomy: <i>Dominant and quiet</i>	104
5.6.1 Quiet people: <i>Quiet but valuable</i>	104
5.6.2 Explaining quiet people: <i>It's natural</i>	105
5.6.3 Group dichotomy: <i>Summary</i>	108
5.7 Group structure and function: <i>Summary and conclusion</i>	108
Chapter 6. Group dynamics and function: <i>Getting on with each other.</i> 111	
6.1 Introduction	111
6.2 Blue dynamics and function: <i>A mixed bag</i>	111
6.2.1 Blue discussions: <i>Friendly fun or awkward tension</i>	112
6.2.2: Blue independent work: <i>Laidback or un-united</i>	114
6.2.3 Blue dynamics and function: <i>Summary</i>	116
6.3 Red dynamics and function: <i>Non-functional to functional</i>	117
6.3.1 Red dynamics issues: <i>Different priorities</i>	117
6.3.2 Resolving Red issues: <i>Growing as a group</i>	119
6.3.4 Red dynamics and function: <i>Summary</i>	121
6.4 Yellow dynamics and function: <i>No disagreements</i>	122
6.4.1: Yellow discussions: <i>Turning social</i>	122
6.4.2 Yellow independent work: <i>Rely on each other</i>	126
6.4.3 Yellow dynamics and function: <i>Summary</i>	127
6.5 Group dynamics and function: <i>Summary and conclusion</i>	127

Chapter 7. Groups and work: Assembling knowledge	131
7.1 Introduction	131
7.2 Stage 1: <i>In the group</i>	132
7.2.1 Group purpose: <i>We're supposed to know something</i>	132
7.2.2 Group activities: <i>Stuff we did as a group</i>	134
7.2.3 Group advantage: <i>See all of the problem</i>	135
7.2.4 Group disadvantage: <i>Different ideas</i>	136
7.2.4 Stage 1: <i>Summary</i>	137
7.3 Stage 2: Doing the work.....	137
7.3.1 Group purpose: <i>The group summary</i>	138
7.3.2 Group activities: <i>Subdivide and allocate work</i>	141
7.3.3 Group advantage: <i>More information more easily</i>	142
7.3.4 Group disadvantage: <i>Wasting time</i>	144
7.3.5 Stage 2: <i>Summary</i>	148
7.4 Stage 3: The mixed group	148
7.4.1 Group purpose and activity: <i>Exchange knowledge, present summaries</i>	149
7.4.2 Group advantage: <i>Don't all have to research it</i>	150
7.4.3 Group disadvantage: <i>Solo collaboration</i>	151
7.4.4 Stage 3: <i>Summary</i>	152
7.5 Groups and work: <i>Summary and conclusion</i>	152
Chapter 8. Groups and learning: Transmitting knowledge	155
8.1 Introduction	155
8.2 Stage 1: <i>Pick up information</i>	155
8.2.1 Knowledge gains	155
8.2.2 Stage 1 Learning: <i>Summary</i>	158
8.3 Stage 2: <i>Only know your bit</i>	158
8.3.1 Knowledge gains	158
8.3.2 Stage 2 Learning: <i>Summary</i>	160
8.4 Stage 3: <i>Not 100% reliable</i>	161
8.4.1 Knowledge gains	161
8.4.2 Stage 3: Learning: <i>Summary</i>	163
8.5 Other views on PBL learning	163
8.6 The value of the group: <i>It frees me up</i>	165

8.6.1 Assessment and priorities	166
8.7 Other group outcomes: <i>It's about group skills</i>	169
8.7.1 Group skills	170
8.7.2 Other group outcomes: <i>Summary</i>	172
8.8 Groups and learning: <i>Summary and conclusion</i>	173
Chapter 9. PBL groups in Dublin: <i>PBL groups in another School</i>.....	175
9.1 Introduction	175
9.2 Dublin methodology.....	175
9.3 Dublin curriculum differences	176
9.3.1 PBL format	176
9.3.2 Group format	176
9.3.3 Problem content.....	177
9.3.4 Assessment format.....	177
9.4 Dublin group structure and function: <i>Niche-finding</i>	177
9.4.1 Group development and roles.....	178
9.4.2 Leaders and leadership	179
9.4.2.1 The chair	179
9.4.2.2 The dominant people	182
9.4.3 Other group roles	184
9.4.4 Group structure and function: <i>Summary</i>	184
9.5 Dublin group dynamics and function: <i>Being comfortable</i>	185
9.5.1 Green group	185
9.5.2 Purple group	187
9.5.4 Group dynamics and function: <i>Summary</i>	188
9.6 Dublin groups and work: <i>Assembling knowledge</i>	188
9.6.1 Group purpose and activity	188
9.6.2 Group advantage.....	192
9.6.3 Group disadvantage	193
9.6.4 Groups and work: <i>Summary</i>	194
9.7 Dublin groups and learning: <i>Transmitting knowledge</i>	195
9.8 The value of the group: <i>If you don't pick up on something</i>	196
9.9 PBL groups in Dublin: <i>Summary and conclusion</i>	199

Chapter 10. The interpreted curriculum: <i>The students' ideal group</i>.....	201
10.1 Introduction	201
10.2 Group climate	202
10.2.1 Group climate: <i>Supporting and helping</i>	202
10.2.2 Group climate: <i>Social bonding</i>	204
10.3 Team spirit.....	207
10.3.1 Team spirit: <i>Belonging</i>	207
10.3.2 Team spirit: <i>Responsibility</i>	210
10.4 Participation.....	212
10.4.1 Participation: <i>Roles</i>	212
10.4.2 Participation: <i>Power and decision-making</i>	215
10.4.3 Participation: <i>Competition and conflict</i>	219
10.5 Work and learning	220
10.5.1 Work and learning: <i>Assembling and transmitting knowledge</i>	220
10.5.2 Work and learning: <i>Collaboration</i>	224
10.6 The students' ideal group	226
10.7 The interpreted curriculum: <i>Summary and conclusion</i>	233
Chapter 11. Conclusion.....	235
References	245
Appendices	257
Appendix 1. Adelaide observation schedule	257
Appendix 2. Dublin research schedule.....	258
Appendix 3. Adelaide student invitation.....	259
Appendix 4. Adelaide project information sheet.....	260
Appendix 5. Dublin student invitation	261
Appendix 6. Dublin project information sheet.....	262
Appendix 7. Adelaide first-year PBL packages (excerpt from yearbook).....	263
Appendix 8. Dublin first-year PBL packages, Michaelmas Term, 2005	265
Appendix 9. Adelaide student PBL assessment criteria.....	266
Appendix 10. Dublin student PBL self-assessment criteria	267
Appendix 11. Adelaide pseudonym letter	268
Appendix 12. Observation notes, Week 8, Yellow (excerpt).....	269
Appendix 13. Group themes and codes (excerpt from NVivo).....	271

Appendix 14. Focus group themes.....	272
Appendix 15. International student focus group themes.....	273
Appendix 16. Dublin interview guide.....	274
Appendix 17. Dublin interview feedback topics.....	275
Appendix 18. Excerpt from interview with Peter	279

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Declaration

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

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Vicki Skinner

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Abstract

In this thesis, I address the meaning of problem-based learning (PBL) groups for students. The group is generally a core element of PBL. Theoretical conceptions of the ideal PBL group have ranged from it being a setting for individual knowledge development to it being a site for students' professional enculturation. However, PBL research from diverse theoretical perspectives has produced results about groups that are not consistent with theoretical conceptions of groups. Research has also demonstrated that students interpret PBL differently to theoretical and curriculum conceptions of PBL, hence the notion of 'interpreted curriculum'. These findings raise the issue of how students interpret PBL groups and the implications this has for practice.

My study addressed this aspect of the interpreted curriculum via the following research questions: *What is the nature of a PBL group for students? What is the purpose and value of a PBL group for students?* Informed by social constructionist theory, the study was a qualitative investigation based on an ethnographic approach, employing observation and interviewing to collect data. The participants were volunteer first-year undergraduate dental students in Adelaide, Australia and Dublin, Ireland.

The thesis contributes to knowledge about PBL groups and provides recommendations for practice. It explains how students understood PBL group structure, dynamics and function, and how they understood work and learning in relation to PBL and the group. In response to the research questions, I found that, for students, the nature of the PBL group was primarily social, with its success related to the personality mix of group members and the subsequent roles and relationships. The group purpose in PBL was to do the work of gathering knowledge, which then supplemented the private learning efforts of individual members, which was constructed as taking in knowledge. In both Dental Schools, the value of the group was to provide social, emotional, and academic support to students, although learning support varied in each School according to the curriculum and assessment structure.

Based on students' explanations, I describe a student ideal group and develop my account of the interpreted curriculum by comparing this group to a theoretical ideal group. While the student group was socially driven and separated work and learning, the theoretical group was primarily a work group that integrated work and learning. To

account for this, I explain that students constructed PBL groups with a conceptual framework that was inconsistent with the conceptual foundation of the theoretical PBL group.

The wider contribution of this thesis is to illustrate that students operated with explicit and implicit understandings that were counter to the theoretical principles on which PBL groups were based and designed, and that this had ramifications for group function. The recommendations for practice take account of these differences, and aim to help students to establish PBL groups that function on the model of a professional team. The recommendations are designed to assist students to develop their concepts of teams, knowledge, and learning, and to enhance students' personal, professional, and academic development through participation in PBL groups.

List of Tables

Table 2.1 Constructivist learning theories	19
Table 4.1 Adelaide interview participants	75
Table 4.2 Dublin interview participants	80
Table 4.3 The relationship between Adelaide and Dublin PBL steps	86
Table 5.1 Summary of “unofficial” group roles and functions	91
Table 10.1 Parameters of the functional approach to groups	226

Chapter 1. Introduction

This thesis is about the meaning of problem-based learning (PBL) groups for the students involved. Based on a qualitative investigation, it presents an account of PBL groups in action and how first-year dental students understood and explained their PBL groups. Through this account, I explain how students' conceptions of PBL groups compared to theoretical conceptions and other research findings about groups. I argue that there is a discrepancy between the characteristics and function of a student ideal PBL group and a theoretical ideal group, and that this can be attributed to each having a different conceptual basis. I then consider the significance of the differences between the students' conceptions and theoretical conceptions of the group for how PBL groups are implemented.

The theoretical foundation of this thesis and my research approach is that meaning is constructed through social interaction. I assume that the meaning of the PBL group is not a universal or a given, but is developed through and resides in the language and action of the participants. This theoretical position is broadly known as social constructionism, because it refers to the social production of the social and natural world that people inhabit (Crotty 1998).¹ That is, the PBL group is a social construction. From this perspective I also assume that any research account is an interpretation of the participants' standpoint and is also a construction, as opposed to a direct discovery and reporting of an underlying reality (Schwandt 1994). For this reason, this thesis is written in the first person, which I explain further in Chapter 4, where an account of the methodological implications of constructionist research is provided.

To investigate the meanings that students attributed to PBL groups I undertook a naturalistic study of students in their groups so that I could see and hear (and hear about) what went on. My aim was to find out, from observing and talking with students as they engaged in PBL group-work in and out of classes, how groups developed and functioned,

¹ To explain the nature of social constructionism, Crotty (1998) provides the following example:

That social realities are socially constructed is something of a truism. The most ardent positivist would find that hard to contradict. What distinguishes constructionism, setting it against the objectivism inherent in the positivist stance, is its understanding that *all* meaningful reality, precisely as meaningful reality, is socially constructed. [A] chair may exist as a phenomenal object regardless of whether any consciousness is aware of its existence. It exists *as a chair*, however, only if conscious beings construe it as a chair. As a chair, it too is 'constructed, sustained and reproduced through social life' (Crotty 1998, p.55, italics in original).

what practices and activities groups engaged in and how students described and explained these things. Therefore, this thesis addresses the following research questions:

1. What is the nature of a PBL group for students?
2. What is the purpose and value of a PBL group for students?

My enquiry into PBL groups is an investigation of the group as concept and as practice. A core premise of the investigation is that education and research are socially, culturally and historically constituted activities, as are the theories that underpin these endeavours (Freebody 2003). Therefore, I locate PBL, the group, and research (including my investigation) within a socio-historical context. I address the group as a social and historical concept through an examination of the conceptual basis of PBL and the PBL group. The group as social and historical practice is addressed through a survey of research into PBL and then my own in-depth exploration of student PBL groups in two dental schools, one in Adelaide, Australia and the other in Dublin, Ireland.

This thesis has a defined scope. Given my account of PBL as socio-historical practice, the PBL group in any particular disciplinary and institutional setting is thus a localised version of a PBL group. Localised practice can be understood as a series of interpretations comprising the ‘interpreted curriculum’.² PBL curriculum is interpreted in the sense that educational theory provides a theoretical ideal of PBL that curriculum designers (in a given institution and discipline) interpret to plan PBL materials and activities; these PBL materials and activities are then interpreted by faculty and students as PBL in action. In this thesis, I am concerned with one aspect of the interpreted PBL curriculum, which is localised *student* practice in relation to the *group* and its relationship to the theoretical curriculum; I am not concerned with the interpretations of the curriculum designers or PBL tutors or other stakeholders. Further, I locate my investigation in the field of PBL in medical and health sciences education and I do not consider broader applications in other fields of professions education that employ PBL.

² The concept of the interpreted curriculum has been referred to by different labels in the education literature. For example, Grundy (1996) argued that students were not passive recipients of the curriculum. Grundy suggested that curriculum as “syllabus”, which comprised the documented curriculum delivered “as object” by teachers to students, was distinct from the “pedagogical” curriculum, which was curriculum “as action” translated into teaching and learning through active interaction between teacher and students in a particular context (1996, pp.28-32). Similarly, Hafferty (1998), in an account of the “hidden” medical curriculum, set this against the “formal” or “stated, intended and formally offered and endorsed” version and the “informal” or “highly interpersonal form of teaching and learning that takes place among and between faculty and students” (p.404). I have adopted the term “interpreted curriculum” from Vermetten, Vermunt and Lodewijks (2002), who used it to describe how students interpreted and used the provided curriculum materials and activities and which I explain further in Chapter 3.

The subsequent chapters in this thesis comprise an account of the features and rationales of theoretical conceptions and students' conceptions of PBL groups. The purpose is to describe and explain each and the differences between the two and to provide a better understanding of this aspect of the interpreted curriculum.

Chapters 2 and 3 use a constructionist analytical lens to explore the nature of the PBL group represented in the literature. They illustrate how the small group has been a constant although variously defined and researched element of PBL. These chapters address PBL as a social and historical educational innovation and chart directions in its implementation and research, considering how the group has been positioned and investigated. Chapter 2 provides a foundation for the discussion of research in Chapter 3. In Chapter 2, I discuss how PBL has been conceptualised, both by implementers and theorists, since its inception in the late 1960s. The discussion illustrates how different conceptions of PBL have attributed different roles and significance to the small group. Chapter 3 continues this theme in a discussion of how research into PBL has been framed by different conceptions of PBL and shows how this has shaped what can be asked about the group in PBL. The chapter focuses on what research from different perspectives has contributed to our knowledge about PBL groups and what issues have been raised. Chapter 3 concludes with a summary of a theoretically ideal PBL group, to which I return in my discussion chapter (Chapter 10), when I compare the theoretical ideal to a model of the students' ideal group distilled from the accounts of the Adelaide and Dublin dental students in the results chapters.

The literature review in Chapters 2 and 3 shows that each paradigm has enabled certain theoretically ideal features of groups to be investigated, but that there is also a pattern of unexpected and anomalous findings throughout the literature. For example, the constructivist and collaborative theoretical basis of PBL predicts that learning is enabled by particular individual and group interactions and processes. However, although evidence of such interactions and processes has been produced, studies have also demonstrated that these theoretically important concepts may be absent, altered, or interpreted differently by students. These findings suggest that there may be a discrepancy between theoretical conceptions of PBL groups and the ways that students conceive of groups, which raises the question of what the salient features of PBL groups are for students and how students might explain them. Yet, as I show in Chapter 3, few in-depth studies have addressed PBL from the point of view of the students and none has explored the group from the students'

point of view. This is the focus of this thesis and therefore it addresses an important gap in the body of knowledge that we have about PBL *in action*. It explains how students in two different Schools viewed PBL groups and the inconsistencies between students' and theoretical conceptions of the group. By taking the in-depth approach adopted in this thesis, I demonstrate that the students' rationales for their PBL groups had an internal coherence, even though some features of the groups may have been classified as dysfunctional when examined using theoretical criteria.

The methodology that informs this in-depth investigation is discussed in Chapter 4. As noted previously, I explain how my constructionist position and ethical considerations shaped the ethnographic design of the research and the use of observation and interviews as research methods. I explain how data were generated and analysed to produce this interpreted account of the nature of students' PBL groups. Throughout the chapter, I position myself as researcher and describe how my own background and interests contributed to the plan and execution of the research.

Chapters 5 to 9 present the results of the study in both Schools. The findings from the major part of the study, which was undertaken at Adelaide, are presented in Chapters 5 to 8. These four chapters illustrate how students described and explained their group and so provide a response to my first research question, about the nature of a PBL group for students. My second research question, about the purpose and value of a PBL group for students, is initially addressed in Chapters 7 and 8. Both research questions are re-visited in Chapter 9, where the results of the smaller, cross-site study undertaken in Dublin are presented. This chapter addresses questions 1 and 2 by providing comparative data for each of the Adelaide results chapters.

Chapters 5 and 6 address the nature of a PBL group with regard to group structure and dynamics and the way these shaped group function in Adelaide. Chapter 5 is an account of students' understandings of how group role structure developed and their explanations of why this occurred. I document the type of roles that students took on and how each contributed to PBL or group processes. A major part of this chapter addresses students' understandings of leadership and quiet students, since these were highly influential elements of group structure. Chapter 6 continues the discussion with an account of the interpersonal relationships and overall climate that developed in each group. Through this I illustrate the relationship between the social and the work dimensions of students' PBL groups.

Chapters 7 and 8 add to the account of the nature of a PBL group by focussing on the role of the group in work and learning. These chapters are linked explanations of what students understood work and learning as a group in PBL to be and how these concepts shaped group activities. In Chapter 7, students' descriptions of what occurred during PBL sessions are used to explain what students understood the purpose of the group was in PBL. Chapter 8 then considers what learning in PBL meant to students and the role of the group in their PBL learning. I conclude Chapter 8 with a discussion of the overall value of the group for the Adelaide students.

The purpose of the Dublin study reported in Chapter 9 was to investigate the same research questions in another school and to ask how any similarities or differences might develop my account of the nature, purpose and value of the group for students. Each section in Chapter 9 addresses the theme of each Adelaide results chapter: structure and function; dynamics and function; groups and work; and groups and learning. Throughout Chapter 9, I compare and contrast the results from the Adelaide and the Dublin students. The discussion of how students in Dublin understood and practiced PBL groups is oriented toward an explanation of the overall value of the PBL group for both the Dublin and Adelaide students.

In Chapter 10, I return to the concept of the interpreted curriculum and to my research questions about the nature, purpose and value of PBL groups for students. From my account of the Adelaide and Dublin students' groups as localised interpretations of PBL groups, I develop and discuss a model of the nature, purpose and value of an ideal PBL group from the student point of view. My discussion considers how the model of a student ideal group compares to the theoretical ideal group, of which I developed a model in Chapters 2 and 3 and to the other research findings and issues that were discussed in Chapter 3. I conclude Chapter 10 by considering the conceptual basis for the students' ideal group and some implications that this raises for how PBL groups are implemented.

Chapter 11 concludes my account of the interpreted curriculum by summarising the responses to my research questions. I discuss the limitations of the study and consider its wider significance to the field of health professions education. I conclude the chapter by making recommendations for implementing PBL groups that take account of the findings presented in this thesis.

Chapter 2. Conceptions of PBL: *What is an ideal group?*

2.1 Introduction

Chapters 2 and 3 survey and discuss the ways that PBL has been conceptualised and researched since it came to the attention of the medical and health professions education community from the late 1960s. I approached the literature with a view to understanding how we as health science professions educators know PBL. I asked how we construct PBL and therefore how we construct our research into PBL and the implications this has for our knowledge about PBL groups. Through the discussion I situate this thesis in the field of PBL research.

My discussion of the literature in Chapters 2 and 3 draws on publications from the field of medical, dental and other health professions education. Chapter 2 is a brief history of conceptions of PBL from its inception in medical education through its dissemination in health sciences education. It is a foundation for the discussion of research in Chapter 3, which examines how the different approaches to PBL that were presented in Chapter 2 have framed research and generated knowledge about groups. In both chapters, my point is that for PBL in practice, different conceptions and theories construct different roles for the group; and for PBL in research, different theories form different lenses that focus on the group in a particular way. Therefore, we can ask what light each perspective can shed on our understanding of PBL groups.

Chapter 2 comprises two main sections: firstly, how PBL in practice has been described and defined by health science professions educators and then how PBL has been theorised in the field and throughout I note the implications raised for the group. Section 2.2 shows that since its inception PBL has been defined and characterised in different ways, which has caused confusion and sometimes controversy over the meaning of PBL. I consider how various definitions of PBL have positioned the group and its role. Section 2.3 surveys the major learning theories that have been applied to PBL. I show that PBL has been understood from a variety of theoretical perspectives, which place varying emphasis on the group in relation to learning, which has had implications for implementing and researching PBL. The ways that different theoretical lenses illuminate the group is further addressed when I discuss PBL research findings in Chapter 3.

2.2 Defining PBL: *Positioning the group*

There has been discussion, debate and even controversy in the literature over the meaning of PBL. In this section's review of the conceptions of PBL that have followed its inception, I show that although there has been some variation in the prominence or purpose of the group, there has been less debate and no controversy about the PBL group. The group has been a largely taken-for-granted part of the methodology of PBL.

2.2.1 PBL at McMaster: *The multi-potential group*

My starting point is the McMaster University medical school curriculum, as their 1969 innovation is usually considered to be the origin point for the dissemination of PBL (Albanese & Mitchell 1993; Hmelo & Evensen 2000; Neufeld & Barrows 1974; Spaulding 1969; Taylor & Mifflin 2008)¹. I cite numerous works authored or co-authored by Howard Barrows as evidence of McMaster PBL, since he has been responsible for promulgating this particular form of PBL.

At McMaster, PBL was conceived as a way of learning, being defined as “a fundamental intellectual process” (Neufeld & Barrows 1974). An early and extensive publication defined PBL as a particular form of learning associated with grappling with a problem; its defining feature was the role of the problem as *organiser* for learning (Barrows & Tamblyn 1980, p.18). However, PBL and the small group were in fact separate aspects of the new McMaster philosophy for medical education (Neufeld & Barrows 1974).

Accounts of the McMaster curriculum included numerous references to the small group and its role. The group had a potentially wide purpose. Described as a “laboratory of learning about human interaction”, it could support students' personal and professional development (Neufeld & Barrows 1974, pp.1044). Later, Barrows described the group as one of “basic elements of this approach” to PBL (1985 p.8). In this latter sense, the core role of the group was as a setting for the tutorial process or facilitated problem investigation, which was the means for students to learn medical knowledge and reasoning skills (Barrows 1988). However, the cooperative and social elements of the group were important for success in PBL; “cooperation” included group members “sharing responsibility” and “complementing” and “reinforcing” each other (Barrows & Tamblyn

¹ The other site at which problem-based learning was first implemented was Case Western Reserve University in the USA during the 1950s, however, this institution's contribution is less frequently acknowledged (for example, Boud & Felletti 1991, p.14).

1980, p.73). “Teamwork” was not initially presented as one of the core objectives of PBL but rather as a beneficial corollary of the PBL process (Barrows 1985, p.8). Further benefits of the group included access to a wider range of prior knowledge and perspectives for problem analysis, the possibility of active discussion, and students’ helping each other learn (Barrows 1985). Finally, the ultimate goal of participating in PBL, which was professional development as a doctor and clinician, occurred in the small group and was mentored by the tutor (Barrows & Tamblyn 1980; Spaulding 1969).

PBL was adopted world-wide during the 1970s and 1980s, initially by medical schools and subsequently other professional disciplines (Boud & Feletti 1991). In response to the widespread adaptations (and possible misunderstandings) of PBL appearing in the medical literature, Barrows (1986) published a detailed explication of various forms of PBL. The paper aimed to situate the original version of PBL in a “taxonomy” of PBL, by illustrating the relationships between the elements of PBL (“variables”) and its potential range of outcomes. This paper did not mention the PBL group, which suggested the group was not essential to the core outcomes of PBL. Barrows’ principal concern was that through PBL students would develop an integrated, clinically-usable knowledge and skills base together with the ability to direct their own learning². Therefore, Barrows’ (1986) focus was explaining how to organise learning - principally with respect to the problem and whether it was employed as a focus for learning and also whether the responsibility for learning lay with staff or students.

The positioning of the small group in the original conception of PBL merits attention. Since the McMaster group was not necessary to achieve the core PBL outcomes (although it conferred certain additional benefits to medical education), the use of small groups was not prescriptive. For example, Neufeld and Barrows (1974) suggested that “Problem-based learning can occur both in individual and in small-group learning situations” (p.1042). In descriptions of the approach, PBL was usually presented in a small group setting (five to six students) to illustrate the facilitation of the PBL process to achieve the core outcomes (Barrows & Tamblyn 1980; Barrows 1985). However, it was also suggested that for the purposes of learning clinical reasoning and self-directed learning, PBL could be facilitated with diverse group sizes including whole classes, and that the process could also be undertaken by students independently of staff, either singly

² These were abbreviated as SCC, CRP, SDL. SCC = structuring of knowledge for use in clinical contexts; CRP= clinical reasoning process; SDL= the development of effective self-directed learning skills (Barrows 1986, pp.481-482).

or in groups (Barrows & Tamblyn 1980, pp.72-73). Furthermore, it was recommended that the small group should be a learning context for the initial years only and that senior students should continue by individually confronting problems (Barrows 1985, p.8; Barrows 2000, p.77). The subsequent role of the group would be collegial and students could meet as necessary to discuss their individual progress (Barrows 1985, p.8).

In summary, the small group was part of an overall innovative approach to medical education at McMaster. The PBL group in McMaster was an optional albeit highly desirable extra. The small group augmented the PBL process and outcomes without being essential to the core definition of PBL itself. As the following discussion shows (Section 2.2.2), the small group became an integral part of PBL that was rarely questioned or debated. I suggest that an explanation for this phenomenon was the language of PBL in the early McMaster descriptions, which constructed it as a small group event (e.g. tutor, tutorial process). This was further enhanced by their use of the small group as an exemplar of implementing PBL with its attendant advantages. An additional factor was a shift among subsequent implementers from viewing PBL as an educational philosophy to a narrower view of PBL as an instructional method, which was aided by the way PBL was initially theorised. This shift is addressed in the next section, where I discuss some key, representative examples of PBL implementation and debate. PBL theory is discussed in Section 2.3.

2.2.2 PBL in other places and times: *Context vs. means of learning*

The new medical school at Newcastle University in Australia implemented a PBL curriculum in the mid-1970s (Clarke 1979). The Newcastle approach was very similar to that of McMaster, in its curricular rationale, conception of PBL and employment of small groups. A PBL curriculum was also seen as a response to the “problems of conventional medical education” (Neame 1989, p.112)³. PBL was thus part of an overall philosophy that underpinned Newcastle’s approach to planning the curriculum (Clarke 1979). The small group was the principal means through which students and staff would interact (Clarke 1979) and this format was deliberately chosen to foster “the educational process; personal development for professional competence; preparation for collaboration in professional teams” (Engel & Clarke 1979, p.78).

³ The problems with traditional medical education identified by the Newcastle implementers (e.g. Neame 1989) were similar to those noted by the McMaster staff (e.g. Barrows & Tamblyn 1980), such as students being overwhelmed in the early years with a heavy load of factual basic sciences, which they were then unable to effectively recall and apply during their clinical years.

The other early implementers of PBL, who strongly influenced the field of PBL in health professions education, were researchers at the University of Limburg at Maastricht in the Netherlands (Barrows 1996; Schwarz, Mennin & Webb 2001). In contrast to McMaster and Newcastle, Maastricht positioned the group as a beneficial context for individual knowledge learning rather than a means of learning a range of broad outcomes. The Educational Development and Research team at Maastricht defined PBL as “an instructional method that is said to provide students with knowledge that is suitable for problem-solving” (Schmidt 1983, p.11). The PBL process was central to Maastricht accounts; it involved a systematic procedure called the 7-Jump Method (Schmidt 1983; Schmidt 1989; Schmidt 1993). The group was always an instructional method, or learning context in PBL, for example:

The process of problem-based learning starts with a problem ... The task of a group of students is to explain these phenomena ... While working on the problem, the study group uses a systematic procedure to analyse the problem ... This procedure consists of seven steps (Schmidt 1983, p.13).

In contrast to the educational philosophy approach of McMaster that blended PBL and the small-group tutorial, at Maastricht the small group was positioned as a ‘booster’ element of PBL methodology with regard to knowledge outcomes. Small group discussion was employed to enhance students’ knowledge acquisition and recall and stimulate their intrinsic interest (Schmidt 1989; Schmidt 1993). As I show in the subsequent section (Section 2.2) this was due to Maastricht’s cognitive constructivist theoretical orientation at the time, which focussed on individual knowledge development⁴.

As PBL was taken up in different contexts and curricula, interest in its efficacy grew and there arose a need to define PBL in order to compare the numerous research studies appearing in the literature (refer Section 3.2). For example, two large and subsequently widely-cited reviews of PBL-outcome research published in the early 1990s (Albanese & Mitchell 1993; Vernon & Blake 1993) noted the variation in forms of PBL: “a major curriculum innovation ... involves some form of problem-based learning and its variations” (Albanese & Mitchell 1993, p.52); “increasing interest in curriculum innovation ... associated with this interest is a considerable body of research on PBL in its various forms” (Vernon & Blake 1993, p.550). Both reviews included a definition of PBL, which

⁴ I am not suggesting that the Maastricht team were devoid of an educational philosophy. Schmidt (1993), for example, discussed at length a philosophical basis for PBL, tracing scientific philosophies about knowledge development and their influence on education psychology. However, the underlying philosophy of PBL was not a major feature of publications from this institution. The predominant themes were methods of learning and their psychological underpinnings, which I illustrate with my discussion of the research literature in Chapter 3.

had guided the selection of papers⁵, and one was prefaced with the comment that defining PBL “was a confusing and contentious task” (Albanese & Mitchell 1993, p.53). Both papers described PBL as a method of instruction or learning. One focussed on the problem-oriented nature of PBL but did not include the group in the definition itself:

Problem-based learning at its most fundamental level is an instructional method characterised by use of patient problems as a context for students to learn problem-solving skills and acquire knowledge about basic and clinical sciences (Albanese & Mitchell 1993, p.53).

The following discussion of how PBL was implemented included the group by citing McMaster sources: “the use of small tutorial groups ... [is] the central educational event” (Neufeld *et al.* in Albanese & Mitchell 1993, p.53) and also described small group tutorials among “conditions that facilitate PBL” and one of the “main instructional activities” (Albanese & Mitchell 1993, pp.53-54)⁶. The other definition (Vernon & Blake 1993) classified PBL as a “method of learning”, characterised by five main features, three of which related to the group.

For the purposes of the present review, PBL was defined as a method of learning (or teaching) that emphasised (1) the study of clinical cases, either real or hypothetical, (2) small discussion groups, (3) collaborative, independent study, (4) hypothetico-deductive reasoning and (5) a style of faculty direction that concentrated on group process rather than imparting information (Vernon & Blake 1993, p.551).

Further attempts to define and clarify PBL appeared in the late 1990s. In the same issue of *Medical Teacher*, two papers approached the issue by specifying design principles. Both shared the aim of explaining PBL as an educational approach and therefore they focused on how learning could be organised in PBL. One aimed to facilitate meaningful discussion about PBL by presenting a classification scheme of learning designs, based on how the relationship between the ‘general’ or theory and the ‘particular’ or examples could be organised for learning purposes (Harden & Davis 1998 and writing in the UK). This paper presented a learning design continuum, with lectures at one end and ‘real-world’ practice at the other, locating Barrows’ form of PBL in a penultimate position at the real-world end (Harden & Davis 1998, p.319). The other paper compared PBL in use at the authors’ three institutions, based on a set of instructional principles that they suggested embodied a PBL approach (Charlin, Mann & Hansen 1998 and writing in the US). It

⁵ A third major review published at the same time by Berkson (1993) addressed similar issues and concerns but did not include any definition or description of problem-based learning.

⁶ Albanese and Mitchell (1993) did note that “proponents suggest that PBL could be implemented with students individually and even in large groups” but they suggested that most schools “almost universally” used small groups (p.54).

presented PBL as a learner-centred, educational approach - not method - where the problem was the starting-point for all learning. Charlin, Mann and Hansen (1998, p.323) also prefaced their definition of PBL with a review of definitions from the current literature, noting that PBL had been “described in diverse ways”.

In these two papers, conceptions of PBL focussed on learning as an individual matter and the group did not figure prominently. One omitted the group completely, since their scheme was a theoretical consideration of learning design, it only addressed how learning was organised for the individual student (Harden & Davis 1998). In their conclusion, they explained that by moving toward the ‘Barrows-formulation’ of PBL, “students are more challenged, their prior knowledge is activated in the learning process, there is more emphasis on discovery learning and learning is acquired in a meaningful context” (Harden & Davis 1998, p.321). However, they did not note that as one moved in this direction along the continuum, there was also more group involvement. The other paper briefly mentioned the group, suggesting it could augment individual learning outcomes (Charlin, Mann & Hansen 1998). Having adopted an information processing approach⁷ to their conception of PBL, the paper identified four aspects of learning proposed to underpin PBL knowledge development. This included the possibility that in PBL learning “is enhanced when students work in groups” due to opportunities for elaboration of knowledge through discussion (Charlin, Mann & Hansen 1998, p.327).

In contrast to the spectrum approach to defining PBL adopted by the previous two papers, which accounted for variations in forms of PBL, others aimed to provide a comprehensive definition. One paper argued for consensus about PBL, suggesting that equivocal and contradictory research findings about the efficacy of PBL could be due to the many variations of PBL being implemented (Maudsley 1999). Maudsley (1999 pp.183-184) reviewed the literature to synthesise some defining characteristics for a unitary form of PBL and, like Charlin, Mann and Hansen (1998), she noted that group activity was an instructional method in PBL. After considering various issues of contention, Maudsley argued that in spite of the “conceptual fog” surrounding PBL, it was possible to specify a set of PBL “ground rules”. The group was considered to be a method. PBL was defined as a curricular “method and philosophy”, involving problem-driven, contextual and self-regulated knowledge and skill development, which “achieves its goals via facilitated small-group and independent study” (Maudsley 1999, p.184).

⁷ I address the information processing approach in Section 2.3.2.

To summarise the conceptions of PBL presented to this point, there was a different emphasis between the McMaster ideas and many subsequent early accounts of PBL with regard to the group. The McMaster faculty had conceived a potentially broad role for the group, which included outcomes beyond the core learning outcomes of PBL⁸. While the Newcastle approach was similar, in other subsequent early definitions and forms, the group was mainly an instructional method for knowledge acquisition through group problem-solving and PBL was often described as involving group discussion. The implication of these definitions was that the group was a setting or vehicle for individual learning, which I relate in Section 2.3 to the application of cognitive constructivist theory to PBL.

However, more recent definitions of PBL have given the group a wider role, which was closer to the McMaster conception. These depictions of the group included but expanded upon the previously discussed background notions of the group as an instructional method or context. They fore-grounded the group in PBL and drew attention to collaboration, in both cognitive and social senses and hence to the group as a learning unit, (which in Section 2.3 I relate to the uptake of group- and socially-oriented theories to explain PBL). For example, a comprehensive analysis of PBL as a learning method stated that “collaborative, problem-solving groups are a key feature of PBL” (Hmelo-Silver 2004, p.246). In connection with the PBL goal of “becoming a good collaborator”, Hmelo-Silver (2004) noted that learning *to collaborate* and collaborating *to learn* were often closely interlinked. Similarly, a recent review of the “future challenges” for PBL in the light of current knowledge, placed importance on both the cognitive and social functioning of the group (Dolmans *et al.* 2005). This paper suggested that the group had three functions: learning *through* collaboration, learning *about* collaboration and motivation to learn as a *result of* collaboration (Dolmans *et al.* 2005, p.734). An extended definition of PBL was provided in the introductory article to a new journal on PBL (Savery 2006). This definition included three references to the collaborative and social nature of the group: (i) “to work cooperatively, to demonstrate effective communication skills” (Duch, Groh & Allen cited in Savery 2006, p.12); (ii) “students work in collaborative groups to identify what they need to learn in order to solve a problem” (Hmelo-Silver cited in Savery 2006, p.12); and (iii) “Collaboration is essential. In the world after school most learners will find themselves

⁸ As discussed in Section 2.2.1: SCC: Structuring of knowledge for use in clinical contexts; CRP: Clinical reasoning process; SDL: the development of effective self-directed learning skills (Barrows 1986, pp.481-482).

in jobs where they need to share information and work productively with others” (Barrows cited in Savery 2006, p.13)⁹.

One of the most recent attempts to resolve confusion over PBL took the original McMaster conception as a bench-mark. This paper discussed factors that might shape understandings and practices in PBL and result in significant changes, with consequences for both student outcomes and research findings (Taylor & Miflin 2008). Arguing that it was futile to actually define a consensus form of PBL, the paper suggested that significant principles could be identified that might guide implementation approaches “true to the original intent” (Taylor & Miflin 2008, p.753). This approach echoed Barrows’ outcome-oriented concern with distinguishing the form that originated at McMaster from other forms of PBL (Barrows 1986). However, in Taylor and Miflin’s (2008, p.753) conception of “PBL in 2008”, the only mention of the group concerned its size in relation to processes and outcomes: they suggested it should be small enough to function well, so that the group would learn to manage PBL processes, become collaborative and self-directed and also so that tutor could monitor individual progress (Taylor & Miflin 2008, p.756).

Although there has been debate over the definition of PBL, there has been little direct debate about the PBL group. I have located only one paper (Miflin 2004c) that specifically critiqued assumptions about groups in PBL. Miflin’s (2004c) premise, like that of Maudsley (1999), was that confusion over implementing and researching PBL could be remedied by achieving consensus and she aimed to address this in relation to the small group - she used the metaphor of PBL practitioners and researchers “singing from the same hymn sheet” (2004c, p.444). Rather than question the actual use of groups in PBL (although she pointed out that Barrows had not prescribed using groups), Miflin (2004c) examined assumptions about issues such as group dynamics and size and the way that groups were employed. The value of her critique was that it highlighted the previously unquestioned nature and role of the PBL group.

2.2.3 Defining PBL: Summary

Since the late 1960s the conception of the PBL group, from a practice point of view, has followed the shape of an hour glass, originating with a wide range of functions, narrowing to a more specific focus and then broadening out again. When PBL was first

⁹ Interestingly, Savery, who promoted a constructivist view of PBL and social negotiation of knowledge (Savery & Duffy 1995), did not devote much space to the role of the group in his discussion of learning outcomes. I discuss Savery’s constructivist conception of PBL in Section 2.3.3 *Constructivist explanations of PBL*.

implemented, the group was conceived as being both a site and means of learning, so that students learned in and through being a group. It was an instructional context in that the knowledge and reasoning skills were learned by individuals through the PBL activities they undertook in the group. However it was also a means of learning and of enculturation, as students collaborated with each other and their tutor, forming close academic and professional relationships. As PBL became more widely used, the group in its narrowest form was simply a method or way to implement PBL and group discussion was the vehicle for individual knowledge development. Then conceptions of the group broadened and it again became a context for collaborative learning, with students learning in and through being a group. This pattern in the role and emphasis accorded to the group can be associated with the range of theories applied to PBL, which subsequently I address in Section 2.3.

2.3 Theorising PBL: *Explaining the group*

Numerous ways of theorising PBL have also appeared in the literature. My focus in this section is to show how the major perspectives have illuminated the group in different ways. I indicate how theory has shaped what could be asked of the PBL group in practice and what could be asked about it in research. This section begins with an account of the rationale underlying McMaster PBL and then discusses the two major theoretical directions in PBL that have informed the research field: constructivist and collaborative learning theory¹⁰. I do not attempt to present an exact or complete chronology of the theory of PBL. However, the order in which I present the approaches follows a general chronology.

¹⁰ Although constructivist and collaborative theories of learning have been most frequently used to explain and research PBL, other approaches have been adopted. The most commonly used other model is adult learning theory. Adult learning theory focuses on conditions for learning rather than cognitive processes, and it emphasises the learner's stance toward learning and the role this plays in achievement. As a theory it was first proposed by Knowles in 1973 and has continued to be promoted as a theory of learning (Knowles, Holton & Swanson 2005). It was first conceived in relation to human resource development as a means of explaining how adults learn in contrast to children, and so was presented as a theory of andragogy as opposed to pedagogy (Knowles 1978). According to Knowles's theory, conditions for learning included the learner's need to know, experience, intrinsic motivation, and independence, plus engagement in authentic, problem-centred learning (Knowles, Holton & Swanson 2005). The concepts of adult learning theory have an obvious affinity with the features of problem-based learning in medical and health professions education and they have been linked to PBL by a number of writers (e.g. Boud & Feletti 1991; Engel 1991; Neufeld & Barrows cited in Mifflin 2004a; Savin-Baden & Major 2004). However, this theory has been used more as a rationale for adopting PBL, rather than to explain learning outcomes, and it has not been associated with a distinct research strand in PBL.

2.3.1 The McMaster explanation: *Justifying outcomes*

In the McMaster innovation, the small group was presented as a practical way of organising educational opportunities consistent with the envisioned outcomes of the new curriculum. The development of PBL was a largely pragmatic move to alleviate what was described as “current dissatisfaction with medical education” (Spaulding 1969, p.659). Detailed accounts of PBL from McMaster cited a large body of theory-based research to support the practical advice presented, but did not explicitly describe an over-arching theoretical basis for PBL as an educational approach (Barrows 1985; Barrows & Tamblyn 1980).

The McMaster staff designed PBL with two main and related goals: (i) to relieve and revive students from the overload imposed by the demanding pre-clinical medical curriculum and (ii) to enable students to learn basic science in a more medically meaningful way, so equipping them to be more science-based and humane clinicians in their later years of study and their careers (Barrows 1985; Neufeld & Barrows 1974; Spaulding 1969). The third key goal was that students would become able to monitor and address their own learning needs, or become “self-directed” learners (Barrows 1985; Neufeld & Barrows 1974; Spaulding 1969). The new curriculum actually comprised several “components”, *viz.* self-directed learning, PBL and small-group tutorials (Neufeld & Barrows 1974).

A key component of PBL was the relationship between tutor and students, which developed in the small group. Spaulding (1969) suggested a mentorship role for the tutor, who was to be responsible for guiding the small group of students throughout each case investigation. The tutor as group mentor helped novice medical students develop inquiry and reasoning skills, which was later described as a “metacognitive” function for the tutor (Barrows 1988, pp.1-5). The small group was further explained in terms of the extended goals of the new approach to medical education. It was intended to support the development of intra- and inter-personal skills, as well as academic skills like self- and peer-evaluation and providing and receiving effective feedback (Neufeld & Barrows 1974, pp.1044-1045). As I noted in Section 2.2.1, group members themselves were also expected to be mutually supportive of each other and their learning (Barrows 1985).

So in the original, applied explanation of a PBL curriculum, the group had a multi-faceted academic and professional role. It was a means of making the processes of learning to think, reason and apply knowledge explicit, all under the guidance of an experienced

tutor. It was a learning context, where students could actively engage with each other in discussion. The group was also a professional unit, where students were expected to cooperate and support each other in their learning and development. It was also a site of enculturation for novices into a way of practice, as experts provided experienced models for their students. Although no explicit theoretical basis was given, the McMaster use of groups was consistent with a range of the subsequent theorised accounts of PBL, which I consider in the following sections¹¹.

2.3.2 Constructivist learning theories: *Locating learning*

The majority of explicitly theorised accounts of PBL have adopted constructivist approaches to learning (Hmelo & Evensen 2000). However, constructivist theory or constructivism is not a single paradigm, but a family of psychological theories united by the proposal that knowledge is actively constructed by individuals, rather than being passively taken in, which is the assumption behind didactic or transfer approaches to teaching (Perkins 1999; Reynolds, Sinatra & Jetton 1996). In all constructivist approaches, the key component is the learner's active engagement in knowledge construction; however, other components can include social interactions and elements of the learning context (Perkins 1999). On this basis, constructivist approaches are classified as being cognitive or social or sociocultural in orientation. In this section, I first compare and contrast cognitive and social theories and then discuss the sociocultural approaches¹².

Cognitive and social approaches focus on individuals but differ in how they understand knowledge and where they locate learning and developmental processes (refer Table 2.1). The point of divergence is the significance of internal cognitive processes compared to external events and interactions (Reynolds, Sinatra & Jetton 1996). Purely cognitively-oriented theories (called cognitive constructivism or psychological constructivism) emphasise learning as purely internal; it is conceptualised as cognitive self-organisation (Cobb 1994; Reynolds, Sinatra and Jetton 1996). In contrast, socially-oriented constructivist theories, variously called “social constructivist” (Reynolds, Sinatra and Jetton 1996) or “interactionist constructivist” (Cobb 1994), are also concerned with

¹¹ It is interesting to note that the McMaster approach embodied all the components of a Vygotskian sociocultural approach, as outlined in the following section; however this was before the work of Vygotsky was translated and became well-known in the West. Most of Vygotsky's writing did not appear in English until the 1970s and Vygotsky's ideas were not generally applied to education until the 1980s (Moll 1990).

¹² Although recent critiques have appeared on the effectiveness of constructivism for designing learning (e.g., Kirschner, Sweller & Clark 2006; Mayer 2005), my intent here is not to evaluate but to explain the constructivist application to PBL. Since the use of constructivist theory began in late 80s and early 90s, I use contemporaneous accounts of these theories.

individual cognitive development, but as it is *mediated* by social interactions (Cobb 1994; Reynolds, Sinatra and Jetton 1996).

Table 2.1 Constructivist learning theories

Theoretical approach	Conception of learning	Research Focus
Cognitive constructivist theory (includes information processing theory)	Internal cognitive re-organisation	Cognitive processes and the structure of knowledge
Social (interactionist) constructivist theory	Individual cognitive re-organisation mediated by social interactions	Cognitive processes and the structure of knowledge Dialogic representations of cognitive processes and structures
Sociocultural theory (e.g. Vygotsky)	Internalisation of social practices through social action	Social processes, symbols and tools; expert-novice interactions

The most socially-oriented perspective within the constructivist family is sociocultural theory, which emphasises learning as a completely socially-driven process: social practice is the *means* of learning (Bereiter 1994; Cobb 1994). Sociocultural approaches are distinguished from other constructivist accounts by their attention to the fact that learning is culturally and historically constituted (Renshaw 1998). A core claim of sociocultural theorists, such as Vygotsky, is that the social precedes the individual: learning is a process of an individual internalising the external social practices that the learner engages in with more experienced others (John-Steiner & Mahn 1996; Reynolds, Sinatra & Jetton 1996). Sociocultural theories draw on other disciplines apart from psychology, such as anthropology and sociology, to address learning as a form of “apprenticeship” in a community of social practice (Renshaw 1998; Lave & Wenger 1991). Sociocultural learning is thus a process of enculturation to a discipline or profession (Cobb 1994; Lave & Wenger 1991).

As a result of their different concepts of learning, each constructivist perspective has a different research focus (refer Table 2.1). *Cognitive* constructivists would focus on “individual cognition” (Reynolds, Sinatra & Jetton 1996, p.98) and would investigate “conceptual processes located in the individual” (Cobb 1994, p.14). In this category, information processing constructivists would investigate knowledge (as a cognitive variable) and cognitive processes. These processes would include activating prior knowledge to make sense of new information, and elaboration to enrich the structural links between concepts through repetitive cognition (Alexander 1996). Cognitive constructivists who came after the information processing theorists would investigate these knowledge-

related variables and also address internal factors such as affect and motivation and their role in learning (Alexander 1996).

On the other hand, social constructivists and sociocultural theorists would focus on the group in some manner. The research focus of a *social constructivist* would be to investigate social interactions in relation to individual cognitive processes (Reynolds, Sinatra & Jetton 1996, p.98). In contrast, the *sociocultural* theorist would be interested in the group itself, as a socially constituted phenomenon (Reynolds, Sinatra & Jetton 1996, p.98). Of particular interest would be the nature of the social practices and the interactions between experts and novices (John-Steiner & Mahn 1996).

2.3.3 Constructivist explanations of PBL: *From individuals to groups*

Constructivist explanations of PBL began with information processing theory and were closely followed by the social or interactionist approach and then more recently by the sociocultural model. As theory of how learning occurs in PBL has shifted its focus from the intra-individual to inter-individual to social, the group has assumed increasing importance.

Information processing theory as applied to PBL largely emanated from the educational psychologists at Maastricht in the 1980s. As a cognitive constructivist approach it focused on internal cognitive processes and so explained PBL in terms of knowledge outcomes only. For example, Schmidt (1983, 1989, 1993) explained how PBL could support individual learning with reference to three core tenets of information processing theory: activation of prior knowledge, elaboration and encoding specificity. Each of these processes was understood to lead to better comprehension, retention and recall of information in PBL (Norman & Schmidt 1992).

The information processing approach to PBL could include but did not necessarily specify a group, since individual efforts could activate prior knowledge and enable elaboration, while encoding specificity was a feature of the problem itself (Schmidt 1989). However the group was valued as a context that could enhance individual development. As Schmidt (1989, 1993) explained, undertaking PBL in a small group could provide a learning advantage, because group discussion could increase the opportunity for prior knowledge to be drawn on and for cognitive elaborations to occur. Therefore, from an information processing perspective these cognitive processes were the subject of PBL research (refer Section 3.3.2.1).

Later cognitive approaches to PBL, from Maastricht in the 1990s, also included the role of intrinsic motivation (an affective component) as a driver of learning. This form of motivation, which was a cognitive process called epistemic curiosity, was said to increase the time the learner would be willing to devote to processing information (Schmidt 1993). Epistemic curiosity arose as a result of cognitive conflict, which occurred when new knowledge did not fit with the learner's existing knowledge. These concepts informed later cognitive investigations of PBL (refer Section 3.3.2.1 and 3.3.2.2).

In contrast to the intra-individual focus of cognitive constructivists, in the 1990s social constructivist accounts of PBL expanded the importance of groups and illuminated learning interactions and the metacognitive role of the PBL facilitator. However, the focus was still on PBL learning as knowledge development. Since social constructivists saw learning as an active, goal-oriented and *social* process, PBL groups were considered ideal for facilitating learning (Savery & Duffy 1995). The PBL group could foster individual conceptual development directly, since group discussion provided an ideal opportunity for cognitive conflict to occur. The group was a site for “providing alternative views and additional information” against which students could compare and adjust their personal knowledge or understanding (Savery & Duffy 1995, p.32).

Social constructivists posited that metacognition, or thinking about thinking, supported cognitive development. Hence from a social constructivist perspective, the role of the PBL facilitator as metacognitive guide and making metacognition explicit was important (Gisjelaers 1996; Savery & Duffy 1995). Social constructivist researchers sought evidence of learning in PBL in the interactions between students and their facilitator during the tutorial process and in explorations of group function and practices (refer Section 3.3.2.2).

Sociocultural views of PBL put the group on centre-stage as the vehicle of learning and the site of enculturation into medical and health professional practice. This theory focussed on enculturation to a community through PBL (Hmelo & Evensen 2000). While the problem itself could enable activities leading to cognitive development, the group as a ‘sociocultural context’ could promote professional “identity-making” (Hmelo & Evensen 2000, p.4). The theory also focussed on PBL as enculturation and apprenticeship. A recent paper suggested this meant a sociocultural approach might afford an alternative way of conceptualising PBL in health sciences education, since “professional education is about learning and using the language of the profession” (Loftus & Higgs 2005, p.6). Vygotsky's

concept of the zone of proximal development (ZPD) was important for understanding the tutorial process from a sociocultural perspective: this explained how novices could be supported or scaffolded to perform beyond their current levels of expertise by a more experienced guide, or the PBL tutor (Loftus & Higgs 2005).

Like the social constructivists, sociocultural theorists also foregrounded the facilitator. For example, learning how to reason clinically, when considered beyond the level of metacognition, became a process of enculturation into the social world of the health professional and ways of thinking and managing people, processes and information. Therefore, sociocultural researchers investigated how the facilitator scaffolded students' thinking and reasoning practices (refer Section 3.3.2).

2.3.4 Collaboration in PBL: *Adding a social dimension*

In Section 2.2, I described how collaboration has been associated with PBL in various forms, for example: cooperation, teamwork, sharing responsibility, cooperative groups, learning through collaboration and learning to collaborate. Therefore, another task for theoretical accounts of PBL was to explain the relationship between collaboration and learning as it occurred in the PBL setting. However, authors prominent in the collaborative learning field have adopted different approaches and terminology. Therefore, I precede my discussion of collaborative explanations of PBL with a brief overview of issues in the field of collaboration.

The first point of difference among collaborative learning theorists is the name they give to the phenomenon of learning together. For example, in separate reviews of the field Slavin (1996) referred to "cooperative learning", while Dillenbourg (1999) opted for "collaborative learning". On the other hand, the editors of a special journal issue on collaborative learning noted that "students working together could be called 'collaborative', 'cooperative', 'peer', or 'small group' learning", but they suggested that regardless of the name chosen, any theoretical meaning shifted during site-specific implementation (Sweet and Svinicki 2007, p.14).

Therefore, meaning in practice is more important than the actual word used to describe the phenomenon. With this in mind, some authors have usefully contrasted collaboration and cooperation for the purpose of distinguishing different types of activities:

In cooperation, partners split the work, solve sub-tasks individually and then assemble the partial results into the final output. In collaboration, partners do the work 'together' (Dillenbourg 1999, p.8).

Stahl, Kosschman and Suthers (2006) also suggested that the difference was salient, citing Dillenbourg's (1999 p.8) distinction between collaboration and cooperation, and providing the following definition of collaboration to make their point.

... a particularly important kind of social activity, the *collaborative construction of new problem solving knowledge*. Collaboration is a process by which individuals negotiate and share meanings relevant to the problem-solving task at hand (Rochelle & Teasley cited in Stahl, Kosschman & Suthers 2006, p.3, italics added in secondary reference).

Since the meanings attributed to collaboration in these distinctions are congruent with the intent of PBL, in this thesis I use collaborative learning.

Another difference is how collaborative learning is conceived. Like the term constructivism, collaborative learning is an umbrella term covering many different conceptions of learning. However, unlike constructivist theories, which all share the concept of learning as active knowledge construction, collaborative learning theories are not united by a common theoretical construct of learning or of collaboration. Apart from their sharing the idea that multiple learners are involved, collaborative learning theories differ widely. The field is multi-disciplinary, including (among others) cognitive and developmental psychology, sociocultural perspectives and sociology, and even within disciplines different theories explore different aspects of collaborative learning (Hmelo-Silver & Bromme 2007). Dillenbourg (1999) suggested a provisional definition that included three terms: group + learning + together and argued that approaches to collaborative learning varied with respect to each of the three terms and the level of analysis. He also suggested that “major” collaborative theories were more comprehensive (e.g. sociocultural theory) while other “local” theories explained a small aspect of collaborative learning (e.g. cognitive load theory). In contrast, Slavin (1996) classified collaborative learning theories into two major types. He suggested that they either explained learning itself (“developmental” and “cognitive” theories) or the conditions that promoted collaboration (“motivational” and “social cohesion” theories)¹³. Bruffee's (1999) conception of collaborative learning also addressed knowledge outcomes and the conditions needed to support them. Bruffee (1999 p8) proposed that collaboration in

¹³ Slavin's (1999) fourfold categories comprised (i) “motivational”: a form of externally driven interdependence and cooperation - “the only way group members can attain their own personal goals is if the group is successful” (p44); (ii) “social cohesion”: an internally driven form of cooperation and interdependence that derives from team spirit - “students will help one another to learn because they care about one another and want one another to succeed” (p46); (iii) “developmental perspective”: a social cognitive view - through interactions “peers motivate one another to abandon misconceptions and search for better solutions” (p49); (iv) “cognitive elaboration”: an information processing cognitive view - “the learner must engage in some sort of cognitive restructuring, or elaboration, of the material” (p50).

“transition groups” would enable students to work toward eventual membership in academic/professional communities. This approach is consonant with Lave and Wenger’s (1991) idea of learning membership in a community through legitimate peripheral participation.

These variations of theoretical direction, level and scope are important for considerations of collaborative learning in PBL. For example, Slavin’s (1996) and Bruffee’s (1999) approaches apply to both the outcome and group process dimensions of PBL. Slavin’s cognitive category included the constructivist theories applied to PBL, from information processing (the “cognitive elaboration perspective”) to social constructivist and sociocultural theories (the “developmental perspectives”). Further, Bruffee’s idea of collaborative learning as a means of shifting the ‘authority of knowledge’ was congruent with the intended shift in PBL from transmission of knowledge to construction and ownership of knowledge. Both Slavin (1996) and Bruffee (1999) identified forms of interdependence as relevant to the group dynamic aspect of collaboration. Dillenbourg’s (1999) concept of scale was also particularly relevant to PBL. He advised that different theories considered collaborative learning from different levels, sometimes appropriating concepts to the new scale, such as individual cognition becoming shared cognition or culture becoming group culture.

These ideas from collaborative learning have been applied to PBL. For example, in relation to knowledge development, constructivist accounts of learning have assumed collaboration to various extents. There is overlap between Slavin’s (1996) cognitive perspectives and the constructivist accounts presented in Section 2.3.3. In fact, it has been noted by collaborative learning theorists that explanations of how collaborative learning supports knowledge development have a shared history with theories of individual learning, having undergone a shift from a focus on individual cognition in a group to social interaction and then to social processes (Stahl, Kosschman & Suthers 2006). On a smaller scale and drawing on Dillenbourg’s (1999) idea of local theories, separate elements of PBL collaboration have also been explained by using small-scale concepts such as distributed cognition (for example, Pea cited in Faidley *et al.* 2000, p.110; Pea cited in Hmelo-Silver 2004, p.246).

The social aspect of collaborative learning in PBL was most explicitly theorised by the Maastricht team. They augmented their cognitive, knowledge-focussed approach to PBL by explicitly drawing on Slavin’s cognitive-social typology (Dolmans *et al.* 2005;

Dolmans & Schmidt 2006) and the distinction between collaboration and cooperation (Dillenbourg *et al.* cited in Dolmans & Schmidt 2006). They suggested that in addition to individual and social cognitive processes, collaboration required “mutual interaction and a shared understanding of a problem” (Dolmans *et al.* 2005). Therefore, the small group in PBL was suggested to add a motivational component to learning. Other authors addressing the social nature of PBL groups have referred to other elements of collaborative learning theory, such as interdependence and community, drawing on the ideas of Bruffee (1999) and/or Lave and Wenger (1991), for example, Albanese (2000), Hmelo-Silver (2004) and Loftus and Higgs (2005).

The collaborative theoretical direction in PBL expanded the research focus from cognitive processes and knowledge development to investigating the social conditions that enabled the interactions that supported knowledge development and other outcomes. Researchers interested in collaboration investigated group relationships and dynamics (refer Section 3.3.3).

2.3.5 Theorising PBL: Summary

This section has described how different theoretical explanations have informed PBL. Although McMaster PBL had no comprehensive theoretical basis and even though it was based on theoretically-informed research, as an educational innovation it was explained in terms of its intended outcomes. Subsequent major theoretical conceptions of PBL adopted constructivist or collaborative approaches. Overall, theories of PBL have grown wider in scope and more recently have increasingly involved the group to explain learning. Constructivist theories initially addressed the issue of knowledge development, first as an intra-individual phenomenon and then as a result of social interactions. More recent sociocultural conceptions of PBL addressed knowledge, skills, identity and culture as they develop in the group setting. In parallel to constructivism, the field of collaborative learning has brought the social aspect of learning into view, which has included group dynamics as part of PBL.

2.4 Conceptions of PBL: Summary and conclusions

My focus in this chapter has been to survey how the group has been positioned in PBL. I have shown how, throughout its history in medical and health professions education, PBL has been defined and explained in different ways. As such, the group has ranged from being conceived of as a context for individual knowledge development to being a community of novice professionals.

PBL began as a means of rejuvenating medical education that was grounded in the perceived shortcomings of traditional medical education. This original idea of PBL was a particular philosophical approach to learning, based on certain ways of organising materials, activities, and the roles and relationships of staff and students. It was a pragmatic approach, designed to achieve a range of outcomes related to academic and professional skills and knowledge, initially in the context of facilitated, collaborative group-work. In this conception of PBL, the group was a means through which students would begin their development as clinicians, collaboratively learning the ways of thinking and being of their future profession. Once this process was started, the need for the group and for intensive facilitation would fade as students became more independent.

Subsequent conceptions and explanations of PBL and the group varied in breadth and scope. Some practitioners described it as an instructional method based on problem-solving through group discussion. This view was contemporaneous with early cognitive constructivist accounts that explained learning as cognitive change and which positioned the group as a context for individual knowledge development. The 'group problem-solving' conception of PBL was developed further by social constructivist theorists, who suggested that group discussion was central to learning because it involved particular social interactions that enabled individual conceptual change. In these accounts the group was positioned as an instructional method for individual learning.

Following the focus on individuals in groups, practitioners and theorists widened their view: conceptions of PBL emphasised its collaborative nature and the role of the group as a collaborative learning unit. Theoretical explanations of PBL as a collaborative undertaking either addressed how students learned collaboratively or the conditions that favoured effective collaboration. Continuing the constructivist account of learning in PBL, sociocultural theorists explained learning in terms of social processes and enculturation, so that the group was central to the efficacy of PBL for professional learning and development. Collaboration-oriented explanations addressed learning conditions and focussed on factors like group dynamics and motivation and their role in supporting collaboration and learning outcomes. In these accounts, ideas such as interdependence and community were important.

These variations in conceptions of PBL and the position of the group informed the PBL research agenda. For example, investigators might focus on individuals or groups, they might explore processes or outcomes, or they might address learning or dynamics in

groups. In the next chapter, I discuss how the various conceptions of PBL have shaped the research agenda and what is known about PBL groups.

Chapter 3. Research in PBL: *What do we know about groups?*

3.1 Introduction

This chapter discusses PBL research in the field of medical and health sciences education. Using a framework developed from the preceding chapter, I consider how pragmatic, constructivist and collaborative approaches to PBL have informed research. I show how the group has been positioned in PBL research, what various types of studies have contributed to our knowledge about PBL groups and what further areas need to be addressed.

To illustrate the increasing significance of the group, I chart the shift in research focus according to the conceptions of PBL that investigators adopted. In addition to the organising conceptual theme of the chapter, there is a historical overlay to my discussion to give a sense of how PBL has been researched since its inception. The material is loosely chronologically ordered to show the major shifts in PBL research.

Section 3.2 briefly describes the research program associated with the early implementation and evaluation of PBL. Section 3.3 demonstrates how investigators focussed on tutors or students or the whole group, depending on their particular theoretical orientation. In this section, I also show how the notion of collaborative groups contributed to the research agenda through a focus on group dynamics. Section 3.4 presents a range of work that addressed students' own interpretations of and activities during PBL. Throughout this discussion I consider what the different types of research have suggested about the PBL group and show that there has been a large contribution to our understanding of the potential of the PBL group, but that we know much less about PBL groups in action from a naturalistic perspective.

3.2 PBL as curriculum innovation: *Implementing and evaluating PBL*

Associated with the dissemination of PBL, a large body of early research was concerned with implementation and so it addressed the question, 'Does PBL work?' (Svinicki 2007). Researchers were concerned with justifying curriculum change and investigated claims made by the McMaster faculty and other PBL proponents about what such a curriculum innovation would achieve (refer Section 3.21). Another research direction that concerned PBL implementation issues was tutor selection. A major question was to ask what type of tutor was needed to implement a student-centred learning environment and optimise student outcomes. These studies addressed the question 'Does

expertise matter?’ (refer Section 3.2.2). Although these types of studies did not examine the group in great detail, the issues they raised brought groups into focus and so I briefly address them.

3.2.1 Student outcomes: *Does PBL work?*

Extensive evaluative research was conducted in the 1980s and 1990s and three major reviews of outcome-based research in medical education were published in the early 1990s (Albanese & Mitchell 1993; Berkson 1993; Vernon & Blake 1993). Outcome-based studies sought evidence of the quality of PBL as an educational approach and were designed to test claims made by PBL advocates, often by comparing PBL students with non-PBL (‘traditional’) students. This is understandable in the light of comments, from McMaster and Newcastle for example, about “dissatisfaction” and “problems” with traditional medical education (refer Section 2.2) and arguments that PBL would better equip students with knowledge, clinical reasoning and self-directed learning skills, as well as promote students’ motivation, team-work and professional development.

However, the outcome-based studies did not contribute to knowledge of the group. The organisation of early reviews of PBL research clearly showed a concern with individual outcomes, consistent with a pragmatic view of the group as an instructional context for achieving these outcomes. All three reviews summarised the results of the research in terms of a range of cognitive, behavioural and social outcomes, which included: students’ scientific knowledge and clinical reasoning performances; students’ learning approaches and behaviours; students’ and faculty ratings of various aspects of PBL; and practical issues related to implementation, such as time, cost and resourcing (Albanese & Mitchell 1993; Berkson 1993; Vernon & Blake 1993).

In addition to reviewing the outcome-based studies, Albanese and Mitchell (1993, p.73) discussed some early, exploratory group-oriented research in their section on ‘implementation issues’. They noted that “the question of how faculty tutors should function in the learning process in PBL has only recently been targeted for study” and commented that research into group function was still descriptive rather than ‘prescriptive’. They also noted that there was a body of work addressing the effect of tutor expertise.

3.2.2 Tutor selection: *Does expertise matter?*

Investigations of tutor subject-expertise have “dominated” the tutor-research program in PBL (Schmidt & Moust 2000) and this can be traced to the importance of the

tutors as “guides to learning” (Spaulding 1969, p.659) and the emphasis in the literature on the tutor role for group success (Barrows 1988, pp.43-45; Barrows 2000, pp.37-39; Barrows & Tamblyn 1980, p.83; Barrows & Tamblyn 1980, pp.105-108). Barrows was adamant about not using tutors with poor PBL and group facilitation skills, even if they did have expert knowledge, since lack of facilitation skills would render them unable to support student-centred PBL processes; in his words: “it is **not acceptable** to have a teacher who is an **expert** in the area of study, but a **weak** tutor” (Barrows 1988, p.44, bold in original). Therefore, early investigators addressed the effect of tutor subject-expertise, often driven by practical concerns such as staffing availability. Although my concern in this thesis is with students, these studies are important to my account because they raised the issue of group function in PBL. I summarise the tutor expertise studies to illustrate how they shaped the research agenda in relation to the group.

Tutor-expertise studies addressed two implementation issues in relation to student achievement: whether staff tutors needed to be subject experts and whether student tutors or non-experts could be used instead of staff (i.e. experts). Investigators studying the effect of staff-tutor subject-expertise on outcomes reported conflicting results as to the need for an expert tutor. Even studies done at the same institutions produced no clear decision (for example, Davis *et al.* 1992, Davis *et al.* 1994, Schmidt cited in Schmidt and Moust 2000 p36, Swanson, Stalenhoef-Halling and van der Vleuten cited in Schmidt and Moust 2000 p36). Studies comparing the effect of staff and student tutors on achievement also produced contradictory results and any findings in favour of staff tutors were often small (for example, de Volder, de Grave & Gijssels 1985; Schmidt *et al.* 1995).

However, the question of subject-expertise also raised the issue of tutor behaviour in relation to tutor-directedness and group function and achievement¹. Studies of staff tutor behaviour and the relationship between subject-expertise and tutor-directedness, produced conflicting results (for example, Davis *et al.* 1992; Davis *et al.* 1994) but showed that there were particular aspects of tutor behaviour that could be investigated. Silver and Wilkerson (1991) showed that subject-expert staff tutors differed qualitatively and quantitatively from non-experts. Further, staff tutor research revealed that subject expertise and tutor behaviour could not be studied in isolation from other factors. For example, Schmidt *et al.* (1993) showed that although student achievement in a Health Sciences program was slightly better with expert staff tutors, tutor subject-expertise had the strongest effect on achievement

¹ Studies of tutor behaviour as specific types of actions and their effect on group function is discussed in Section 3.3.1.

with junior-level students. To explain these findings, Schmidt (1994) concluded from a later study that the need for tutor subject-expertise was contextual: students would be more likely to need an expert tutor if they lacked sufficient knowledge or if the problem was too ill-structured.

Comparisons of staff- and student-tutor behaviour shed further light on the expertise issue. Researchers concluded that there was a qualitative difference in how student-tutors related to PBL group members. For example, in one study all student cohorts except first-year rated staff tutors (i.e. experts) as better than student tutors at using their knowledge appropriately; to explain this, the researchers suggested that the early-years difference was because novice students and student tutors had greater “cognitive congruence” (Schmidt *et al.* 1995). Cognitive congruence was an information processing concept that referred to the degree of similarity of learners’ “cognitive schemas” or knowledge structures (Cornwall cited in Moust & Schmidt 1995, p.290). A more detailed investigation of staff and student tutor behaviour showed that student tutors related better to PBL students both intellectually *and* socially: the idea of cognitive congruence in action was demonstrated more clearly (Moust & Schmidt 1995).

In general, research into tutor subject-expertise and student achievement was inconclusive about the need for an expert tutor to guide groups. This was the result of methodological issues that limited the effectiveness of comparisons. A recent review of PBL tutor research from various sites suggested that the equivocal findings may have been due to many factors associated with variations in the research settings and the complexity of PBL as an object of study (Schmidt & Moust 2000). The factors they identified as contributing to conflicting findings included: investigators having used different definitions of expert; the effects of differences in students’ PBL experience and prior knowledge; and differences in expert and non-expert, or staff and peer, facilitation skills and behaviours (Schmidt & Moust 2000, pp.38-42). An item not noted in this commentary was that the tutor expertise studies often used limited and quantitative measures of achievement, such as examination scores or marks on True/False tests of knowledge, which did not fully represent the intended outcomes of PBL. A further confounding factor was that subject-expertise was positioned as a one-dimensional variable that influenced tutor behaviour uniformly.

However, in spite of the methodological limitations, the tutor expertise research showed that there were qualitative differences in how tutors behaved and how groups

functioned, which had implications for implementing PBL as a constructivist approach. This signalled the need to understand PBL group function better.

3.3 PBL as a constructivist learning environment: *How does PBL work?*

The equivocal results of outcome-based research (refer Section 3.2.1) raised the importance of understanding how groups functioned and how learning happened in PBL. This question has been addressed from a constructivist and/or collaborative theoretical perspective. Researchers were concerned with the ideal of a student-centred, active (and later, collaborative) learning environment. How this might be achieved and what processes were occurring were researched by exploring tutors (refer Section 3.3.1), or students or whole groups (refer Section 3.3.2).

3.3.1 Facilitating group function: *What makes an effective tutor?*

One direction in group function research was to investigate how a constructivist, student-centred learning environment could be created. Therefore, researchers asked what made an effective tutor. To answer this question, the effect of tutor behaviour on group function was investigated. Group function was given a range of meanings: it included group productivity, group dynamics, group success, extent of student-directedness, and amount of collaboration in a group.

Some researchers framed group function as an intervening variable i.e. an enabler of student learning. For example, to account for the mixed findings in tutor expertise research, a theory of the effective PBL tutor was proposed and tested in a health sciences curriculum (Schmidt & Moust 1995; Schmidt & Moust 2000). The theory developed the tutor research strand (refer Section 3.2.2) by exploring the concept of cognitive congruence further (Moust & Schmidt 1995; Schmidt *et al.* 1995). To test this model, effective group function meant a “productive” group and “agreeable” meetings (Schmidt & Moust 1995, p.710). A structural equations model suggested that tutor effectiveness, which directly enhanced group function and hence student motivation and achievement, was associated with cognitive congruence, which in turn was the product of the social and intellectual empathy that the tutor demonstrated for the students (Schmidt & Moust 1995). These two types of empathy represented the extent to which tutors could relate to the intellectual and lifestyle demands that PBL and university life made on students and included appropriate use of content-expertise to support active knowledge construction (Schmidt & Moust 1995, 2000).

The tutor and group productivity (not function, as previously) were explored further by Maastricht researchers, who hypothesised that tutor and group operated reciprocally. Continuing to use modelling, and following on from the idea that the tutor directly influenced group productivity (as posited in the effective tutor model from Schmidt & Moust 1995), the study asked if group productivity and tutor behaviour might be associated (Dolmans *et al.* 1999) and if group productivity might actually influence tutor behaviour (Dolmans & Wolfhagen 2005). This work reported that tutor performance and group productivity were associated in a bi-directional relationship (Dolmans *et al.* 1999) which was further influenced by the quality of the PBL problem (Dolmans & Wolfhagen 2005).

The effective tutor model (Schmidt & Moust 1995) was limited in that it constrained group function to a one-way series of input and output variables and was based on retrospective reports of tutor behaviour. However, it was of value because it signalled the importance of relationships within the group by adding the notion of group dynamics (i.e. agreeable meetings and social congruence) to the research agenda. Subsequent investigations addressed this input-output limitation and showed that tutor behaviour was not a constant influence but was responsive to group function (Dolmans *et al.* 1999; Dolmans & Wolfhagen 2005); however, these studies removed dynamics from group function and focussed only on the productivity component. Another limitation is that research of this type was not able to say what particular tutor behaviours promoted ideal group function.

The impact of cognitive congruence on group function was also demonstrated (explicitly and implicitly) at other sites. Two studies of medical students, one in Bahrain (Kassab *et al.* 2005) and the other in the US (Steele, Medder & Turner 2000), each of which showed no demonstrable difference in achievement scores with staff or student tutoring, recorded similar findings about student-tutor behaviour and its effect on group function. Both groups reported students' preferences for peer tutors. Kassab *et al.* (2005) investigated if cognitive congruence would enable peer tutors to perform effectively and also help their medical school manage staffing issues. Students' ratings of tutors and group function showed that peer tutors exhibited greater cognitive congruence. The qualitative data revealed that when students tutored, their groups enjoyed a better climate and decision-making and group members found their tutors more in tune with their current levels of knowledge and understanding and so more able to support their efforts (Kassab *et al.* 2005). The other study, which did not explicitly address cognitive congruence, found

that although medical students did not rate group or tutor function differently for staff or student tutors, the qualitative data from student focus groups showed that students preferred student-led groups (Steele, Medder & Turner 2000). This was because student-led groups were “more cooperative, more efficient and less stressful” since they saved time by not discussing irrelevant material or hypotheses (Steele, Medder & Turner 2000, p.26). Although the quantitative results of both studies were weakened by small numbers (ten and thirteen groups respectively), the qualitative data in each paper brought to light how cognitive congruence contributed to student experiences of group function.

Since PBL involved a shift in both staff and student roles, another strand of tutor-effectiveness/group function research was to ask how tutors could create the constructivist ideal of a student-centred learning environment in PBL groups. Rather than research the single element of tutor effectiveness, investigators sought to identify specific tutor behaviours and skills that might enhance this aspect of group function.

One early investigation aimed to “establish a working definition of a student-directed discussion” using qualitative methods (Wilkerson, Hafler & Liu 1991, p.S79). Observations of four groups were compared to the ideal characteristics of a PBL group, in order to identify core features of a student-centred group and the key actions of a tutor that either enabled or impeded it. The paper described features of tutor behaviour and group interactions that characterised student-directedness; students were able to commence and sustain discussion among themselves, while the tutor’s involvement was constrained to encouraging the content and process aspects of interaction, through careful questions and comments and judicious use of silence (Wilkerson, Hafler & Liu 1991, p.S80). This paper was a forerunner for later process studies that examined in closer detail how tutors supported student-centred groups and knowledge and reasoning development (refer Section 3.3.2.3).

Specific tutor behaviours and group function were also investigated using modelling approaches. Whereas, previously, such approaches had addressed tutor effectiveness as a single variable: ‘tutor performance’ (refer previously: Dolmans *et al.* 1999; Dolmans and Wolfhagen 2005), later approaches investigated certain goal-directed tutor behaviours. These behaviours were derived from the principles of social constructivist learning (active, self-directed, contextual and collaborative) and a list of ideal skills. Examples of constructivist actions in each category were used to develop a questionnaire (Dolmans and Ginns 2005; Dolmans *et al.* 2003) that was used to explore the relationship between tutor

behaviours, problem quality, group function (a single-item student rating of group productivity) and student achievement (van Berkel & Dolmans 2006). In the resulting model, the most influential tutor behaviours were those directed toward active, self-directed and collaborative interactions, while behaviours related to contextual learning and interpersonal interactions were found to be less significant for group function/productivity (van Berkel & Dolmans 2006).

However, in addition to the limitations that the authors noted, for example, the results were based only on student ratings and a small number of groups (Dolmans and Wolfhagen 2005; van Berkel & Dolmans 2006), none of the papers using group productivity as a variable defined what this item consisted of, or indicated what, if any, direction was provided to students in making this judgement. This raises the question of what students thought group productivity meant. Nonetheless, a contribution of this work was to highlight the influence of the tutor and the importance of skill-based staff development as an important component of PBL group function (Dolmans & Wolfhagen 2005; van Berkel & Dolmans 2006).

The impact of tutor behaviour on group function was also documented using qualitative interview methods (Gilkison 2003). Although this study was published under the rubric of tutor expertise, its principal concern was with facilitating effective group function; the author cited her faculty's tutor materials: "Your role is to help the group to function" (Gilkison 2003, p.6). The paper's concern was identifying how tutors supported a student-centred learning environment, through observations and interviews with a medical tutor and a social science tutor and their students.² Although the report was limited to mostly description, the results showed that tutor behaviour was a complex of strategies, intentions and effects (Gilkison 2003). It showed that both tutors sought to stimulate students' critical thinking by "raising awareness"; however the medical tutor used her content knowledge more to prompt metacognition, while the social sciences tutor addressed group process and self-direction more by prompting students to question each other (Gilkison 2003). Importantly, students in each group endorsed their tutor's strategies

² This report was the subject of debate following a criticism by Miflin (2004b), who argued that Gilkison (2003) had misconstrued the meaning of expert and non-expert and only added to the confusion surrounding PBL. Miflin (2004b) pointed out that Barrows's original distinction between experts and non-experts assumed that all tutors had a medical background, but that they were not necessarily experts in the particular case focus. Gilkison (2004) countered by claiming that institutions must adapt the idealised version of PBL to suit their own circumstances. However, the issue of expertise can be regarded as a matter of semantics in this case, since Gilkison (2003) made it clear that she was not concerned with deciding which tutor was superior on the basis of expertise, but rather, with identifying salient differences that might inform faculty development taking account of the provenance of tutors.

for achieving the desired outcomes. This type of study contributed to our understanding of groups by revealing that group function was also shaped by tutors' perceptions of their role and how this influenced their behaviour.

The studies of tutors and group function discussed to this point are some of the many that have demonstrated idealised tutor qualities for facilitating a student-centred learning group from a theoretical perspective. However, other tutor studies have shown that ideal tutor behaviour may not be ideal from the students' point of view. First year dental students' perceptions were shown to be quite different from their tutors' perceptions of the tutor role (Chaves, Lantz & Lynch 2001). Students' ratings of tutor behaviour suggested that they did not appreciate the independent nature of the student role in the group process and learning in PBL and therefore they wanted more direction and input from the facilitator (Chaves, Lantz & Lynch 2001). Similarly, second-year medical students in student-led groups were observed to make major changes to the PBL group process, which was an unexpected outcome in an investigation of the differences between student- and staff-led PBL groups (Steele, Medder & Turner 2000). The student-led groups took what the investigators described as "short cuts" in the PBL process, which included omitting discussion of the problem scenario, waiting to receive the case objectives before identifying learning issues, or distributing case objectives at the start. Steele, Medder and Turner (2000) suggested this explained focus group data about why student-led groups were more "efficient" (refer Section 3.2.2).

To summarise, the body of work that explored the tutor brought group function into focus. It showed that group function can be enhanced by particular ideal tutor qualities and behaviours. It demonstrated that knowledge construction was best supported by tutors who used their subject knowledge appropriately for the level of the student, who supported students to lead their own active and collaborative discussion, and who adopted tutoring strategies in support of these goals. However, other papers reported that students' perceptions of group function may not be congruent with that of theoretical notions of PBL or those of curriculum planners.

3.3.2 Constructivist learning: *How do students learn in PBL?*

A complementary research direction to the tutor behaviour studies was to explore group function in terms of what students did. Researchers addressed learning processes and the conditions supporting learning in PBL. The constructivist investigation of student learning in PBL commenced in the 1970s and is ongoing; it has evolved as learning theory

has evolved. Most of the learning studies were grounded in the constructivist and collaborative conceptions of PBL, following the learning theory movement from cognitive to social constructivist to sociocultural approaches (refer Sections 2.3.3 & 2.3.4). Therefore, most early learning research explored knowledge development from either a cognitive or social perspective. The other PBL outcomes, clinical reasoning and self-direction, were integrated into learning process research within the sociocultural model of PBL. The research lens widened its focus from individual cognitive processes, to group interactions and shared cognition and then to social processes and practices. I chart this progress in the remainder of this section.

3.3.2.1 Group as background: *How does individual knowledge develop?*

The team at Maastricht pioneered much early cognitive research in PBL. In the 1970s and 1980s they conducted a number of studies using information processing theory to investigate internal cognitive processes (for a review, see Schmidt 1993). For example, Schmidt *et al.* (1989) explored whether activation of prior knowledge during problem analysis increased students' knowledge development. Evidence of cognitive development was investigated in experimental and control groups in the form of individual 'integration' and 'retention' of concepts following problem analysis by group discussion. This study provided support for one of the core information processing learning processes applied to PBL, but the authors noted that the study did not address the actual contribution of the group discussion to the outcome. They cited work by colleagues (published in Dutch) that demonstrated a better outcome from group discussion in contrast to that achieved from individual problem analysis (de Grave *et al.* cited in Schmidt *et al.* 1989).

Such cognitive learning research was often experimental (e.g. Schmidt *et al.* 1989) and so its application to authentic settings has been questioned (e.g. Colliver 2000). However, a later study attempted to replicate the 1989 study in an "ecologically valid context" (de Grave, Schmidt & Boshuizen 2001, p.33) and specifically addressed the role of group discussion. Group discussion was reported to enhance cognitive development because it stimulated use of prior knowledge, supported elaboration, and led to greater integration, retention and recall of information (de Grave, Schmidt & Boshuizen 2001).

Cognitive investigators also sought direct evidence of conceptual change. It was suggested that individual cognitive development during group problem analysis could be 'seen' in the verbalisations of group members and retrieved from video-stimulated recalls of students' thoughts (de Grave, Boshuizen & Schmidt 1996). The paper reported that

cognitive and metacognitive processes, such as causal reasoning and reflection on prior knowledge, were visible in students' contributions to the discussion and concluded that students developed their understanding of concepts during meta-reasoning about their own and others' ideas during group discussion (De Grave, Boshuizen & Schmidt 1996). The paper also noted the contribution of group discussion to enabling cognitive conflict as a motivator for learning (de Grave, Boshuizen & Schmidt 1996).

However, these investigations of individual learning processes raise the need to understand what students were doing and thinking in their own words and not rely solely on observation data. Although the conceptual change research demonstrated that students' underlying cognitive processes were represented in dialogue, the group discussion was only "the tip of the iceberg", since student recalls showed that much cognitive work was unexpressed and took place as internal dialogue (de Grave, Boshuizen & Schmidt 1996, p.327). Another report of group discussion and knowledge acquisition found that students who participated less did not learn less, which contradicted theoretical predictions (Moust *et al.* 1987). This finding was explained by suggesting that non-verbalising did not mean non-participation and that it was possible for students to engage in what the researchers called "covert elaboration", which meant that students learned through silent participation in group discussion (Moust *et al.* 1987).

Cognitive studies of this nature were also subject to the constraint of equating verbalisation directly to underlying cognitions and were limited by reliance on recall of specific detail. In addition, some work was experimental, which raised the issue of generalisability to other settings. As noted previously, students' perspectives were the missing element. However, exploration of PBL from an information processing perspective provided support for the *possibility* that group discussion could enhance individual knowledge development through students using their prior knowledge and elaborating on concepts, whether overtly or covertly. The actual nature of the contribution of group discussion to learning, which could not be fully addressed from an information processing perspective, was investigated further from a social constructivist and collaborative perspective.

3.3.2.2 Group as context: *How does shared knowledge develop?*

Investigators adopting a social constructivist view of learning shifted the focus from individual cognition to shared cognition and so learning interactions entered the learning research agenda. The shift to shared cognition brought collaboration into focus too and

researchers addressed factors influencing the process aspects of group function and their impact on learning.

Drawing on constructivist and collaborative learning theory, the influence of theoretical concepts on group ‘success’ has been explored in order to understand the differences between “functional” and “dysfunctional” groups (de Grave, Dolmans & van der Vleuten 2001, 2002; Dolmans, Wolfhagen & van der Vleuten 1998). The relevant concepts were derived from Slavin’s (1996) fourfold classification of collaborative learning: cognitive elaboration, cognitive developmental, motivational, and social cohesion perspectives (refer Section 2.3.4). In these studies, group success³, a mediator of students’ learning, was measured as a single item rating by students of their group’s productivity on a scale of one to ten (de Grave, Dolmans & van der Vleuten 2001, 2002; Dolmans, Wolfhagen & van der Vleuten 1998). One paper reported the relative influences of a range of such cognitive and motivational factors on group success by comparing successful or productive groups with unproductive groups (Dolmans, Wolfhagen & van der Vleuten 1998). Subsequent papers addressed (i) the prevalence of success inhibitors, which were defined as a lack of salient cognitive and motivational factors (de Grave, Dolmans & van der Vleuten 2001), and (ii) students’ opinions about the impact on learning of the success inhibitors that contributed to unproductive groups (de Grave, Dolmans & van der Vleuten 2002).

The results of these studies suggested that although theoretically significant associations could be demonstrated, some student groups did not function in theoretically desirable ways. The first paper reported that group success was directly influenced by interaction (a cognitive developmental factor i.e. discussing, questioning) and motivation (e.g. encouraging each other) and indirectly affected by elaboration (i.e. reinforcing understanding through explaining) and cohesion (i.e. extent of connectedness as a group) (Dolmans, Wolfhagen & van der Vleuten 1998). However, the second study recorded that certain group processes that were theoretically desirable for group success did not necessarily occur: students reported that the success inhibitors ‘lack of interaction’, ‘lack of elaboration’ and ‘unequal participation’ were common occurrences in group discussion (de Grave, Dolmans & van der Vleuten 2001). In the third study, students again rated these three factors as the most common incidents, but, in spite of their theoretical importance in learning, students did *not* consider them to inhibit learning. Students considered that

³ This variable represented the same concept as that used in the tutor effectiveness studies, discussed in Section 3.3.1 under the name of group function or group productivity.

learning was inhibited mostly by lack of motivation (de Grave, Dolmans & van der Vleuten 2002). In addition, the students believed that the tutor was responsible for stimulating group elaboration, interaction and motivation and was slightly less responsible for ensuring participation, cohesion and managing difficult group members (de Grave, Dolmans & van der Vleuten 2002).

In considering limitations of these studies, the authors acknowledged that the measure of group success may have been subject to a halo effect since all the variables were included in the same questionnaire (de Grave, Dolmans & van der Vleuten 2002; Dolmans, Wolfhagen & van der Vleuten 1998). They also noted that these cognitive and motivational factors provided only a partial explanation of group function (de Grave, Dolmans & van der Vleuten 2002; Dolmans, Wolfhagen & van der Vleuten 1998). In addition, the studies were limited by their measure of group success as a global, abstract item subject to students' interpretations of their group's productivity. However, such studies illustrated the value of exploring student factors that might shape the PBL group. They revealed that although theoretical factors influenced group function, the theoretically ideal notion of group function did not occur in their student samples. Such findings point to the need to understand group practices and student beliefs in students' own words.

Similar studies of group function have been conducted in other sites. For example, a group in Finland, basing their work on the Maastricht approach, reported that group function (student rating on four items) and student achievement, and group function and member's own participation were associated (Nieminen, Sauri & Lonka 2006). A team in Norway addressed group function by exploring the relationship between types of group member behaviours and student outcomes and reported that "improving learning" was correlated positively with student achievement (Wigen, Holen & Ellingsen 2003). However, in both cases the interpretation of the results was limited by the non-specific and possibly ambiguous nature of the Likert-rating questions about group function, for example:

I found our group as a whole to be [poor/satisfactory/excellent/good]
 I found my own contribution today to be [poor/satisfactory/excellent/good]
 (Nieminen, Sauri & Lonka 2006, pp.66-67).

Improving learning: contributes to effective learning [scale of 1-9]
 (Wigen, Holen & Ellingsen 2003, p.33).

Group function and group success have also been addressed by qualitative approaches asking students what contributes to function/success. These studies concluded

that participation and cooperation were valued by students for group success. A paper on the attributes of successful and unsuccessful group sessions, derived from medical students' journals, concluded that success was associated with individual and whole-group preparation and participation and good group dynamics (Virtanen *et al.* 1999). Focus groups with second-year medical students addressing the motivational and cognitive factors related to effective groups showed that students preferred groups to cooperate and have all members contribute and engage in focussed discussions that supported basic science learning (Willis *et al.* 2002). The papers presented detailed examples of student quotes that illustrated students' attitudes and behaviours, for example, in both studies students believed that all members were obligated to prepare and to contribute to the discussion (Virtanen *et al.* 1999; Willis *et al.* 2002).

In addition to investigating group function in terms of large-scale categories of process, social constructivists also analysed group function at the smaller scale of dialogue. Two investigations of collaborative learning with medical students addressed "learning-oriented interactions" (Visschers-Pleijers *et al.* 2004; Visschers-Pleijers *et al.* 2006). The first examined and coded dialogue during the reporting phase of PBL for evidence of individual and collaborative episodes of questioning, reasoning and conflict (Visschers-Pleijers *et al.* 2004). A follow-up study focused only on the collaborative aspect of the group by quantifying group episodes of questioning, reasoning and conflict (Visschers-Pleijers *et al.* 2006). The two studies suggested that theoretically important processes were represented in dialogue. A number of students' contributions to the discussion were identified as individual elaboration, while particular interactions between group members represented shared cognition in the form of co-constructions, although the latter were easier to classify than elaborations (Visschers-Pleijers *et al.* 2004). Collaborative learning interactions comprised the bulk of the group discussion (approximately 80% of the session), and of the collaborative interactions, students engaged mostly in collaborative reasoning and least in questioning or discussing discrepant information and views (i.e. cognitive conflict) (Visschers-Pleijers *et al.* 2006a).

A similar investigation of specific "learning-oriented verbal interactions" addressed individual and collaborative knowledge building in basic science PBL groups in Singapore (Yew & Schmidt 2009), which added a different educational/cultural context (Asian, Confucian) to the previous two European studies. In addition, the researchers were able to record students' independent, self-directed learning discussions, which was a unique factor

in this type of investigation. Of all the interactions, about 50% were classified as collaborative, about 30% were self-regulatory (i.e. planning or monitoring progress) and 16% were constructive (i.e. individual activation of prior knowledge and elaboration (Yew & Schmidt 2009). However, of the collaborative interactions, episodes of basic question and answer and information sharing were most common, while episodes of co-construction and conflict, were generally fewer than the researchers expected (Yew & Schmidt 2009). That is, theoretically important elements of group discussion were infrequent.

The patterns of learning interactions over the PBL session or cycle have also been documented. Visschers-Pleijers *et al.* (2006) found that while reasoning and questioning occurred regularly over the reporting session, conflicts did not occur until the end, which they suggested was to be expected in a reporting session, in which students initially presented their research and then discussed findings. Yew and Schmidt (2009) reported that in each phase of PBL the nature of group interactions suggested that different individual and shared cognitive processes were taking place: the problem analysis discussion was mostly collaborative information sharing and simple question and answer; the second group discussion that followed SDL was mainly explanation and simple question and answer; while the final session which involved reporting to the whole class was predominantly information sharing (Yew & Schmidt 2009, p.257).

Medical students' beliefs about these types of learning interactions and group success have also been addressed (Visschers-Pleijers *et al.* 2005, 2005b)⁴. Learning interactions were measured by a questionnaire with 3 dimensions (exploratory questioning, cumulative reasoning and handling knowledge conflicts) and again group success was a single item, group productivity as student rating on a scale of one to ten. Students rated group productivity and the *occurrence* of particular interactions (Visschers-Pleijers *et al.* 2005a) and then, to elicit students' attitudes to particular interactions, students were asked to rate the frequency and *desirability* of particular interactions (Visschers-Pleijers *et al.* 2005b).

The results shed light on how students regarded particular group interactions and again the findings suggested that theory and practice were at times divergent. First, the data were analysed at student level to test relationships between factors, which showed that group productivity was explained by questioning (24%) and reasoning (2%) but that conflict (theoretically important) did not explain any variance in productivity (Visschers-

⁴ This followed their previous work on shared cognition during PBL group reporting discussions (refer previously: Visschers-Pleijers *et al.* 2004; Visschers-Pleijers *et al.* 2006).

Pleijers *et al.* 2005a). Subsequently, the data were analysed at group level to see if the group profile could provide feedback on group performance. Each group had its own pattern of interactions, but in general, students thought that questions and reasoning were desirable but not frequent enough and that conflict was less common and not as desirable (Visschers-Pleijers *et al.* 2005b).

Apart from the limitation of using a single-item rating of group function, the interaction studies used criteria based on theoretically significant items. The basic assumption, which may not hold, is that these items had the same significance for students as for researchers. Nevertheless, these studies showed what was possible in a group and also demonstrated that students may have different perceptions to researchers about theoretically important concepts.

Therefore, these types of studies have raised some important issues for consideration in relation to the interpreted curriculum. For example, although cognitive conflict and its mediation via social interaction was a major constructivist concept in PBL (refer Section 2.3.3), the previous interaction studies recorded very few occasions of dialogue that represented it. In Europe, the lack of apparent episodes of cognitive conflict was described as “remarkable” (Visschers-Pleijers *et al.* 2006 p134). Similarly, in Singapore, episodes of content-related conflict or debate about ideas were uncommon: “we found that team members tended to ignore differences in opinion and did not attempt to work out whose idea was more accurate through critical discussion” (Yew & Schmidt 2008, p.269). Further, in the study of students’ perceptions of group success, the learning interactions associated with group success were questioning and reasoning but conflict did not explain productivity (Visschers-Pleijers *et al.* 2005a). In the follow-up work, students reported that conflict occurred least and they found it less desirable than the other type of interactions (Visschers-Pleijers *et al.* 2005b). About the absence of conflict and students’ perceptions of it, the authors suggested that perhaps students did not recognise it or preferred to avoid conflict because it introduced uncertainty (Visschers-Pleijers *et al.* 2005a, 2005b). The patterns of learning interactions in these studies were also inconsistent with theoretical ideals; students were observed to engage in more basic interactions, such as simple question and answer and exchanges of information. Yew and Schmidt (2009, p.269) suggested that “Students do not spontaneously make connections between concepts and when left to discuss on their own, spend more time sharing information and ideas with less elaboration than hoped for”.

This raises questions about the interpreted curriculum in other previously discussed investigations of group function, particularly regarding the unexamined assumptions in these studies about students' interpretations of key concepts. For example, it can be asked what students understood by "effective learning" (Wigen, Holen & Ellingsen 2003, p.33), "our group as a whole" or "my contribution" (Nieminen, Sauri & Lonka 2006, pp.66-67), "group success" (Virtanen *et al.* 1999) or "the group worked cooperatively" (Willis *et al.* 2002, p.499). It is possible that students did not share the researchers or theorists conceptions of these terms.

In summary, the contribution of social constructivist and collaborative PBL research to knowledge of group function was to demonstrate how group discussion might support students' knowledge development and how group function could be analysed in terms of specific learning-oriented interactions. Researchers showed that group dialogue represented valuable information about how students interacted. Yet, it also showed that ideal learning interactions, such as those enabling cognitive conflict and conceptual development, did not necessarily occur and that students' views of learning were not completely congruent with ideal conceptions of PBL. The results suggested that students' understandings of key learning concepts were an important area for research. In addition, the social constructivist perspective was limited to observing interactions as evidence of learning and it could not enable investigators to comment on the social process of collaborative learning.

3.3.2.3 Group as learning team: *How does scaffolded learning occur?*

Researchers who adopted a sociocultural perspective were able to investigate the social process of collaborative learning and brought the group as a professional setting to the foreground of investigation. This has been a relatively recent direction for PBL research and although few studies have been conducted, they have illustrated learning as both process and outcome and highlighted the social nature of the PBL group.

These studies have explained how learning occurred in a PBL group by documenting social processes and practices. These include explorations of group knowledge development, with Howard Barrows as an expert facilitator (Hmelo-Silver & Barrows 2006, 2008) and investigations of the discourse practices associated with collaborative reasoning, theory development and learning issue identification (Conlee & Koschmann 1997; Glenn, Koschman & Conlee 1999; Koschman, Glenn & Conlee 1997). These studies have placed the social constructivist notion of specific learning interactions into a wider

context. They documented how learning-oriented interactions occurred in the service of particular group activities that were instances of professional thinking and doing.

Collaborative knowledge-building has been shown to occur in episodes, such as hypothesis generation or testing and each episode was found to be mediated by particular types of questions and statements (Hmelo-Silver & Barrows 2008). Collaborative knowledge building and reasoning was also found to be underpinned by students sequentially proposing and testing their own theories to account for the data (Glenn, Koschmann & Conlee 1999). Similarly, the clinical reasoning process was an iterative procedure: a PBL group worked through the patient data to advance hypotheses and then went back to the data to test their hypotheses (Conlee & Koschmann 1997).

Sociocultural analysis illustrated how students engaged in monitoring learning or self-direction. During collaborative knowledge building a number of interactions were task-oriented, which included monitoring group process and self-directed interactions (Hmelo-Silver & Barrows 2008). At each stage of clinical reasoning, students tested the limits and certainty of their shared knowledge (Conlee & Koschmann 1997). Group interactions also addressed learning issues, which emerged from recognition of the limits of students' knowledge during these knowledge and reasoning activities (Kosschman, Glenn & Conlee 1997).

This perspective also addressed the tutor's role in scaffolding learning. A key factor in effective tutor scaffolding was careful use of questions that required elaborated responses to stimulate independent discussion among students to test theory or build knowledge (Glenn, Kosschman & Conlee 1999; Hmelo-Silver & Barrows 2006; Hmelo-Silver & Barrows 2008). Effective scaffolding was student-centred and emergent: the tutor responded to what students were doing at any stage of the enquiry (Glenn, Kosschman & Conlee 1999; Hmelo-Silver & Barrows 2006; Hmelo-Silver & Barrows 2008). Hmelo-Silver and Barrows (2006) described how the tutor's actions during a tutorial were designed to accomplish specific educational and task-related goals. The strategies included asking the group to formulate and test hypotheses and asking them to link their hypotheses to the symptoms; the tutor employed statements or questions to pick up on and draw students' attention to key aspects of the discussion and to stimulate further consideration (Hmelo-Silver & Barrows 2006).

A major shift of sociocultural and discourse studies from the interactionist perspective involved documenting broader levels of social practice in groups. Shared cognition involved social conversation practices such as initiating and turn-taking. For example, during collaborative theory-building students took turns at raising ideas and group discussion involved an iterative process of considering, accepting and rejecting theories (Glenn, Kosschman & Conlee 1999). However, theorising was not *per se* an inevitable feature of the problem analysis, but was made possible by “group members’ methodical practices”: it was suggested that if, instead of turn-taking, interrupting had occurred, then tentative student theories would not be able to enter group discussion (Glenn, Kosschman & Conlee 1999, pp.130-131). Episodes of collaborative knowledge building could be student- or facilitator-initiated, the former was the result of a more symmetrical “participant structure” that allowed all group members agency to initiate courses of action (Hmelo-Silver & Barrows 2008). Further, scaffolding was explained as an instance of professional enculturation: when asking students to summarise in order to focus the discussion and to support his goal of professional learning, the tutor suggested “do it like you’re presenting a patient on rounds” (Hmelo-Silver & Barrows 2006, pp.30-31).

Each of these studies was well-designed and executed. They presented a thorough account of how the whole group engaged in the process of problem investigation. The Kosschman team’s work was based on numerous *in vivo* studies of PBL groups in action. The Hmelo-Silver and Barrows studies were not naturalistic, they were based on an expert facilitator working with a small group (five students) that was possibly constructed for the purpose of research (this was not stated). Nonetheless, their work illustrated the ideal situation and demonstrated the potential of a sociocultural approach to groups for understanding the social nature of PBL groups.

Another sociocultural analysis of PBL groups in action, which possibly misinterpreted sociocultural theory and the concepts of modelling and scaffolding, involved an observational case study of nine PBL groups (Lycke 2002). Observations of three groups were reported using PBL theory and two tutors fit the customary constructivist ideal of a PBL tutor with their questioning and guiding approaches; however the third tutor was more directive, providing content information and suggesting discussion topics and learning issues, in a traditional didactic mould. It was suggested that such tutoring could be re-interpreted using sociocultural theory as a form of modelling of expert

mastery as a scaffold for novice participants (Lycke 2002). However, sociocultural theory does not suggest that the expert should dominate the group in this manner, it suggests modelling be provided indirectly, via questions rather than providing answers (Hmelo-Silver & Barrows 2006).

One investigation used sociocultural theory to frame ideal tutor behaviour, which was then compared to results obtained from students' free responses to a single open-ended question about tutor effectiveness, plus results of two in-depth student interviews (Papinczak, Tunny & Young 2009). Student responses mostly addressed how tutors scaffolded group process, discussion and learning; however, students also made comments (related to the sociocultural conception of the group) showing that they preferred tutors who provided suitable role-modelling when sensitive issues arose from a problem (Papinczak, Tunny & Young 2009), which reflected an earlier finding about the tutor as role model (Chaves, Lantz & Lynch 2001). Although the authors did not comment on it, students' responses about group dynamics suggested that they expected the tutor to be wholly responsible for maintaining good group dynamics. Student quotes indicated the tutor should "enforce" respect, "should have stopped" dominating and should be "stepping in" when disagreements occurred (Papinczak, Tunny & Young 2009, p.381).

In summary, the sociocultural strand of research explained how tutor and students ideally worked together, which involved (i) the students in simultaneously reasoning, constructing knowledge and developing self-directed learning skills and (ii) the tutor in scaffolding these activities. In this strand of research the broad goals of PBL were regarded as integrated and the sharp separation between process and outcome was diminished. However, these studies have focussed mainly on the learning-related element of group function. The other element of group function to be explored was group dynamics.

3.3.3 Group dynamics: *What underpins group function?*

Research into group dynamics, as result of difficulties experienced with groups, did not appear in the literature until later in the history of PBL. Three initial studies addressing dynamics appeared in the late 1990s and each was associated with implementing staff and/or student development; two were theory based (Mpofu *et al.* 1998; Tipping, Freeman & Rachlis 1995) and the other was grounded in practice (Hitchcock & Anderson 1997)⁵.

⁵ Tipping, Freeman and Rachlis 1995 did not derive theoretical guidelines about group dynamics from the PBL literature, but adopted a scheme of ideal group dynamics criteria from the behavioural science literature (Dimock cited in Tipping, Freeman & Rachlis 1995, p.1051). Ideal dynamics consisted of clusters of

These early studies of group dynamics suggested that there was a discrepancy between ideal and actual situations. For example, face-to-face and video observation results were compared with students' and tutors' questionnaire-derived responses about group dynamics and found that (i) reports of external observers and internal reports (students or tutors) did not match and that (ii) tutors and students gave differing reports of their group (Tipping, Freeman & Rachlis 1995). It was concluded that the students had a poor general understanding of group dynamics and a limited capacity to evaluate their group processes effectively (Tipping, Freeman & Rachlis 1995). The instrument used by Tipping, Freeman and Rachlis (1995) in a Western setting was adapted and applied it in a different (Arabic) cultural context (Mpofu *et al.* 1998). Differences were also found between issues of concern identified by tutors and those noted by students. Mpofu *et al.* (1998, p.425) described a "faculty-student gap" in perceptions about the salient group skills and features, which they suggested was possibly exacerbated by cross-cultural differences between faculty (Western) and students (Arabic).

In contrast to the previous theoretical approach, other studies drew on tutors' and students' experiences with groups to illustrate the breadth and similarity of problems arising in PBL groups. These papers reported on both interpersonal dynamics and PBL process problems. An early study, designed for faculty development and based on tutor experiences, included dynamics issues such as a "dysfunctional" member who was often late, unprepared or absent (Hitchcock & Anderson 1997, p.21) and PBL problems, such as the group engaging in "superficial discussion" (Hitchcock & Anderson 1997, p.21). A more recent paper derived from tutor interviews (Houlden *et al.* 2001) reported six categories of common group problem: dynamics issues involved a range of behaviours that resulted in uneven group participation (e.g. passivity, dominance, non-participator, negative attitudes to PBL) plus frustration with the tutor; process issues involved a range of group behaviours that altered the PBL process (e.g. skipping PBL steps, not researching or discussing thoroughly, lecturing rather than discussing). A third study (Hendry, Ryan & Harris 2003) illustrated how particular individual member and whole group behaviours interacted and reduced the effectiveness of group dynamics and the PBL process. This used a survey developed from other publications (including the Houlden *et al.* 2001 paper), to

interpersonal and process behaviours that were suggested to contribute to the smooth functioning of the group. The interpersonal dimension included the emotional climate (e.g. cooperative, non-judgemental) and the level of cohesion (e.g. group solidarity and norms). The process dimension of group dynamics included: interaction (e.g. even participation and power), productivity (e.g. clear goals and decision-making) and leadership (e.g. style and effect) (Tipping, Freeman & Rachlis 1995, p.1051).

gather the perspectives of staff and students about the types of problems that occurred in groups and their effect on learning. Students considered that learning was most compromised by dominant students, a “sloppy” systematic group approach, or members doing superficial study. The most significant problem, from the students’ perspective, was the presence of dominant students, which was common *and* detrimental. In contrast, quiet students were also regarded as very common by both tutors and students, but neither group saw them as a threat to learning (Hendry, Ryan & Harris 2003), which was a similar finding to that of de Grave, Dolmans and Wolfhagen (2002) in their critical incident study (refer Section 3.3.2.2).

Although good group process was considered important for collaborative learning in PBL, papers had reported on students’ poor awareness of dynamics (Mpofu *et al.* 1998; Tipping, Freeman & Rachlis 1995) and the range of problems occurring (Hitchcock & Anderson 1997). Therefore, another study investigated the use of observation and a survey instrument to record group dynamics (Faidley *et al.* 2000). Results from the specially-designed “Learning team survey” (LTS p114) showed a marked variation between groups in students’ overall satisfaction with their group and also different levels of satisfaction within groups (Faidley *et al.* 2000), which demonstrated that group function could be perceived quite differently even by members of the same group. Observations of four groups were described in terms group interactional and learning styles, which varied from group to group and explained some of the variation in within-group satisfaction ratings. Groups were either tutor or student-led; interactions were equitable or uneven and processes could be collaborative or dominated by a minority (Faidley *et al.* 2000). In addition, some groups performed perfunctory and limited reflection on group function (Faidley *et al.* 2000), which echoed the theme of poor self-evaluation noted earlier by Tipping, Freeman and Rachlis (1995).

Collaborative learning theory has also informed investigations of the role of gender or ethnicity and culture in group function in Western educational contexts to reveal a complex picture. One study from a cross-cultural setting in the USA addressed Bruffee’s (cited in Duek 2000) notion of interdependence and the related concept of equitable participation, by asking what impact gender and ethnicity might have on equity (Duek 2000). Students’ levels of participation were not associated with gender or ethnicity (Duek 2000), although the participant numbers were too small to draw firm conclusions (23 male, 9 female, in all ethnic groups). Two other papers reported on Asian students’ experiences

of collaboration in a cross-cultural Australian setting (Remedios, Clarke & Hawthorne 2008a; Remedios, Clarke & Hawthorne 2008b). Asian students were “silent participants” (Remedios, Clarke & Hawthorne 2008a, p.7), which was attributed to differences between the students’ cultures and PBL group culture. However, another paper (Remedios, Clarke & Hawthorne 2008b) reported that silent participation was not restricted to International Students and was a complex interaction of student and group factors in each case.

In the previous cross-cultural studies, interviews with students about their group participation yielded valuable information about the student’s perspective. The equity study observed that groups contained members who regularly dominated discussion, over-talked others, engaged in side conversations, or withdrew completely from discussion (Duek 2000). Yet, student interviews revealed widely differing perceptions among group members about the quality of their group’s functioning and some students interpreted their dysfunctional behaviour in ways that validated it (Duek 2000). Duek (2000) concluded that “despite the best intentions of the course designers, the ideals of PBL - student-centeredness, self-directed learning, situated learning and problem-solving - were not being fully realized” (p99). Interviews with Asian and local students found that each group had differing perceptions about collaboration and the relative value of speaking and listening, which had the potential to disrupt collaborative practice (Remedios, Clarke & Hawthorne 2008a). Collaboration was seen to be far more complex than previous conceptions of co-constructive speech and the authors argued that attention be paid to multiple ways of being in PBL groups, including silent participation (Remedios, Clarke & Hawthorne 2008a)⁶.

Investigations of group dynamics have revealed that similar group problems involving interpersonal dynamics and group processes may have been common across institutions and involved a wide range of social, cultural and contextual factors. The contribution of this body of work to understanding groups was to illustrate that although

⁶ My main interest related to these studies is ethnicity in cross-cultural Western settings, since that is relevant to my study. However, there is also a body of literature about problem-based learning in other cultural contexts, principally relating to Asian and Arabic students/institutions. In a review of publications about how PBL has been implemented in Asian medical schools, Khoo (2003) surveyed publications from the Asian region bounded by India in the west and Korea in the east. He suggested that although some Asian cultural characteristics may appear to be incompatible with PBL, other cultural factors are compatible; incompatible and compatible factors relevant to group work that he identified were: a tendency not to participate in group discussions but an orientation toward collaboration. He cited a number of studies showing that Asian students could adapt successfully to PBL and concluded that despite the cultural differences, Asian students had similar successes and difficulties with PBL as had been reported with Western students (Khoo 2003). In relation to groups, these difficulties included problems with involving students in participation, students only speaking to meet assessment requirements and second language problems if students had to discuss in English (Khoo 2003).

ideal group dynamics could be specified, in reality this did not develop spontaneously and institutions needed to address group dynamics as part of their staff and student development activities in PBL. They also illustrated that PBL is essentially a complex interpersonal, social and cultural activity that cannot be fully explained by constructivist or collaborative learning theory.

3.3.4 PBL as a constructivist learning environment: *Summary*

Research into learning and group processes from constructivist and collaborative perspectives has demonstrated what is possible in a theoretically ideal group. It has described active student involvement in learning discussions, effective and responsive facilitation, the collaborative PBL process and effective group dynamics and processes. However, it has also suggested that just putting students into PBL groups and having them go through the PBL process did not necessarily result in functional groups and good learning processes or outcomes. Groups have been observed to deviate from the theoretically ideal form of discussion, to alter the PBL process and to have problems with group dynamics. The research implication of the reported discrepancies between actual and ideal dynamics and of students' divergent interpretations of group function is that we need to obtain in-depth accounts from students of what occurs in PBL groups and why. In-depth studies of PBL from the student perspective can contribute to understanding of the interpreted curriculum and how it might compare to theoretical ideals and help explain the apparent inconsistent research findings in the field of PBL research.

3.4 PBL as interpreted curriculum: *How do students implement PBL?*

My discussion to this point has charted some of the major directions and findings in PBL research. I have shown that although the PBL group has a rich potential, it may not be fully realised in practice and that PBL in action can be different to theoretical or ideal conceptions of PBL. Some studies have suggested that the interpreted PBL curriculum is in fact quite different from a conceptual ideal of PBL⁷. For example, a recent publication from

⁷ As I noted in Chapter 1, I have adopted 'interpreted curriculum' from Vermetten, Vermunt and Lodewijks (2002). An investigation of university-wide curriculum reforms at Tilburg University in the Netherlands showed that students used various learning materials in quite different ways, which often were at odds with how course planners had anticipated the materials may have been used (Vermetten, Vermunt & Lodewijks 2002). The initial study evaluated the impact of university-wide curriculum change to a student-centred model to encourage deep learning processes; this study found the innovations had minimal effect on how students approached their learning (Vermetten, Vermunt & Lodewijks 2002). The second study aimed to find out how students had used the teaching and learning materials and activities. The findings led the researchers to draw a distinction between the "objective" learning environment (as designed/intended) and the subjective or "interpreted" learning environment (as experienced by the students), which was mediated by students' perceptions of and responses to the learning environment (Vermetten, Vermunt & Lodewijks 2002, p.274). Vermetten and colleagues (2002) concluded that regardless of curriculum intent, there was no "direct

Maastricht, the origin of many insights into the theoretical basis and potential of PBL, documented how PBL has changed in the 30 years since its inception at that institution (Moust, van Berkel & Schmidt 2005). The paper described how students were observed to implement PBL differently to the theoretical conception that underpinned the curriculum and the authors noted that PBL “practice differs from theory” (Moust, van Berkel & Schmidt 2005, p.669). The adaptations made by students at Maastricht were considered part of the “erosion” of PBL. After presenting a cognitive rationale for PBL in the form of a model (Moust, van Berkel & Schmidt 2005, p.668), the authors detailed the changes that had occurred in different Schools, which they suggested were incompatible with the theoretical model. They argued that students neglected opportunities for using prior knowledge and for elaborating, which was a “*sine qua non* for structuring their knowledge” (Moust, van Berkel & Schmidt 2005, p.670). Students were observed to “deviate” from ideal behaviours by reducing the time and complexity of the PBL process (Moust, van Berkel & Schmidt 2005, p.669). Moust and colleagues (2005, p.670) described these adaptations as “skipping” steps and being in a “rush to accomplish their findings”, which resulted in a “watered down process”. These observations resemble findings discussed previously: the absence of theoretically important learning interactions in several studies of group discussion (refer Section 3.3.2), the “short-cuts” taken by student-led groups (Steele, Medder & Turner 2000 - refer Section 3.3.1) and the process problems raised by studies of group dynamics (refer Section 3.3.3). This and other research documenting alternative student practices raises the question of what beliefs and understandings underlie students’ practices in PBL.

Students’ conceptions of PBL have been researched using Students Approaches to Learning (SAL) theory⁸. The core idea behind this group of theories is that learning processes and outcomes are shaped more by how the student perceives the learning context and what the students does in response, than by what the teacher does (Biggs 2003; Prosser & Trigwell 1998). Research in this tradition has sought to elicit students’ understandings of their learning context to explain how they interpret and respond to it.

influence” of instructional measures on how students learned, but rather students adapted the learning context to suit their own preferences for learning (p282).

⁸ The SAL theory and its attendant methodology of phenomenography are based on work by Marton and Säljö who devised the concepts of deep and surface learning (cited in Entwistle 1991, pp.201-202). Various models or instruments to account for or measure deep and surface learning have been proposed by Biggs (2003), Entwistle and Ramsden (1983), Prosser and Trigwell (1998) and Vermunt (e.g. Vermunt & Verloop 1999).

SAL studies of PBL have shown that students' conceptions of PBL were not always congruent with theoretical or curricular conceptions of PBL. For example, in three Australian studies, the responses of very few undergraduate nursing or pharmacy students matched the intended nature and purpose of PBL in their respective programs, while the majority of the conceptions of PBL varied from and some were quite limited in comparison to what the curriculum planners had intended or understood PBL to be (Duke *et al.* 1995, Duke *et al.* 1998, Ellis *et al.* 2008). Most first-year nursing students perceived PBL as either a process of problem-solving or about process and clinical context; only a small minority described PBL in terms of professional development and lifelong learning (Duke *et al.* 1995). In a cross-sectional study of second- and third-year nursing students, the authors concluded that "students do not have well developed conceptions of PBL, with about 80% of the second year students and 73% of third year students holding relatively low level conceptions" (Duke *et al.* 1998, p.68). Only one third of fourth-year pharmacy students demonstrated a "cohesive" or professionally-oriented conception of PBL, while the other two thirds held "fragmented" or limited conceptions (Ellis *et al.* 2008).

These reported discrepancies between students' conceptions and theoretical/curriculum conceptions of PBL signal the need to use other approaches to further document how students conceive of and implement PBL and the meanings they attribute to PBL. Although SAL studies can usefully demonstrate conceptual differences as categories of qualitatively different conceptions, their unit of analysis is categories of difference and so SAL studies do not address individual conceptions or shared conceptions among a whole group (Booth 1997; Trigwell 1997). Complex phenomena like PBL also require in-depth investigation, using interpretive or ethnographic approaches that involve close observation and interaction with students to understand their point of view (Leung 2002). This is the most appropriate means by which students' understandings of PBL can be explained.

However, to date there have been few interpretive or ethnographic studies of PBL and none has explored the group as a group. The majority of PBL ethnographies have documented the individual learner's experience of PBL (e.g. Lähtenmäki 2001; Savin-Baden 2000; Silén 2001). Such work has reported on the intensely personal experiences that students have engaging with PBL, especially as novices. Students have been described as (i) undergoing transformations that involve their sense of self and invoke intense thoughts and feelings (Savin-Baden 2000); (ii) alternating between extremes of feeling

empowered or feeling bewildered during the adjustment to self-directed learning (Silén 2001); and (iii) experiencing changing intellectual and emotional responses to PBL in the first year that were influenced by personal, group and contextual factors (Lähteenmäki 2001).

One ethnographic study, which clearly documented the interpreted curriculum, explored how medical students undertook self-directed learning (SDL) in PBL (Lloyd-Jones & Hak 2004). In this study, SDL was shaped more by social negotiation and contextual factors than by the PBL process. The authors noted that student learning in PBL was ideally driven by student-derived learning issues that arose during problem analysis in response to a desire to know (i.e. to resolve cognitive conflict); however, the medical students' learning was driven by a quest to identify a syllabus and determine what would be examined (Lloyd-Jones & Hak 2004). To resolve this quest, students were observed to "hunt the curriculum" for clues, which included using the resource guide as a *de facto* curriculum, networking to monitor learning goals across the cohort and seeking advice from senior students about what to learn (Lloyd-Jones & Hak 2004, pp.65-66). Lloyd-Jones and Hak (2004, p.72) concluded that the ideal of PBL was not realised: "unconsidered features of implementation may interfere with, and contradict, PBL process".

The results from these in-depth, ethnographic studies have illustrated how the individual student experience can be used to draw broad conclusions about what happens in PBL from the student perspective, which can in turn explain why students do or don't engage in certain activities. Taken together with the preceding discussion of the knowledge that research has generated about PBL groups, these results point to the need for ethnographic research to address PBL groups. It is essential to broaden the focus on the group from the tutor or learning or dynamics to exploring how the PBL group is interpreted and responded to in terms of how students construct their groups as part of the interpreted curriculum. Such data would enable the nature of PBL groups to be explained in relation to their purpose and value for students, and not just their theoretical purpose and value.

3.5 Research in PBL: *Summary and Conclusion*

Chapters 2 and 3 have charted some major episodes in the historical, theoretical and empirical development of PBL and the small group. These chapters have described how PBL implementers and theorists have characterised, explained and researched PBL groups.

From this discussion, it is possible to describe a contemporary, theoretical, ideal group comprised of key features specified by implementers and theorists. This description would address learning and group dynamics.

The theoretical ideal group would engage in active group discussion that supported individual or shared knowledge development. The constructive nature of the interactions would be important, especially occasions for cognitive conflict. The group would adhere carefully to the systematic PBL process, which Barrows (1988, pp.65-67) called the “architecture” of hypothetic-deductive teaching-learning sequence and which Maastricht developed as the 7-Jump process (Schmidt 1983). Through this process, students would collectively critique their current understanding of a problem, undertake appropriate research, and acquire knowledge, skills and behaviours appropriate for their future profession.

This ideal group would also be a collaborative learning group. It would have a supportive and non-judgemental “emotional climate” (Tipping, Freeman & Rachlis 1995, p.1051), which Barrows and Tamblyn (1980) described as the ideal “learning atmosphere”. A sense of team spirit or cohesion would infuse the group (Dolmans & Schmidt 2006; Tipping, Freeman & Rachlis 1995) and so each member would feel responsible for the group’s success and all members would actively participate in group tasks (Barrows & Tamblyn 1980, p.73, Tipping, Freeman & Rachlis 1995). Group membership would also have a motivating effect on individual students, so that they would exert maximum effort for the group to gain their individual goals (Dolmans & Schmidt 2006). An effective group would require cooperation rather than competition (Barrows & Tamblyn 1980; Tipping, Freeman & Rachlis 1995) and equal and active participation (Barrows 1988; Tipping, Freeman & Rachlis 1995). To maintain this optimal functioning, the conceptual ideal group would include regular self-evaluation and timely conflict management, initially modelled by the tutor but subsequently as the responsibility of the students (Barrows 1988).

However, as my discussion in Chapter 3 has clearly demonstrated, the research program in PBL has provided consistent evidence that PBL groups in action may differ from this ideal. While many investigations have illustrated the potential of the group through its interactions and processes, they have also yielded unexpected and anomalous findings about learning processes and group dynamics, which are documented throughout Chapter 3. These ‘non-standard’ results were echoed in a recent summary of the “erosion”

of PBL from one of the principal innovators and researchers of PBL (Moust, van Berkel & Schmidt 2005). These results suggest that current research-based knowledge of PBL groups is inadequate, especially when the concept of the interpreted curriculum is considered. To have a better understanding of PBL groups as interpreted curriculum, it is necessary to have in-depth, ethnographic data from which explanations may be constructed. This is the focus of this thesis, which seeks to understand the nature of PBL groups from the student perspective (research question 1) and explain the purpose and value of PBL groups for *students* (research question 2). Chapter 4, which follows, provides a detailed explanation of the methodology and decision-making that shaped this investigation and thesis.

Chapter 4. Methodology

Chapter 4 consists of Parts 1 and 2, which respectively address the research methodology and contexts. Part 1 describes and explains the methodology and methods and illustrates how fieldwork, analysis, writing and reflection were integral to the construction of this thesis. Part 2 describes the research context, outlining the curriculum structure and the main features of how PBL was implemented in each School and indicating how implementation varied between the Schools.

Part 1: Planning and doing research

4.1 Introduction

This part of the chapter is based on the idea of symmetry between the theme of this thesis and the pattern of the research. Just as I show in this thesis that PBL in action was not the same as a theoretically ideal form of PBL, so my research in action was not the same as my planned ‘ideal’ research. In my account of the methodology of this project I aim to show how what I did compared to what I had planned, hence the title, *Planning and doing research*. Through this narrative, the chapter documents key moments in this development.

Part 1 also addresses the nature of qualitative research and the critical issues of research quality and researcher subjectivity or reflexivity. It aims to provide an audit trail of the research process that allows the reader to judge the quality of the account I present and to show how my involvement as researcher shaped the research process and results. I introduce these twin concerns in Section 4.2 and then thread them through the narrative. Section 4.3 shows how my history and interests shaped the research questions. Section 4.4 and Section 4.5 explain first how I planned the project on the basis of my understanding of the literature about research and secondly how I undertook it and the challenges and changes that occurred along the way.

4.2 Quality and reflexivity

This section locates the quality framework for this thesis within the debate among qualitative researchers in the social sciences over the issue of quality and its assessment. The issues have been debated on epistemological grounds about truth and knowledge claims. The main issues have been (i) to identify appropriate criteria to replace the scientific canons of validity, reliability and objectivity (grounded in a positivist-objectivist research paradigm) and more recently (ii) to debate the appropriateness of using criteria for

evaluating qualitative research (from a constructivist and/or relativist paradigm) (Grbich 1999; Guba & Lincoln 1994; Guba & Lincoln 2005; Lincoln & Guba 2000; Mays & Pope 2005; Smith & Deemer 2000; Smith & Hodkinson 2005). Initially, the issue of criteria was addressed by using corresponding qualitative criteria to demonstrate trustworthy methods, such as plausibility and credibility and the use of triangulation (Denzin & Lincoln 1994; Grbich 1999; Mays & Pope 2005). Then, researchers such as Schwandt (1996) and Smith & Hodkinson (2000) suggested that this approach was inappropriate, since it implied there were underlying (or 'foundational') referents against which plausibility and credibility could be judged, i.e. it implied the existence of an independent reality for comparison. These researchers adopted a practical, moral and values-based approach to social inquiry, based on its social goals and consequences (Schwandt 1996; Smith & Hodkinson 2005). However, others argued that in addition to usefulness of results, trustworthiness or some form of methodological rigour or even validity, was still a requirement of the research *process* (Freebody 2003; Grbich 1999; Mays & Pope 2000). A recent paper on this issue argued that the matter of method needs to be reconsidered to ensure quality (they used the term validity) *during* rather than *after* research, to make the researcher responsible for *quality* and not just the reader responsible for *evaluating* (Morse *et al.* 2002). They suggested using "...activities such as ensuring methodological coherence, sampling sufficiency, developing a dynamic relationship between sampling, data collection and analysis, thinking theoretically and theory development" (Morse *et al.* 2002, p.18).

In this thesis, I adopt a quality and evaluation (i.e. method and goal based) approach to rigour and usefulness. With this in mind, the thesis has two main goals: (i) it has a practical and moral goal as a research apprenticeship for me as a PhD student and (ii) it has a practical and moral goal as education research for the wider education community.

To address these goals, I drew on ideas from Liamputtong and Ezzy (2005), Morse *et al.* (2002) and Smith and Deemer (2000). I suggest that the internal coherence of this thesis can be judged for its logic and design without requiring foundational criteria. Morse *et al.* (2002, p.18) described this as "thinking theoretically", "methodological coherence", "appropriate" sampling and "collecting and analysing data concurrently". Liamputtong and Ezzy (2005, p.38) suggested that "theoretical and conceptual rigour" is demonstrated if "the research strategy is consistent with the research goals" and it has "soundly constructed arguments and analysis"; and that "methodological or procedural rigour" are provided by "an audit trail of methodological and analytical decisions [that] allows others to assess the

significance of the research” (Liamputtong & Ezzy 2005, p.39, italics added). Although an audit trail is a “post-hoc” quality measure (Morse *et al.* 2002 p16), in this thesis it shows the iterative and dynamic nature of my research, which is evidence of quality *during* research (Morse *et al.* 2002 p18).

A consideration of quality also needs to address reflexivity. The so-called reflexive turn in qualitative research has been documented as progressing beyond consideration of how the researcher’s interests shaped the research questions and methods to becoming a complex reflection on research as an intersubjective and ethical process (Denzin & Lincoln 1994, 2000, 2005). The early conception of reflexivity focused on “the researcher as instrument” (Liamputtong & Ezzy 2005, p.43; Mays & Pope 2000). A contemporary reflexive researcher goes beyond this view to see self and those being researched as involved in co-constructing interpretations of social phenomena and attends to issues such as representation of and the voice given to, self and others in any research text (Denzin & Lincoln 1994; Denzin & Lincoln 2000; Denzin & Lincoln 2005).

Concerning the content or meaning of the thesis, I have not used the idea of interpretive rigour proposed by Liamputtong and Ezzy (2005), since their conception separated interpretation and data, suggesting that data are representative of some external reality, meaning that interpretation can be interrogated for its accuracy or validity. As an alternative, Morse *et al.* (2002, p.18) suggested “theory development”, to mean working between a “micro perspective of the data and a macro conceptual/theoretical understanding”, which I address in this chapter.

The results and conclusions of the thesis can also be judged on moral grounds for speaking ethically about and for students and on practical grounds for their contribution to understanding of PBL groups (Smith & Deemer 2000). The ethical dimension of rigour discussed by Liamputtong and Ezzy (2005) is relevant in this respect. Ethics were considered as both “procedural ethics”, meaning the methodological processes requiring approval of ethics committees, as well as the wider political and moral implications of research (Liamputtong & Ezzy 2005, pp.41-42), which other contemporary commentators have also emphasised (Grbich 1999; Mays & Pope 2000; Schwandt 1996). Schwandt (1994, p.130), in this vein, suggests that research can be “judged on the pragmatic grounds of whether [it] is useful, fitting, generative of further enquiry”.

Framed by this discussion of quality and reflexivity, this chapter details the theoretical and conceptual logic and the methodological decision-making with which I produced the thesis. In it I describe ethical issues and provide an account of reflexivity as self-awareness and intersubjectivity and explain how I addressed issues of representation and voice associated with speaking about students' lived experiences.

4.3 Genesis of a research question

The decision to undertake a PhD was made when I identified an issue that I wanted to investigate. This occurred while I was a research officer at the Adelaide School of Dentistry. Our research program on PBL was informed by a Students' Approaches to Learning (SAL) perspective on student learning (Biggs 2003; Prosser & Trigwell 1998 - refer Section 3.4). The SAL approach directed our interest toward the relationship between how individual students perceived and interpreted their learning environment, in this case PBL and what they actually did to learn. Given the importance of the small group in PBL, I decided to investigate students' perceptions of the group as a learning context.

From the SAL perspective, I wanted to explain how individual students perceived and used the group as a learning context in PBL. Using this theoretical orientation, my research question and working title were initially framed as '*What are students' experiences of group-work in PBL?*'. In my research proposal, I wrote:

I aim to investigate how dental students frame their experiences of group work and whether and how they might understand group-work in relation to the PBL process and to learning in PBL. I seek to answer the following questions:

- What do students do, think and feel during PBL group-work?
- What do groups do during PBL group-work?
- How do students understand and explain PBL group-work?

However, early in the investigation my research focus began changing from the individual student to the whole group and from a narrow interest in group-work to a wider focus on the nature of the group itself. I became interested in what a PBL group meant to students and how they constructed it. My orienting question and working title became '*How do students construct PBL groups?*'. The research questions that this thesis addresses are:

1. What is the nature of a PBL group for students?
2. What is the purpose and value of a PBL group for students?

As I explain in the following Section 4.4, both sets of research questions were congruent with my methodological approach; there was no need to change the research plan or methods to accommodate the new questions. Furthermore, the original research questions remained relevant to my research, as they contributed to how I gathered and analysed the data. Individual students' stories about what they did, thought and felt in groups, and their explanations of what groups did, were the material from which I developed my interpretation of how students constructed PBL groups. The following sections of this chapter explain the key moments at which my research focus changed and how I developed new research questions that addressed the meaning of the PBL group for students.

4.4 Planning research

4.4.1 Methodology and methods

This thesis is organised around my learning about PBL groups through engaging with students. My broad goal was to explain the meanings that students attached to the PBL group; the research questions were initially directed toward explaining students' experiences of a PBL group as a learning context, but then were directed toward explaining how students constructed PBL groups. A research purpose and questions such as these indicate an in-depth approach using qualitative methods. While there is no single definition, disciplinary affiliation, or method of qualitative enquiry, it can be characterised as an evolving and iterative form of research, oriented toward learning about the social world through means that attend to lived experiences and understandings (Preissle 2006; Denzin & Lincoln 2005; Liamputtong & Ezzy 2005).

Although conventional wisdom says that the choice of methodology is driven by the research question (e.g. Neuman 1997; Pope & Mays 1995), a more pragmatic (and, I suggest, reflexive) view arranges the research question and choices about methods in a mutually informing relationship (Bryman 2007). Bryman (2007) undertook a qualitative enquiry into how research questions were used and concluded that, while textbooks "provide a normative view of the research process" (p.17), other factors operated in social research in practice. One of these factors was "methodological identities" (Gorard *et al*, cited in Bryman 2007, p.15), which refers to the way in which a researcher's affiliation with a particular methodology or paradigm shapes how a research question is framed. The research questions in this thesis were shaped by my affiliation with qualitative, meaning-oriented research and my social constructionist theoretical perspective:

The social constructionist approach is predicated on the assumption that “the terms by which the world is understood are social artefacts, products of historically situated interchanges among people” (Gergen 1985, p.267). [...] the focus here is not on the meaning-making activity of the individual mind but on the collective generation of meaning as shaped by conventions of language and other social processes (Schwandt 1994, p.127).

Social constructionism is a theoretical perspective that shapes how one goes about not just social inquiry but all forms of inquiry (Crotty 1998)¹. A social constructionist researcher asks how people in a given location have constructed their world and what the consequences of that are for the people involved (Patton 2002). Since my focus was these socially negotiated meanings, my chosen approach was ethnography. Ethnography has both an anthropological and sociological history with different applications in each field, however the common aspect is that it involves a close, ongoing association between the researcher and the researched, usually through the researcher living and participating in the daily life of the research site (Liamputtong & Ezzy 2005; Tedlock 2000). I did not undertake ethnography in this sense of being “immersed in the culture under study” (Patton 2002, p.81), as I did not live with and participate in the life of a dental student. In this thesis, I work from the following understanding: “Ethnography involves an ongoing attempt to place specific encounters, events and understandings into a fuller, more meaningful context” (Tedlock 2000). An ethnographic approach was my means of situating my interpretation of the daily practices and understandings of students in PBL groups into the wider explanatory framework of this thesis.

An ethnographic approach includes both fieldwork in a naturalistic setting and writing an account of the enterprise; fieldwork involves observation and informal interviewing in natural settings “to learn from the people” about their daily lives and

¹Social constructionism is a theory that can be grouped with other constructivist theoretical paradigms on social research, such as symbolic interactionism and hermeneutics (Schwandt 1994). It is a “constructivist” research paradigm by virtue of having a non-objectivist epistemology, a relativist ontology and interpretive methods (Guba & Lincoln 1994); this epistemological position is variously referred to as “constructivism” (Schwandt 1994) or “constructionism” (Crotty 1998). Social constructionism as a theoretical perspective is distinct from the constructivist learning theories discussed in Chapters 2 and 3, which are theories of knowledge development (or learning) that oppose the notion of learning by transmission (refer Chapter 2). The distinction is that a social constructionist believes that the reality humans inhabit does not exist independently but is created through language and practices, whereas constructivist learning theories do not address the nature of this reality. Schwandt (1994), for example, has noted that a constructivist understanding of knowledge does not presuppose any given ontological position:

In a fairly unremarkable sense, we are all constructivists if we believe that the mind is active in the construction of knowledge. Most of us would agree that knowing is not passive – a simple imprinting of sense data on the mind – but active. [...] Further, one need not be an antirealist to be a constructivist. One can reasonably hold that concepts and ideas are invented (rather than discovered) yet maintain that these inventions correspond to something in the real world (Schwandt 1994, pp.125-126).

understandings (Liamputtong & Ezzy 2005, p.165). The accepted understanding of observation has shifted from participant observation, which suggested the researcher focused the gaze on the researched, to observing participation (Tedlock 2000). This shift is associated with the reflexive turn in qualitative inquiry, as it entails the researcher observing both the researched and self as they participate (Tedlock 2000). The rest of Part 1 illustrates how I carried out this ethnography. In Section 4.5.2 I document my observation and my participation and in Section 4.5.3 I describe the process of interviewing from a reflexive viewpoint. How these processes influenced the research in Dublin is addressed in Section 4.5.5. My construction of the meaning students attached to PBL groups is addressed in Sections 4.5.4 and 4.5.6. Although the processes of analysis and writing were in fact iterative and intertwined and began contemporaneously with observation and interviewing, in this chapter they are separated for the purposes of structuring my discussion.

4.4.2 Research plan

The project was an in-depth study of first-year dental students' experiences of PBL groups in two different dental schools using PBL. One site would be my home institution of Adelaide and I would need to locate and approach members of another site for permission to do research. The factors used to select another site were that it be a Western, English-speaking, undergraduate-entry dental school that used PBL. From a short-list of several schools with undergraduate programs, Dublin Dental School and Hospital was approached because this school, like Adelaide, had a hybrid curriculum of PBL and lecture-tutorial classes in which only dental students participated (refer Chapter 4, Part 2), and because Adelaide and Dublin Schools have a previous history of research collaboration.

The cross-site element of the plan was to enhance the practical quality of the research, in the sense of practical and moral evaluation (Smith & Deemer 2000 - refer Section 4.2). While it was not reasonable to expect that the results from an ethnographic study would be generalisable (Patton 2002), it was reasonable to ask if similar lines of thought about key concepts might be applied to another research site. Detailed descriptions of two sites might allow others to "extrapolate" to other sites, (Cronbach and Associates, cited in Patton 2002, p.584), perhaps by suggesting directions for further localised, interpretive research (Schwandt 1994 - refer Section 4.2).

I planned to work with first-year students from the day they commenced the first year of their dental program (a five-year undergraduate degree at each School - refer Chapter 4, Part 2). The research plan at both sites included observing and recording PBL groups during several PBL cases and interviewing volunteer members of observation groups. Both plans included observation early and late in the first Semester/Term, which would spread the burden on students and give me a temporal perspective of groups.

Data collection in Adelaide was planned for a whole academic year. I would alternate face-to-face and video observation of four Adelaide groups over the 12 weeks of Semester 1 (refer Appendix 1), followed by student interviews in Semester 2. I also planned to be present at some group activities with Adelaide students when they undertook independent research between classes.

Data collection in Dublin was adapted to suit the shorter timeframe of my stay in Dublin (refer Appendix 2). It was scheduled for the first academic term (Michaelmas Term), which was ten weeks long. I planned to observe two Dublin groups but decided against videoing due to the limitation on the amount of equipment that I could take to Ireland. Instead, I planned simultaneous in-person observation and audio-recording of one group at a time (since audio without vision was not likely to be as useful). Interviews with first-year students were also planned.

4.4.3 Participants

The student participants were from the first-year cohorts in the Bachelor of Dental Surgery program at The University of Adelaide in 2004 and the Bachelor of Dental Science program at Trinity College (at The University of Dublin) in the following academic year 2005/06. First year students were selected because this was a crucial transition year for the majority of students. Most were experiencing PBL for the first time and many were school leavers and new to a higher education environment. A large number of students at each School were also living away from home in order to undertake their program of studies.

Staff participants at each School were to be PBL tutors who were facilitating the groups that I would be observing. In each School this was organised for me by the staff member responsible for coordinating the PBL program. Two experienced tutors from each School willingly agreed to have me join their groups.

4.4.4 Ethical considerations

Procedural ethical issues include the potential for research to “cause distress to participants” (Liamputtong & Ezzy 2005, p.42). This project’s procedural ethical implications concerned dental students participating in a Dental School project about attitudes and behaviours relating to aspects of their participation in the dental curriculum. The potential for beneficial knowledge to be generated had to be secondary to participants’ well-being (Kvale 1996). It was important to ensure and reassure students that their participation would have no impact (beneficial or negative) on their participation, assessment, or progress in the BDS. I needed to guard against any harm or perception of harm relating to their choice or refusal to take part (Oliver 2003). I also needed to protect all students from any real or imagined negative comments directed at them personally about their group membership by other study participants, or from the consequences of revealing potentially damaging information about themselves or others, during the study (Oliver 2003).

To address these issues, I first obtained ethical approval for the project from the Human Research Ethics Committee of The University of Adelaide (Project Approval number H-50-2003) and the Dublin School of Dental Science Dental Studies Committee (written approval via Dr Jacinta McLoughlin, Curriculum Coordinator and Chair of Dental Studies). All written and oral accounts of the project emphasised the voluntary and non-prejudicial nature of the project. I managed all recruitment activities and documents and kept the records confidential and securely stored (Oliver 2003). Students were aware that I was a PhD student and not involved in any aspect of teaching or assessing students².

The issue of protecting anonymity during observation was difficult. Obviously I could not covertly observe or video groups, which meant that the identities of the observed students were known to staff and other students. To provide some measure of protection in Adelaide, I planned to observe four groups and select three of these to provide the research data and from which to select interviewees. I would not use any data from the fourth group. I informed participants, non-participants and staff of this strategy from the outset, which meant that only I and the interview participants knew which groups would contribute to the research data. I was the only person to view the video recordings and all tapes were securely stored.

² In the previous year, my principal role at Adelaide was as a research officer. I had also been involved with some PBL facilitation during the week 1 induction unit with first-years and had also run several academic language and learning workshops with students, but neither of these involved any assessment.

At the start of the project the Adelaide students were asked to choose a pseudonym that I could use in all my field notes and analysis documents (Appendix 11). I did this for two reasons: to de-identify references to students so that I could discuss my notes with my supervisors (one was a member of staff of the Dental School) and to keep my data personal; this would also help me keep in mind that I was working with and talking about real people. The latter issue related to the ethics of representation and allowing for “multi-vocality” rather than the “abstraction” of impersonal designations like ‘Male 1’ or ‘Female 1’ (Altheide & Johnson 1994, p.489).

To help conceal interviewee identity, I conducted Adelaide interviews at a location convenient for students off the University campus. I booked a study room at the State Library of South Australia, which was a few minutes’ walk from the University and about ten minutes from the Dental School. The interview tapes were only identified by participants’ pseudonyms and were transcribed by a professional service whose staff did not know the students’ identities and were stored securely³. Only I and the transcribers listened to the recordings.

I also had a duty of care to my participants regarding the potential disclosure of sensitive information during the interviews (Oliver 2003). A preliminary course of action was planned in the event of disclosure of negative or damaging information (Patton 2002); this included preparing information packs with the contact details of University agencies for support and/or complaints, such as the University Counselling Service. However, no follow-up action was required. Sometimes during the conduct of the interviews I chose to not pursue certain directions for ethical reasons to safeguard interviewees’ well-being and self-perceptions (Kvale 1996). For example, some students spoke of personal conflicts in groups. In **Blue** group⁴ I had interviewed both students concerned (**Angela** and **Paula**) and both described conflict in detail, so I had two sides of the same story from which to construct an account. However, in **Red** group I interviewed two students, **Morgan** and **Julie** and only **Julie** referred to conflict with **Morgan**. I did not know, from the interview, if **Morgan** was aware of Julie’s resentful feelings toward him but I suspected that he was not. In this situation, I accepted that **Morgan’s** perspective on the relationship could not be obtained without risk of harm (both to **Morgan** and also by betraying **Julie’s** confidence).

³ The cost of transcribing data from each site was supported by two grants from the Australian Dental Research Foundation.

⁴ Throughout the thesis each group from Adelaide and Dublin is identified by a colour-code name: **Blue**, **Red** and **Yellow** in Adelaide and **Green** and **Purple** in Dublin and students’ names are printed in the colour of their PBL group to indicate group membership when student quotes or opinions are cited.

The ethical concerns in Dublin were similar with regard to safeguarding students' participation. As a visiting researcher, I was removed from the teaching and assessment of students, but I had to guarantee students of the confidentiality of my research insofar as no staff members having access to data. Anonymity was a greater concern in Dublin. The Dublin students were also asked to provide me with a substitute pseudonym so I did not have to use student names in my field and analytical notes. However, I was not able to use my Adelaide observation strategy, i.e. observe three groups and select two, and I had to conduct interviews in the Dental School because I did not have access to other rooms in Trinity College. It was not possible, with students' timetable and my schedule, to observe another group or do interviews off-campus. What I could do was reassure students that I would be the only person with access to research data (apart from transcribers in Australia) and that I would keep the identity of interviewees confidential. All students accepted this reassurance (some commented that they were not concerned about anonymity, but I emphasised my reassurance).

4.5 Putting plans into action

4.5.1 Recruiting participants

I took a "purposive" approach to selecting and recruiting participants, which means that in contrast to a random selection strategy, participants were chosen strategically as part of the research plan (Patton 2002, p.230). My strategy was to aim for "maximum variation" (Patton 2002, p.234): since I wanted to obtain the widest range of student experiences, I imposed no exclusion criteria - all students in each cohort at each School were invited to participate in the observation part of the study. To avoid offending any volunteers who may have been declined, I advised students that if I had more volunteers than required, I would randomly select volunteers to take part. At each School, I provided all students with an invitation to take part and an information sheet about my project (Appendices 3-6).

In Adelaide, the recruitment process went smoothly and as planned. I was responsible for recruiting and allocating participants to observation groups. Participants were recruited in Orientation week and so I was able to allocate the whole first-year cohort of seventy to groups (ten groups of seven) before classes started. From thirty six initial volunteers, twenty eight volunteers formed four groups of seven, and these students took

part in the initial participant observation phase of the Adelaide study⁵. Volunteers included School Leavers and entrants with previous university experience and local (i.e. Australian resident) and International Students (the demographic details of the interviewees are provided in Section 4.5.3, in Table 4.1).

When I arrived at the Dublin Dental School, I discovered that the initial first-year PBL session would be part of the orientation day two weeks later and that students (who would not arrive until then) had already been assigned to groups. As a result, I would need to recruit participants at the last minute. However, I was fortunate because the introductory PBL session on Monday was a whole-class session and the first small-group sessions were not until the following Wednesday, which gave me time to get organised. The Dublin staff helped me by scheduling my project introduction into the Monday orientation session. From a first-year cohort of forty, thirty students volunteered to take part, which I was very pleased about. Since the students had already been allocated to four PBL groups of ten students, I negotiated with Dublin staff to determine the least disruptive way to establish my participant-only groups: I selected the two groups with the highest participant numbers and swapped the non-participant members (one or two in each case) with participants of the same gender from the other two groups. This meant I had two groups of ten to observe, beginning two days later on the following Wednesday.

4.5.2 Observing in Adelaide

The Adelaide observation data are an important part of this thesis. Consistent with the notion of observing participation as a reflexive undertaking (Tedlock 2000, refer Section 4.4.1), observing in Adelaide was where and how I began to learn about doing ethnographic research; it developed my understanding of constructionist research; and it informed the understanding of PBL groups and group members that I brought to the Adelaide interviews, analysis and writing. The Adelaide observation shaped the planning, conduct and analysis of the student interviews and it underpinned the research in Dublin.

During the observation stage, the questions that I faced and sometimes wrestled with included: what sort of observer was I, where did I fit into the setting, what was I observing, how would I record that and how would I make sense of it all?

⁵ I aimed to have an even distribution of male/female and local/International students in each group, so I divided the class list into local male, International male, local female and International female and used a random number table to allocate students to groups. The volunteer names were grouped separately from non-volunteers, so that I could form volunteer-only member groups.

Before starting, I considered the issue of how I as outsider would relate to students as insiders. I wanted to avoid students feeling as though I was judging how well they did PBL, so I adapted Lofland's (1971, p.101) notion of "observer as acceptable incompetent". I presented myself as sharing with the students a novice member position in a PBL group. I explained that I had not done PBL as a student and was interested in what group-work was like for them. I also told them that I was not a dentist and had no content expertise and that I was not interested in how well they performed. Students accepted my presence and the camera: throughout my field notes I recorded their positive comments and reactions and their welcome helped me adjust to the new experience of being a researcher-observer.

I had planned to be a "passive" participant observer, or "spectator" only (Spradley 1980, p.59). This was from a naïve sense of not wanting to influence the data. For example, in the first session I remained aloof from students.

Observation notes Week 1, Mon 1-3-04
(Introductory session)

Students were beginning to arrive at about 9.15. Prof. asked them to wait outside. I decided that rather than go in and be 'one of the teachers' I would wait outside with the students. I felt a bit odd standing there alone, only said hello to a couple of students and then to my relief the door opened and we went in.

Part of my learning was that I could not abstract myself from the research process and be observer only, my presence was part of and contributed to the research setting (Patton 2002, pp.326-329; Tedlock 2000), particularly in the close setting of a PBL group. To position myself, I decided on a "peripheral" membership role (Adler & Adler 1994, pp.379-380), where I interacted with students but did not participate directly in the PBL or group process. In addition to social interaction with students, I spoke during sessions if I had a research question, such as asking students to clarify what they were doing if I was confused. Since students and I were in a new situation, we were effectively co-participants in making sense of the PBL group. As such, my presence is likely to have increased the extent to which students reflected on the group and their participation in it.

Deciding what to record and how during observation was a learning process that shaped the project. I spent the first sessions writing frantically, trying to record what everyone was saying and doing. Similarly, when writing up field notes from the video observations, I tried to transcribe each session and record every event. Again, I had a naïve view: if I captured everything verbatim, I would be recording what 'really' happened. This

approach was not consistent with social constructionism and it was exhausting, as my field notes illustrate:

Observation notes Week 2, 9-03-04: Blue

[...] Prof enters the room and asks what step they're on. **Angela**, at the board, says they're about to do step 3. They then move to Step 3 under the Professor's direction.

Note: After this I've written "I'm exhausted, I've lost the plot, can't do process, content and watch at the same time!" I had been so busy head-down writing, I wasn't really observing. This is where I decided to cut the note-taking down.⁶

After this, I focussed more on getting a feel for what I thought of as the big picture and only focused on particulars for short periods. I wrote less during sessions and opted to write recall notes immediately after each session. When observing the videos after each session, I wrote more descriptive accounts of what I was seeing and hearing. These field notes from my observations and the videos form the 'Observation notes' that I used for analysis.

At this point my observation focus began to change from individual students to the group as a unit of analysis and my field notes changed markedly. I understood how my recounts were also analysis and interpretation by the very act of deciding what I would write about and how (Tedlock 2000). My observation field notes (from sessions and videos) now included a narrative about what each group member was like and about the group overall, which was both description and my impressions (Appendix 12).

I began analysing the observation data while still observing (Miles & Huberman 1994, pp.50-51). Initially, I developed a set of starting codes, using guidelines suggested by Miles and Huberman (1994, pp.55-65). I devised a hierarchy of codes, identified by meaningful abbreviations, associated with PBL process (PBL PRCSS) and group process (GP PRCSS) and under each broad heading I created subordinate codes, for example, STEP (identify step/procedure) and VLNTR (volunteer e.g. scribe), respectively. However, I soon realised that instead of coding for students' experiences and what might be meaningful to them, I was trying to impose my pre-existing understanding of PBL onto the data. In addition, the coding scheme did not help me develop my interpretation, as the following journal extract illustrates.

⁶ When I typed up my "raw field notes" each day, I included "reflective remarks", which included preliminary analytical thoughts about what I thought was going on, or interesting issues or themes, as well as comments on the research process and my own thoughts and feelings as researcher (Miles & Huberman 1994, pp.66-68). This is consistent with the view of observing participation (Tedlock 2000).

PhD Journal 1-5-04

After coding just one set of notes I feel that I could produce masses of coded data that don't mean much. My problem seems to be that I am trying to be too cut and dried and work it all out to start with. I need to find a way to be more intuitive and work from the data rather than from a scheme. But just looking at the data keeps leaving me overwhelmed - I could go in so many directions!

However, I was making some analytical progress. As I typed up field notes from my in-person and video observation, I included analytical memos to record my early analytical thoughts and to guide observations (Miles & Huberman 1994). These memos illustrate my analytical focus on the group. I gave the memos titles like: "Talk", "Silence", "Groups within groups" and "Invisibility", for example:

Memo Invisibility 10-3-04

It seems as if it might be quite easy for someone to become invisible (or alternately, very visible). I realised one day when writing up field notes that I had overlooked a student who was very quiet and that I possibly 'over-notice' the more vocal students. Might facilitators and other students do the same?

Note: when typing up add invisible students into field notes, as in 'I didn't record what so and so was doing' and then code 'invisible' - might lead to some interesting findings. Also, try to watch what the quiet people are doing and then can have observations of people that might be invisible to PBL group members.

To ask students: how are the quiet people regarded?

A number of these ideas from the face-to-face and video observation of groups shaped the generation of the interview data, both consciously and unconsciously. This occurred in the form of planned and spontaneous follow-up questions and also student comments that I chose either to pursue or not follow up.

4.5.3 Interviewing

When selecting Adelaide groups from which to invite interviewees, I recorded the purposive selection process (refer Section 4.4.4), in detail in my journal and the developing focus on the whole group is clear, as the following excerpt shows.

PhD journal June 2004

[...] What was I looking for? I looked to see if each group could be described in a way that referred to some key quality and if the groups varied in any way that stood out. I drew on the themes that had begun to emerge from the observation. I looked at how the group appeared to function as an entity and how members of the group appeared to fit and function within the group.

Since I wanted a broad range of data, I selected what appeared to be the two most diverse groups: **Red** was the acknowledged 'good group' and I was not sure what sort of group **Blue** was.⁷

⁷ Implicit in students' judgements of their groups as good or bad and my use of the term dysfunctional, is the notion of an external ideal referent. In Chapter 10, section 10.6, I note the occasional tension between

PhD journal June 2004

(excerpt from group selection notes)

My impression of **Red** as an organised, work-oriented group was reinforced by comments from other students about Red being a “good group” and that they were really organised, that is, the other groups had identified these characteristics. In fact I think that the other students thought they were a model or ideal group. These comments were made when I was talking to students from other groups, e.g. **Anna** from **Blue** negatively compared **Blue** group process to **Red’s** organisation, ‘We’re a bad group, not like [so and so’s] group’ (indicating a member of **Red**).

PhD journal June 2004

(excerpt from group selection notes)

From observation I wasn’t able to get a sense of what **Blue** group ‘personality’ might be or even a sense of groupness or bonding about them, yet they have a system of working that they say suits them all. [...] They described themselves as not a good group when referring to what the ideal might be i.e. regular meetings, roles etc. [...] I think that they would be called ‘dysfunctional’ in the literature, however, if there was no open conflict, it would seem they’ve accepted their way of working as a form of functioning that suits everyone to some extent.

I then had to decide between **Yellow** and **Black**. Both groups were most marked by pair/sub-group domination.

PhD journal June 2004

(excerpt from group selection notes)

Deciding between **Yellow** and **Black** was more difficult as they both had features of interest and also had a lot in common. In the end I chose **Yellow** so that I could explore the obvious two-way split further, as well as the ways of being quiet in the group (eg the quiet international female and the apparently non-engaged local male). [...] The choice of **Yellow** was made at the expense of exploring the dominance of the two males in **Black** and their effect on the social and work interactions of that group and on how the fifth local (male) worked across the two sub-groups.

I had planned to purposively select four students from each group to invite for interviews (refer Section 4.4.3) on the basis of their potential to be “information rich” (Patton 2002, p.230) but I had difficulty because all students were of interest. After discussing this with my supervisors, I invited all members of **Blue**, **Red** and **Yellow**. Five students from each group volunteered, a mix of males and females and there was at least one International student from each group (refer Table 4.1). Some were School Leavers and others were either mature-age entry (with or without tertiary qualifications) or tertiary transfer (i.e. they had completed at least one year of another bachelor program and transferred to the BDS).

students’ internal standard of ideal and their use of an external standard to evaluate their groups’ effectiveness. From my own perspective, to understand meanings from students’ perspectives I have tried to suspend judgement and avoid use of these evaluative terms.

In comparison to observation, interviewing was more familiar ground for me, since, as a research officer on other projects I had interviewed students and conducted focus groups. I had practice in asking different styles of questions to suit particular needs, such as encouraging an interviewee to talk or seeking clarification or further information, or reflecting back my own understanding and I was comfortable using a recorder (Kvale 1996; Seidman 1991). The interview format was planned as an open-ended interview with a few broad questions; as interviews and preliminary analysis progressed, I developed an interview guide listing topics of interest to me (Kvale 1996; Seidman 1998). To enhance the interpersonal aspect of the interview, I chose to start with a “descriptive question” to help participants relax and begin talking (Taylor & Bogdan 1998, p.102). The research questions were:

Q1: Would you start by describing your group to me?

Q2: What were the good things about being in a group (or working in a group)?

Q3: What were the not-so-good things about being in a group (or working in a group)?

Table 4.1 Adelaide Interview participants

Participants	Total students	Local female	Local male	IS female	IS male
4 PBL Groups Observed	28	11	9	5	3
Interviewees, 5 from each group	15	7 Amy (S/L) Angela Cathy (S/L) Diane (S/L) Julie (S/L) Paula Rosanne (S/L)	4 Bruce (S/L) Morgan Peter (S/L) Sam (S/L)	3 Alice (S/L) Carol (S/L) Ruth (S/L)	1 Martin (S/L)

* All names are pseudonyms that I have selected to replace the pseudonyms that students provided during the analysis phase. As noted previously, students’ names are in colour to indicate their group membership.

** S/L denotes School Leaver on entry to Dental School, others are mature-entry or tertiary transfer

A key approach (drawing on my earlier questions about what groups did and what students did, thought and felt) was to ask students to describe a “concrete experience” and then to ask what they thought or felt about these things (Seidman 1991, pp.72-73).

From a social constructionist approach, an interviewer is not a neutral gatherer of information. Interview data “are not collected - they are co-authored by the interviewer” (Kvale 1996, pp.183-184). This happened through the choices I made as interviewer and

how I and the interviewees interacted. The interview as a co-authored conversation is illustrated by the following excerpt from an interview with **Rosanne**. I had asked her to describe her group and the major topic was **Morgan** and his behaviour (“domination”) and its impact on the other group members.

Rosanne: [...] So that’s one thing with different people [pause] I’m just talking about him. That’s not good [laughs].

Vicki: You remember him.

Rosanne: Yes. That’s the thing because he’s the one person who stood out the most.

Vicki: Okay, so in terms of the group as a whole – [pause - I was thinking what to ask]

Rosanne: Did we work effectively?

Vicki: [Caught by surprise] Well, yeah, you can tell me about that if you like.

Rosanne: Oh, well, you can ask your question? [laughs]

Vicki: No, if that’s where you want to go, then go [laughs].

Rosanne: I didn’t know what the question was [laughs].

There were competing agendas of what was salient to **Rosanne** (**Morgan’s** domination) and to me (the whole group). I was faced with the tension between letting **Rosanne** talk about what concerned her and also addressing other issues in the time available. There were also multiple and simultaneous interpretations of what was going on. While I was trying to construct an interview about the group, **Rosanne** was trying to interpret what I might want and respond accordingly and evaluating her responses as she made them. Together we co-authored an interview about Red group that addressed a number of aspects but with a large section about **Morgan**.

A challenge occurred when I had recorder problems in the first two interviews, which meant that transcription was not possible. Fortunately, I also had hand-written notes, so I typed these up and sent a copy, with an apology and some follow-up and clarifying questions, to the interviewees concerned, **Morgan** and **Carol**. I was able to re-interview **Morgan**, and **Carol** kindly added detailed typed responses to the Word document I had sent her, so I include written rather than oral quotes to represent **Carol** in this thesis.

As I explained in Section 4.5.2, my developing focus on the group in the form of my observation experiences, themes and memos informed the interviews and analysis. This means that individual student’s narratives are untold stories in this thesis. So, although all students may have talked to me about a particular topic, the context for each student was unique. For example, in Chapter 5, I explain the role of social relationships in group dynamics and how groups worked together. All interviewees spoke of valuing positive social relationships in their group, but with varying emphasis. For **Amy**, the social aspect

of the group (“it’s like a home group”) was a major part of her personal narrative about making the social adjustment from attending a small secondary school to university. Yet for **Peter**, in the same group, the positive social dimension of the group was a bonus (“it was good fun”) within a narrative that was about his learning adjustment to university learning and PBL. In this thesis, I have focussed on shared aspects of experience and meaning, but, apart from these individual differences that are not included, I have indicated where a student either did not talk of an issue or expressed a different viewpoint to the rest.

4.5.4 Analysis

As I noted previously, data analysis is discussed separately, although in practice it was an integral part of data generation and interpretation throughout the observation and interviewing. The memos that I wrote during observation provided avenues for further observation and analysis (refer Section 4.5.1). I also undertook preliminary analysis of interviews during the interview stage of the research. After each interview I listened to the recording and made notes that included analytical and reflective impressions (Miles & Huberman 1994, pp.66-68). This informed the conduct of subsequent interviews, in the form of follow-up questions to explore commonalities and differences between students’ stories.

Since my structured approach to coding the observation data had not been fruitful, I developed a new, inductive approach drawing on elements of grounded theory (Glaser & Strauss 1967).⁸ Once several transcripts were available, I began the process of coding.⁹ I based my coding on students’ words, looking for recurring words or themes - thus ‘grounding’ the codes in the data - and constructed patterns among the data that I could link to my explanatory concepts.¹⁰ I continually re-read transcripts and compared new codes as new data became available and I kept a running log of my codes to check that I was using each consistently (Darlington & Scott 2002). My goal was to construct

⁸ Grounded theory was devised as a way of generating social theory that was localised (i.e. grounded), as opposed to generalisable, normative theories in the manner of the physical sciences. It was originally situated in a positivist and then post-positivist framework, i.e. it sought to explain a social reality that was assumed to have an independent existence; however it has also been developed to be used from a constructivist perspective (Charmaz 2000).

⁹ Before I started coding, for ethical reasons, I sent each student a copy of their interview transcript, (they were also offered a copy to keep) and asked if they would review and approve it for my use, inviting them to add, delete or change anything. All students approved the use of their transcripts and a few added some extra comments.

¹⁰ Grounded theory is a formal methodological approach to analysis, which specifies a particular ongoing iteration between data collection and analysis (Glaser & Strauss 1967), which I did not adopt in full, drawing only on the idea of building patterns among grounded codes and linking them with explanatory concepts. The approach I took was to use “grounded theory methods as flexible heuristic strategies rather than as formulaic procedures” (Charmaz 2000, p.510).

“*plausible relationships among concepts and sets of concepts*” (Strauss & Corbin 1994, p.278 italics in original).

However, I became overwhelmed by the mass of data and codes and also by the diversity of stories students had told me. On the advice of my supervisors, I reapproached the data and analysed it in thematic sections. This allowed me to meaningfully interpret multiple interviews. I drew on themes from my observation results and the preliminary themes that I had identified in each interview summary. For example, a major topic was how students talked about their group (which is logical given the research topic and my opening question), for which I labelled student themes such as *my group*, *people in my group* and *feelings about my group*. Under each theme I derived a grounded code based on students’ words and then I searched each document for related instances of that code. For example, codes in the *people in my group* theme included *active-passive* and *loud-quiet* (Appendix 13¹¹). The next step was to construct relationships among concepts by building patterns among the codes (Strauss & Corbin 1994). For example, I related the concepts ‘group structure’ and ‘role’ in a description of structural development of the group as a process of niche-finding. This conceptual analysis is the basis of my discussion of group structure in Chapter 5.

There were also occasions when I needed to deal explicitly with individual differences. Sometimes a student’s account was at variance with the shared story. These differences forced me to examine the data further and incorporate them into my story or note where I have not been able to explain them. Sometimes difference generated new analytic threads. For example, in Chapter 5, **Morgan’s** unique understanding of leadership provided a contrast that sharpened my view of the other students’ understandings of leadership. In Chapter 6, I show how contrasting member accounts of the same group (**Blue**, **Red** and **Yellow**) enriched my understanding of the complexity of group dynamics. On the other hand, in Chapter 7, **Martin’s** unquestioning acceptance of student-generated documents for exam study was something I could not include in the shared story and so it is addressed in a separate section. In Chapter 8, **Morgan’s** and **Peter’s** stories about learning in and through process highlighted a gap in other students’ stories that became a major interpretive theme. Similarly, in Chapter 8, to discuss what students said they achieved from groups, it was necessary to present numerous different outcomes. Even

¹¹ I began coding by hand and then imported the documents into NVivo (software for qualitative data analysis) to continue searching and coding. In the document in the appendix, codes are referred to as nodes, which is the NVivo terminology.

though they fell under the same broad heading of group skills, their nature varied among students and one student did not speak of any, which is also noted.

The final stage of this thematic analysis was to seek feedback comment from the interviewees. In Adelaide I ran four focus groups early in Semester 1 of the following year (three with local students and one with International Students) and a single interview with **Morgan**. I chose to separate the local and International Students; since the exclusion of International Students from discussions was a major theme of my analysis, I wanted the International interviewees to be able to air their views freely. I interviewed **Morgan** separately, since his views tended to be different to the other students and there was a tendency for him to dominate conversations. Before the focus group all students were emailed a copy of key themes from my analysis and this informed the discussion. The general themes about groups were sent to both local and International Students (IS) Appendix 14), and the IS were also sent a set of themes specific to IS (Appendix 15).

After this stage of the investigation in Adelaide, I travelled to Dublin. I continued to address the research questions about the nature, purpose and value of PBL groups for students in this site, using observation and interviewing as in Adelaide. This is described in the next section, Section 4.5.5.

4.5.5 Dublin

In Dublin I observed two first-year groups as planned using simultaneous in-person and audio-recording, as noted previously (refer Section 4.4.2). My observation strategy was based on my Adelaide experience. I concentrated on the group as whole, made few notes in the session and then reviewed my raw field notes and the audio each night to type up my reflective and analytical field notes. The Dublin observation notes formed the foundation on which the student interviews were based, as in Adelaide. Although I was a stranger to the School, both students and staff were very friendly and willing to have me join their groups. I was more confident observing, yet I found the Dublin observation to be more demanding than Adelaide, since there were six PBL sessions each week, plus observation of other curriculum activities and meetings with Dublin staff. I also added an extra week of observation to enrich the data (refer Appendix 2). This busy schedule meant that analysis while I was in Dublin was mostly restricted to initial memos while reviewing notes and audio.

I brought forward the Dublin interviews to mid-term, which better suited both students and me (refer Appendix 2). I used the same invite-all strategy for interviews and from both observation groups five students volunteered (refer Table 4.2). All except one student were School Leavers on entry to Dental School. Two of the interviewees were from Northern Ireland (marked with a double asterisk) and one was an International Student who had attended an English speaking school. Some of the School Leavers from the Irish Republic had attended an extra final year of the Leaving Certificate at what was colloquially known as ‘grind school’; these were private colleges that specialised in preparing students for the Leaving Certificate exam and they were often attended by students who wanted to improve their final grade and improve their chances of university entrance.

Table 4.2 Dublin interview participants

Participants	Total students	Local female	Local male	IS female	IS male
2 PBL Groups Observed	20	12	6	2	0
Interviewees, 5 from each group	10	5 Aileen (S/L) Brigid (S/L) Deidre (S/L)** Kerry (S/L) Maeve (S/L)	4 Brendan (S/L)** Kevin (S/L) Hugh Liam (S/L)	1 Fiona (S/L)	

* All names are pseudonyms that I have selected to replace the pseudonyms that students provided. S/L means School Leaver on entry to Dental School

The Dublin interview schedule was more structured but as in Adelaide I asked questions to generate open-ended responses to questions (Appendix 16). The focus was on the group as a work team, but within the broader curriculum context and with a view to students’ backgrounds, since that was my main interest at that time from the Adelaide analysis. I also emailed each Dublin student a copy of their interview transcript for reviewing and possible editing before I used them for analysis.

Although I did some preliminary thematic analysis of observation and interview data in Dublin, I did the rest of the analysis after my return to Adelaide, once the interview recordings had been processed. From Adelaide, I emailed Dublin students a copy of their transcript for approval or amendment, together with any follow-up questions for clarification. I continued to use the same thematic grounded-code approach with the Dublin data, working between the Adelaide and Dublin data. This led to refinement of the

analysis, when I had completed it I sent a copy of key themes to each Dublin student for comment, in lieu of conducting focus groups (Appendix 17).

4.5.6 Writing

The interpretation gained coherence through writing. Although I have put writing last, since the thesis was the final stage of the research, writing was a constant feature of the analytical and interpretive process (Denzin 1994; Richardson 2000). Interpretation was an iterative process of working between data, codes and written texts to tell the story in this thesis (Denzin 1994). It included writing field notes during observation and interviews and constant journal and memo writing as a meta-narrative on the research process and myself as researcher - using writing as a path to learning and understanding (Richardson 2000).

Naturally, as an ethnographic study, the research in both Adelaide and Dublin generated a lot of data in the form of field notes and transcripts and I had to make choices about what to include in the thesis. I decided to privilege the students' voices and give prime place to the interview data as an organiser for the account, and present snippets of observation data when I thought that it added richness to the account. However, the observation data are an important component of the story in the thesis. As I noted in Section 4.5.2, the observation phase of the project influenced the development of my research focus from individuals to groups, and shaped the generation of the interview data.

Thesis writing involved decisions about representation and voice (refer Section 4.2). I chose to use first person, because this situates me as the researcher in the text. This is a reflexive, textual move adopted by constructionist researchers, which came about in opposition to texts that abstracted the author out of the document (to demonstrate the objectivity of the research) (Lincoln & Guba 2000). I also chose to situate students as actors in the text through quotes. The students speak through the text so that it is not a single-voice (i.e. me as researcher) representation of the 'other' (Denzin 1994). I use long and short quotes; the longer quotes give voices to students as individuals and tell their story about the group and the shorter quotes (inserted into my text) provide key, illustrative words and phrases. I also use short quotes for practical reasons to control the length of the chapters. I chose quotes that represent typical responses or to show when a student expressed a divergent or alternative viewpoint and where possible to illustrate the conversational nature of students' responses and to represent members of the three Adelaide and two Dublin groups evenly. I have included my questions where necessary to

put the quote into context. Therefore, the thesis style represents interpretation as co-construction by juxtaposing my words and students' words in my text.¹²

I also made choices about structure and format. This was influenced by the purposes of the research and my intended audience - my goal is to communicate the findings in a useful way and contribute to health sciences education. The style of ethnographies and the newer literary formats have been the subject of much debate; one paper argues that “the emphasis on textuality is in danger of privileging the rhetorical over the ‘scientific’ or rational” (Atkinson & Hammersly 1994, p.257). For this reason, I chose to use a structured format of methods, results and discussion chapters, where the methodology and my involvement are described in one chapter, followed by the data, clearly presented and set within an analytical and interpretive framework. This type of structure has been called the “meta-narrative” (Altheide & Johnson 1994, p.495). This is in contrast to the narrative, often literary style of much ethnography (Tedlock 2000), in which the data, the subjective experiences of the researcher and the interpretation can be blended into a single narrative, so that the argument “proceeds implicitly” (Atkinson & Hammersly 1994, p.257). The following chapters represent the interpretive logic of the thesis as a form of layering. In Chapters 5 to 9, students' understandings of PBL groups are organised within my analytical and interpretive framework of chapter headings and sub-headings. This local or “emic” account of PBL groups in the language of students (Patton 2002, p.267) is then situated within my larger interpretive, explanatory or “etic” framework from my position as researcher (Patton 2002, p.267) in Chapter 10.

4.6 Planning and doing research: *Summary and conclusion*

This chapter has documented the way in which I have constructed this interpretation of the nature, purpose and value of PBL groups for students. I have shown that the underlying methodological and conceptual basis of the investigation and the research questions are coherent and logical. I have demonstrated the processes by which observing and interviewing and reflection and analysis were integrated to produce this interpretation. The interpretation in this thesis of how students constructed groups is based on codes

¹² Format for quote use: Long, discursive quotes are indented and in italics; some quotes of up to 30 words are embedded within paragraphs, these are enclosed with double quote marks and identified by student name in the group colour-code. Short, single-word and phrase quotes are also enclosed in double quote marks. Pauses, laughter and other non-verbal components are included in square brackets and sudden stops or interruptions are shown by a dash after or before speech. I have used italics in two ways: (i) to indicate when students used their tone of voice for emphasis; and (ii) quotes within quotes are signalled by italics enclosed in single quote marks. Quotes are in students' natural language and include their idiosyncratic speech (e.g. “like”, “you know”) and grammatical errors. My choice of punctuation was to reconstruct how students spoke and what I interpreted to be units of meaning, marked off as sentences.

situated in students' words, shaped by a sound, iterative research focus on the group, developed through observing and interviewing and driven by my research questions about the nature, purpose and value of PBL groups for students.

Chapter 4 shows that this type of in-depth, social constructionist approach to research has enabled me to produce an account of PBL groups that is unique yet relevant and valuable. In the following chapters, I describe and explain the nature, purpose and value of PBL groups as they were socially constructed by students in Adelaide and Dublin. This illustrates how the group as a social construction shaped the way the students participated in the group and PBL. It also provides an explanation of the contrast between how students constructed PBL groups and theoretical accounts of a PBL group. This understanding of PBL groups is only possible through an in-depth qualitative inquiry such as in this thesis.

Part 2: The research context

The study involved my home school in Adelaide and The Dublin Dental School and Hospital (DDSH)¹³, which I had not visited before. I chose Dublin as my second site because both Schools were Western and English-speaking and the Adelaide Bachelor of Dental Surgery and Dublin Bachelor of Science were both 5-year, undergraduate, PBL-based dental programs designed and mostly taught by Dental School staff. Adelaide and Dublin have hybrid curricula in which a major curriculum component is PBL-based. Students must graduate from both programs fit to practise independently in accord with the local registration bodies (Dental Board of South Australia or EU Advisory Committee of the Training of Dental Practitioners).

4.7 Curriculum structure

The hybrid PBL-based Adelaide BDS was implemented in 1993 to replace a conventional subject-based curriculum in which the first two of the five curriculum years had been preclinical (Mullins *et al.* 2003). The core philosophy of the new programme was its PBL basis, with an emphasis on self-directed individual and small-group learning and contextualised learning. In the new curriculum at the time of this study there were three vertically and horizontally integrated Streams. Each Stream integrated basic and clinical sciences. The Dental Clinical Practice (DCP) Stream introduced students to clinical dental

¹³ Within the DDSH, the Dublin School of Dental Science is part of the Faculty of Health Sciences at Trinity College, The University of Dublin, which is the institution that confers the Bachelor of Dental Science award.

practice and patient management. The Dental and Health Science (DHS) Stream incorporated a range of basic and applied sciences relevant to dentistry. The significant innovations of the Adelaide BDS were that in DCP the students started clinical work in first-year from week 2, performing basic, non-surgical procedures on student colleagues and that in DHS basic and applied science concepts were learned in the context of problem-based patient scenarios, supplemented with class resource sessions in lecture theatres and laboratories and tutorials. The PBL scenarios were called Dental Learning Packages (DLPs).

The new PBL-based Dublin BDS was introduced from 1995 in stages to replace a conventional subject-based program that, like Adelaide's, had been divided into a preclinical (two years) and clinical phase (three years). The new hybrid curriculum was based around a core of PBL problems, with particular material taught by traditional lecture-tutorial format and also laboratory and clinical sessions. The decision to change the curriculum and adopt PBL was driven by a desire to move toward more small-group learning with greater integration and contextualisation of subject matter and a focus on problem-solving, self-directed learning, self-assessment and team skills (DDSH Year 1 Syllabus document 2005-2006). At the time of this study, the new first-year curriculum included a PBL course for integrated basic sciences and a traditional lecture-laboratory-tutorial format for teaching Physics, Anatomy and Dental Anatomy.

From my discussion with the First-year Coordinators in Adelaide and Dublin, it was clear that each School's intention for groups was similar to the sociocultural conception of the group. It was to be a site where students learned collaboratively, both process and content, and supported each other through learning to collaborate.

Each School provided a student orientation to PBL in the form of materials and activities. Adelaide students took part in an intensive one-week PBL unit that introduced them to the BDS, PBL and working in groups. Dublin students participated in a whole-class PBL orientation session that was also the initial session for the first PBL problem in the introductory block. Both introductions focussed on the systematic process of PBL. In both Schools, team-work and group learning were emphasised. Among the Adelaide first-year outcomes was, "effectively and professionally manage your individual and group learning" (First-Year Yearbook 2004, p.11). Similarly, Dublin student documents included to learn to "work as a team" through "discussion and debate" (DDSH Year 1 Syllabus document 2005-2006, p.6).

Apart from these overall similarities there were some differences between the two curricula. These included the format of PBL, the format of the group, PBL problem content and the format of assessment, which are summarised in the following sections.

4.7.2 PBL format

In both the Adelaide and Dublin approaches to PBL the problem scenario was presented as a stimulus to further learning, students worked in small groups to discuss the problem scenario, a staff member acted as a facilitator of student learning and the students were to be responsible for their own learning. To guide students through PBL, both Schools drew on the Maastricht *Seven-Jump Method* (refer Section 2.2), although Adelaide had slightly modified the language of the steps.

However, the approach in each School incorporated the basic PBL cycle: an initial in-class session to analyse the problem and identify learning needs ('learning issues' in Adelaide and 'learning goals' in Dublin), independent research and learning, and then a subsequent in-class session to re-approach the problem with the new knowledge and understanding. Table 4.3 shows the relationship between Adelaide and Dublin PBL methods. The references in brackets to "stages" refers to the headings I use in Chapters 7, 8 and 9 to organise my discussion of work and learning at Adelaide and Dublin.

One difference in PBL format was in how each School managed learning issue/learning goal research. Adelaide students commenced each PBL problem with a small group and were re-assigned to larger groups for the final discussion session, which were comprised of students from several small PBL groups. Each small group had researched one learning issue, so that the larger group was comprised of students who had researched different learning issues¹⁴. In Dublin, students were in the same small group for the entire PBL problem and all students were expected to research and discuss all the learning goals that their group identified.

Additionally, Adelaide students were expected to work as a group between class sessions. The student materials directed students to discuss and apply their research as a group and prepare a written group summary of their learning issue in order to prepare members for participating effectively in the final discussion session. Dublin students were not required to work as a group between classes. The student materials directed students to

¹⁴ This was done for the year of this study, as an attempt to stimulate discussion with a wider group of colleagues.

individually research the group's learning goals and then come to class prepared to discuss the problem and apply their learning.

Table 4.3 The relationship between Adelaide and Dublin PBL steps*

Adelaide: Modified Maastricht 7-Jump method	Dublin: Maastricht 7-Jump method
Problem analysis and formulate problem list ("stage 1")	
Step 1. Clarify terms.	Step 1. Clarify any terms and concepts which are unclear in the problem
Identify significant information to define and analyse the scenario. Make a problem list	Step 2. Define the problem, i.e. list the phenomena to be explained OR write "problem statements"
Identify and organise possible explanations	
Step 2. What explanations (causal and consequential hypotheses) can you provide?	Step 3. Explain the problem using prior knowledge and common sense to produce as many possible explanations as possible ("brainstorming")
Link and prioritise your hypotheses	Step 4. Arrange the explanations to form a coherent description of the processes that seem to underlie the phenomena
Identify further research and learning	
Step 4. What further information do you need to test your suggested hypotheses? Formulate learning issue questions Step 5. Plan research and learning	Step 5. Formulate learning goals
Independent research and learning ("stage 2")	
Group and individual research and application (patient management 1 and 2)	Step 6. Individual study
Discuss and apply research and learning to problem ("stage 3")	
Report and discuss application of LI research	Step 7. Share the findings in a group discussion and integrate the knowledge into a comprehensive explanation of the phenomena (i.e. "solve the problem")

* The directions in each box are taken from the Adelaide and Dublin PBL materials that are provided to students

4.7.3 Group format

Adelaide groups each had seven students and it was expected that each week one student would be scribe for the session and record key information on the whiteboard. Adelaide scribes were expected to draw up the whiteboard into sections to represent the PBL steps in similar manner to that suggested by Barrows (2000, p.55). There were no other directions concerning group management or conduct.

Dublin groups each had ten students and were required to have a chair and a secretary for each session. The chair was to monitor the PBL steps and member

participation during the group discussion (there was no equivalent to the chair role in Adelaide). The secretary was equivalent to the Adelaide scribe, except that there was no direction about how to use the whiteboard. I describe the chair role further in Chapter 9 (refer Section 9.3.2).

In Dublin there was one tutor per group of ten students. In Adelaide, due to staffing issues that year, there was one tutor per two groups of seven. The Adelaide tutors divided their time evenly between the two groups, which worked in adjacent tutorial rooms. For the final PBL session, there was one tutor for each larger group.

4.7.4 Student orientation to PBL

Both Schools provided a PBL orientation. At Adelaide students took part in a week-long introductory unit. This was based around a PBL package and associated class sessions. The package was designed to introduce students to the role and scope of dentistry, communication and professionalism and PBL and lifelong learning. During the introduction week and then in week 8, the First-Year Coordinator and the Dental School Counsellor ran workshops about working in groups, which addressed group dynamics (e.g. not dominating discussions), teamwork (including shared leadership) and conflict management. Dublin students did their first PBL session together as a whole class after an introductory session about the PBL process and the 7-Jump method presented by the First-year Coordinator. In the first PBL session, the staff initially modelled the inquiry process, with one staff member providing a commentary of what was happening. Group dynamics were not explicitly addressed.

4.7.5 PBL problem content

The content of PBL problems differed in each site. The Adelaide PBL packages were clinical scenarios involving knowledge of basic and applied general and dental sciences. In Semester 1, students completed five PBL packages (following the introductory problem). Problems began with tooth morphology, structure and development and then progressed to other oral tissues concluding with common, simple oral diseases (Appendix 7). It was assumed that students had sufficient prior knowledge (e.g. basic types and shapes of teeth) to analyse a problem scenario (e.g. a scenario involving tooth morphology)

Dublin problems were organised in blocks containing a set of problems addressing a topic area of basic sciences. In Michaelmas (i.e. first) Term when the study was done, students completed four blocks of problems (Appendix 8). The General Introductory Block

in week 1 included problems related to origins of life, evolution and the scientific method and was to introduce students to PBL, group-work and self-directed learning. Block 1 addressed *Energy and microbes* and Block 2 *Chemistry* and Block 3 *Cells*. The content of these problems drew on or developed the General Science, Biology and Chemistry content of the final year of the school curriculum.

4.7.6 Assessment format

Both schools included assessment of student participation and exam questions based on PBL content. However, assessment varied with respect to how it was conducted and whether it was formative or summative.

In Adelaide, PBL tutors provided their students with formative feedback on their participation in PBL (as preparation for summative assessment by tutors in Semester 2; refer Appendix 9). In Dublin, students assessed their own participation with a tutor-moderated mark out of ten at the end of every PBL problem part; this meant that they self-assessed twice in every PBL session (i.e. six times each week), since each session began with the conclusion of one problem and the beginning of the next (Appendix 10).

At both schools PBL material was included in exams. Adelaide students sat a PBL-style DHS1 exam at the end of Semester 1, having had a preparatory trial test of the same format at the end of week 6. The question format presented patient scenarios that students were required to analyse with the same stepwise process they used in PBL; question responses also required application of knowledge and understanding developed during the DHS1 curriculum, including PBL, the class meetings and learning laboratories. Dublin students sat an integrated exam at the end of term that included eight questions based on PBL problem content covered over the term in PBL sessions only; two questions were written by each of the four PBL tutors. Example exam questions were provided at the end of each PBL Block Book.

Chapter 5. Group structure and function: *Finding a niche*

5.1 Introduction

In this chapter, I discuss Adelaide PBL group structure, using structure to mean a set of roles with identifiable purposes related to group function. I describe roles that had meaning for students, as seen from my own position as observer. My focus is the meaning of roles for the group as a unit rather than how individual students experienced their roles. I aim to explain how each role contributed to PBL or group processes and how and why group members came to have their roles.

To illustrate this, Chapter 5 comprises four parts. In Section 5.2 I present students' understandings of how their group role structure developed. Section 5.3 describes the roles common to **Blue**, **Red** and **Yellow** groups. In the next section, Section 5.4, I discuss leaders and leadership in detail, since this was the role with the most influence on group structure and function. Then I summarise the other member roles, indicating how each contributed to PBL and group process (Section 5.5). Finally, in Section 5.6, I discuss another structural feature, the dominant and quiet roles, which also shaped group function. In each section, I provide students' explanations for how and why group members occupied their roles, which illustrates the importance of member personality as a shaper of group structure. As indicated in Chapter 4 (refer Table 4.1 & 4.2), throughout the thesis participants' names are in colour to indicate their group membership.

5.2 Group development: We didn't set specific roles to people

Rather than being planned or discussed, group role structure evolved spontaneously. As **Sam** told me, "We didn't set specific roles to people. We didn't really talk about anything with each other. It just happened". **Paula** echoed this notion, "It's not conscious and it's not spoken or anything like that and never was spoken about, but it just happened". Although **Red** group discussed their work system, such as schedules and deadlines (refer Section 6.3.2), its role structure also developed without discussion or explicit negotiation; for example, **Ruth** explained that roles were filled without consultation. Roles were understood to emerge through action; **Amy** told me how people had habitual roles.

Amy: There tends to be not someone who says 'You have to do this and you have to do this' but the way it pans out is that I end up writing on the board and Peter and Cathy tend to give most of the feedback to the cues that we're doing.

Students described group development as a process of each member eventually finding or establishing a suitable niche in the group. **Angela** said, “You just get more comfortable because you get to know the people and you sort of sink into your role, the DLP role”. For example, she said, “**Adrian** emerged as the kind of organiser. [...] He sort of just rose up as that kind of role”. Other students echoed this theme of people ‘finding’ roles.

Paula: [Pause] So I think our group [slight pause] was [slight pause, thoughtful tone] pretty spread out in terms of how people, how people’s personalities and the way they deal with things - we weren’t similar, we were all quite different, but I think we all kind of clicked into roles after a while.

Julie: [In Week 1] we still didn’t know what each other’s strengths were, what role we played and all that kind of thing, so the group just wasn’t - a group at that point. [...] But after a while, I think by second term*, we had gotten it together and we figured out what made each other tick and what buttons we weren’t allowed to push to make things work more smooth.

* This was after 6 weeks of being a group.

5.3 Group roles: *Official and Unofficial roles*

All groups had official and unofficial roles. The term “unofficial role” was used by **Amy**, my first interviewee, to describe **Yellow** structure and function: “As we went further through the semester their sort of unofficial roles, as you might want to call them, or the way that they behaved in the group work, became more and more exaggerated”. Since **Amy** coined that term to denote emergent roles, I use ‘official’ to denote formal or designated roles that were created for a specific purpose. In each group, the two official roles were scribe, suggested by staff and editor, devised by students.

The scribe, as an official role, had the customary PBL responsibility for publicly recording the group’s progress through the problem analysis. It was available to any volunteer. **Julie** explained that **Red** members took turns at scribing. This also occurred in **Blue**.

Sam: The first time it was just someone that was willing to go up on the board because we didn't really know each other. And then once we got to know each other the next person went up, but the person who had already done it didn't go up again.

Amy said that after some turn-taking she became the regular scribe in **Yellow** (refer Section 5.5.3)¹.

¹ **Amy** was the only student to elaborate on the role beyond explaining that it was a volunteer position.

The official role of editor was created by students to fulfil a group need and resulted from their construction of group-work as a division of labour among group members (refer Section 7.3.2); it was a key role in enabling each group to work efficiently (refer Section 7.3.4). The editor's duty was to make the learning issue summary for the group. The role was filled by volunteering and turn-taking; however, there was no forward planning or rostering. The unspoken logic behind this was to balance workload fairly across the group for each PBL case and over the semester, which I explain in Chapter 7.

Angela: People just volunteered. I guess they felt bad for not doing it last week so then they volunteer to do it that time.

Morgan: You just invite somebody to put their hand up for it and eventually what happens is there were enough DLPs in the first year that everybody has to put their hand up. And those that want to do it will have their hands up in the early weeks and those that don't it will just fall to them by default when enough of us had had that role.

Peter: Someone just volunteered, 'I'll do it this week and someone else can do it next week'.

The remaining roles were "unofficial", emerging through action, identifiable by incumbent function. In each group, students adopted at least one, or sometimes two, overlapping roles. Unofficial group roles (summarised in Table 5.1) contributed to PBL and group processes and influenced group function.

Table 5.1: Summary of "unofficial" group roles and functions

Role	PBL/Group function	Responsibility/duties
Leader-director	Direction	Direct PBL process; problem investigation
Leader- administrator	Organisation	Organise group-work tasks; oversee completion of group learning issue summary
Quiet person	Following	Mostly silent participation, occasional valuable contribution, following directions
Knowledge person	PBL content contribution	Contribute relevant facts and information during PBL problem investigation
Researcher	Research	Gather information from internet, textbooks and journals
Involver	Group process contribution	Encourage participation of all members, build positive relationships
Joker	Group process contribution	Use humour to establish positive atmosphere in group and make group-work fun
Excused	Non-contribution	Permitted by group to do no work, mostly excused from research or editor role
Avoider		Does no work, usually means no research, misses meetings

Students identified leaders and from their descriptions of these people, I classified leadership into two forms: leader-director and leader-administrator. Leader-directors influenced how the PBL process was interpreted, the direction of the problem-analysis and discussions and selection of learning issues. Leader administrators had a mainly out-of-class organisational role keeping the group on task, reminding people of duties or meetings and monitoring progress against deadlines. Students referred to them as “leaders” or “organisers” and identified them as being the more vocal or dominant group members.

In contrast to leaders, some students in each group did not participate extensively in group discussions or decision-making, yet students did not speak of these members in ways that constructed them as non-contributors. They referred to them as quiet people; their quietness was regarded as a personality feature and thus constructed as natural (refer Section 5.6.2). Therefore, I do not consider it appropriate to classify them as non-contributors. I refer to the role of quiet person as a distinct aspect of group structure, emergent from behaviour and influencing function through its relationship to other members and roles, especially leaders.

Other unofficial member roles contributing to PBL or group process included knowledge person, researcher, involver and joker. These were associated with members’ usual behaviour and function. Another role category involved non-participation in group activities. One type I have called non-contributor. Students spoke of members who did not work on the group summary. For example, they missed group meetings, did no research, or did not contribute to the production of the group’s learning issue summary. However, some did this legitimately (the excused), while others did it without group permission (the avoiders).

5.4 Leaders: *We definitely had a leader*

Leadership was not explicitly planned, assigned, or rotated in any group. Instead, certain students took on leadership duties early in the group’s formation and continued during the group’s Semester 1 lifespan. Students explained that leadership was associated with personality, leaders being more dominant and vocal than other members. Students assumed without question that a group leader was necessary; however, leadership was not without conflict in two cases (**Blue** and **Red**). Since the leader structure of each group varied, I discuss each group separately and show how they compare with respect to duties.

5.4.1 Blue leaders: *A couple of dominant people*

Different people undertook direction and organisation in **Blue**. From the start of Semester, **Angela** and **Paula** contested for the role of leader-director; both experiencing tension and conflict, which then impacted on some members' perceptions of how **Blue** functioned (refer Section 6.2). **Adrian** was the sole, uncontested leader-administrator.

Angela and **Paula** referred to themselves and the other as leader-directors. **Paula** told me that the sessions in class were "... more dominated by say, **Angela** or I" and that she and **Angela** "... directed most of the discussion". **Angela** told me that she and **Paula** were the two who would "... talk a lot more, share their own experiences a lot more and guide the discussions a lot". Both had previous study and/or work-experience (in health-related fields) between secondary school and dental school.

Angela and **Paula** saw themselves as responsible for the group's success at investigating the PBL problem; they interpreted leadership as focussing group discussions in a particular content direction. **Paula** indicated her direction was "... not necessarily in contribution, as in what people contributed, but more the direction in which it took the group discussion". She explained, "I knew which topics would be easier to deal with and which ones would be more interesting and how to go about it". **Angela** explained her role as intervening to direct the group discussion, "If people got off track, then I'd be the one to say '*Hey stop, think about this and think about this*'".

Martin and **Alice** described **Angela** and **Paula** as leaders. **Martin** said **Angela** was "... someone who became a leader"; "... she talked about this and this and suggested this and this and we tend to follow her and discuss basically what **Angela** said, then we'd come up with other ideas". He did not describe **Paula** as a leader, but his description of her role is consistent with leader-director. **Martin** perceived that she directed the group's approach to their learning issue; he described **Paula** as a "... good organiser"; "She would gather information and say '*I think we have this sub-topic here and that sub-topic there*'". **Alice** described **Paula** as "... the one to say '*We should divide the topic into this*' and why we should do this topic". However, **Sam's** view differed; he regarded **Adrian** as responsible for guiding group discussions.

Sam: Well we definitely had a leader and he like directed discussions, brought us back, if we got side-tracked he'd bring us back.

Vicki: Who was that?

Sam: That was Adrian. And yeah he was, I think he was the first one to type up the DLP and the second or whatever and [pause] so he took a really active role in organising the discussion. That's what made it so easy for me.

All members considered **Adrian** the group's leader-administrator. For **Angela**, **Adrian** "... was the clear director" because he would "... delegate things and get us on track and remind us that things are due"; "... he would be looking after us". **Paula** described him as the one who "... tended to organise outside of the group, organising group meetings" and "... SMS us all to get us organised". **Sam** said that **Adrian** "... organised, 'Alright we're going to meet now' to give all of our resources to this person that was meant to do the summary and he was the one who contacted everyone by email".

Adrian declined to be interviewed due to study commitments, so I do not have an in-depth record of his perspective. However, his leadership was due to a combination of pragmatism and default. In a conversation that I had with the whole group, **Adrian** explained that he did his job simply because it had to be done. When I talked informally with the group, the others suggested, in **Adrian's** presence, that he was the one who did all the work. The following is an excerpt from my field notes after a brief talk with the group during the observation phase of the study.

Observation notes Week 10, 18-05-04: Blue

(Informal conversation with group members about the group)

[...] **Angela** added with a laugh "**Adrian** usually does all the work". The others laughed too and **Adrian** just smiled. **Martin** said that **Adrian** "gets five stars" for the work he does. I asked how that came about and **Adrian** said in a neutral tone of voice (very matter of fact, not self-deprecating or modest), "I don't know, I just do it". **Alice** suggested that it happened in the holidays when they had work due and no one else did it except **Adrian**. I asked if it was by default then that he's become the worker? There were a few laughs at that and **Angela** and **Martin** made comments together about **Adrian's** role - the essence was that he's the "leader" (said in a pronounced tone by **Martin** - I could hear the quote marks). When I jotted down 'leader' in inverted commas, **Adrian** protested that he wasn't really the leader. I said that I realised that, which is why I put the commas around it [...]

By default, **Adrian's** role involved coordinating a loosely engaged group who were disinclined to spend time together outside class sessions (refer Section 6.2.2).

5.4.2 Red leaders: *Motivating the group*

In **Red**, all members identified **Julie** and **Morgan** as leaders, both undertaking direction and administration. **Julie** was a school-leaver and **Morgan** was a mature-age student with work experience that included team-leadership. Both believed the leader was responsible for enabling the group to function well and achieve its desired work outcomes

and that the leader's duties included directing and administrating. The presence of **Morgan** and **Julie** as leaders and the relationship between **Morgan** and the rest of the group had a significant impact on how **Red's** approach to group-work developed (refer Section 6.3).

Julie's understanding of leadership integrated directing, administrating and facilitating group process into a seamless responsibility for the overall function and output of the group. **Julie** told me "A leader's meant to be able to organise the group, get the group to brainstorm, involve the entire group, mediate when there's conflict". As leader, she undertook various tasks, including initiating discussions ("open the floor"), interpreting the PBL process ("step one, let's do this") and intervening and providing direction when the group "... had difficulty with organisation or going through certain things or brainstorming or difficulty with ideas".

Morgan drew "an analogy" between his previous workplace experience and "DLP and group-work" as being a member of "... a multi-disciplinary team capable of delivering against written requirements". **Morgan** said that as leader "... you just tend to be another team member who has this responsibility". His concept of a leader's responsibilities compares to **Julie's**.

Vicki: So if you had to just summarise what team leader duties are in a few words...

Morgan: Yeah, well, coordination and motivation of the team and setting realistic goals and also using the experience of other team members to inform yourself, because it's rare that you would know everything. You're part of the team, you just happen to be the - by no means are you in some ivory tower.

Morgan believed that any control he exerted as a leader was a teaching exercise to develop fellow students and the group. He tried to motivate colleagues to improve by modelling quality work.

Morgan: Early on in the Semester, I tried to lead the group in order to empower them. I experimented to see if I could influence the performance of the group [...] I produced the whole summary for this topic complete with diagram and some other ideas I found through research. I thought that showing a high regard for the success of the group might be a useful message to others and empower them to seek favourable comments similar to those we received during our presentation.

However, my other **Red** interviewees did not interpret **Morgan's** leadership in this way; **Julie**, **Rosanne**, **Ruth** and **Diane** all described it as control and domination. They made different attributions for his behaviour, seeing it as indicative of the type of person he was. Nevertheless, the net effect of **Morgan** and **Julie's** leadership was to motivate **Red**

towards becoming an effective team. In addition, **Julie** said that she and **Morgan** were in “head to head” conflict over the leadership role (the other three female interviewees also commented on this but **Morgan** did not). I discuss this further in Chapter 6 (refer Section 6.3.1).

5.4.3 Yellow leaders: *No one stamped their authority*

Yellow leader structure was described differently to the **Blue** and **Red** hierarchies. Instead of having one or two clear leader-directors, several people in **Yellow** took on the task of guiding the group in and out of class and instead of having a leader-administrator, decision-making was described as a group process.

None of the **Yellow** interviewees identified a specific leader-director. **Peter** said, “No one really took on a certain role [...] nobody was chairperson and told someone to shut up now and the next person start talking, or said there’s two minutes left, let’s hurry up”. The lack of distinct leadership grew out of the friendly, conflict-free group dynamic, which shaped **Yellow’s** approach to group-work (refer Section 6.4). **Cathy** explained, “It wasn’t one of those groups where people had to stamp their authority. It wasn’t one of those groups where you have the really, really loud person who would need to be in charge or anything like that”. **Bruce** told me “We would listen to each other [...] and we wouldn’t care that they [ie other group members] said we were wrong”. He explained that the group was characterised by compromise: “As I said before, no-one really minded and it was just a matter of who persisted the longest (laugh)”.

Amy, in her habitual role of scribe, exercised some directional leadership from the board by monitoring the steps and group members’ input. However, consistent with the group’s democratic view of itself, she shaped what went on the board through seeking and reconciling members’ opinions.

Amy: If people were throwing two ideas at me I felt as if I really had to, not mediate, but sort of, say, ‘*Well you’re saying this and you’re saying this. What does everyone else think?*’ [strong tone] And trying to get other people’s side.

Observation notes Week 8, 4-05-04: Yellow

(PBL session – video record)

[...] **Amy** appointed herself as scribe. She volunteered to scribe and her style was that she directed/checked what step they were on; asked if they should move on; asked questions about the content eg what was significant information, how could it be interpreted; wrote up what she thought was appropriate and asked if that was OK. [...]

Yellow administration was undertaken by several members. **Cathy** said of group organisation, “Two or three people in that group who would organise the meetings or try and get around to everybody and give the forms out or something”. She explained, “My role was: I’d want to sit down and work out what we were doing”. **Amy** also described her role as organisational.

Amy: I’m the one who actually says, ‘*Look such and such you have to do the summary this week*’, or, ‘*Have you done the summary yet? Have you sent it in? Have you printed out a copy for everyone else? Is it posted up on the board?*’

I observed that **Yellow** was a conflict free, consensus-oriented group; however, although not vertically structured, like **Blue** and **Red**, **Yellow** had two sub-groups with different input into group decision-making (this was evident in the video and in-person observation). There were several directional and organisational members, while others were less directly involved in the running of the group. A group of four socially close and more outspoken local students made decisions and consensus was achieved through this group asking the other members if they agreed. The other sub-group comprised International students, **Carol** and **Neil** and local student, **Bruce**. Of my interviewees, only **Carol** commented on this aspect of group direction and organisation, “These people were more the organisers of the group and they put in more ideas”. **Carol** said she did not feel able to take a leadership role, “I waited to see if we had a meeting, or do my own research. I never organised a meeting myself, I was embarrassed or uncomfortable to ask for a meeting”. I discuss this further in Chapter 6 (refer Section 6.4).

5.4.4 Explaining leadership: *Natural leaders*

The majority of students associated leaders and personalities, attributing their own or others’ leadership in terms related to particular individual characteristics. However, **Morgan** was an exception to this understanding of leadership; he regarded it as a learned phenomenon.

For most students, leader-direction was generally associated with dominant or controlling personalities. For example, leadership in **Blue** was a contest between two “opinionated” and “dominant” people. **Paula** told me she and **Angela** were “... both fairly opinionated people” and **Angela** said “There was about two dominating people”. Leadership clashes occurred because of their personalities and so discussion frequently became a contest of opinions. **Angela** explained that she was “... pretty arrogant” and she thought **Paula** was “... one of the more aggressive people” in the group. **Paula** noted a “...

clash maybe in both **Angela** and I's personalities" (refer Section 6.4). **Diane** said of **Red**, "There were a couple of people that were quite dominating". **Julie** felt equipped to be PBL leader (both directing and organising) on the basis of her personality, "In high school people always associated me with being a leader, you know those little quiz thingo's that they give, you know, 'what kind of person are you?', I always get the one that says 'you are a natural born leader'. She explained, "I like to take control, in school I was always the one who organised the group". Since students regarded **Yellow** as a democratic group with no dominating people, no leader-directors were identified in **Yellow**.

Leader-administration was also associated with personal attributes. **Adrian's** administrative leadership of **Blue** was attributed to his being a "reliable" (**Angela**), "dedicated" (**Paula** and **Alice**) and "keen" (**Paula**) person. **Rosanne** observed of **Red** leaders, "**Julie** was an organiser, **Morgan** was an organiser [...] you could see it, their personality shone through". Organisational leadership in **Yellow** was also attributed to having an "organised" personality.

Cathy: There was a few of us who (pause) I think we are all very like, leadership sort of people, so we all took that sort of role and (pause) I am a person who wants something very organised so my role was to speak, I'd want to sit down and work out what we were doing.

Amy: Because I'm quite a decisive person that made me take on the leadership role. I feel as if I'm the one that has to chase after people. Other people say, '*I think so and so's doing it*' [vague voice]. They're quite indecisive, airy fairy in that manner, about getting a decision. I just have to find out who's doing this, get on top of it and I'll be right.

However, **Morgan** was an exception to this pattern of leader-attribution; he spoke of the leader role as a skill-based job, which any team member could learn to undertake. **Morgan** took on leadership to give other ("younger") students in his group the benefit of his experience and skills. **Morgan** explained that he exerted leadership early in the Semester and then "... took a more back-seat role" so that he did not dominate the group. He described the purpose of his leadership as showing students how to "... produce professional work that reflects a high standard" and demonstrating "... group accountability, meaning that all are responsible".

The other members of **Red** took a different, negative view of **Morgan's** leadership. Consistent with their general understanding of why people adopted roles, they interpreted his leadership in terms of 'fixed' characteristics that influenced behaviour. They described him as "dominating" (**Julie**, **Rosanne**), "really pushy" (**Ruth**) and a "bit of a dictator"

(Diane). **Rosanne** explained, “Right at the start that’s the way we perceived him”. **Julie**, **Ruth** and **Rosanne** also believed that **Morgan** assumed it was his right to lead and ‘take control’ because he was older. For example, **Rosanne** explained, “He’s like the father figure where he can get you in trouble”.

Further, the way that **Morgan** faded his leadership over time confused **Julie**. I relate this to her using a fixed personality view to analyse and understand his behaviour. She regarded his self-described approach of leading by example and fading as inconsistent and poor leadership.

Julie: But I found that when we got the second DLP he took a more - membership role, which I found very confusing because it just threw everything up that I preconceived. And I was, ‘oh, what’s going on?’ He didn’t really fulfil what that person’s supposed to do. He would start off trying to lead, but kind of waver and just not lead anymore, which made things really difficult.

5.4.5 Group leaders: *Summary*

Leadership in all three groups had similar features. In each group, particular members regularly performed the tasks of (i) directing discussions and decision-making and (ii) organising the group. All students described these two functions as aspects of leadership. There was no election of leaders or discussion about who would provide leadership. Leaders emerged early in the life of the group and remained in their role and they shaped the group and group-work. There were no changes of leadership in the sense of other members taking on the role. Apart from **Morgan**, who understood leadership as a learned phenomenon, the other students explained leadership in terms of personality. Leadership suited people with particular characteristics and leaders emerged from among the ‘dominant’ group members.

However, each group had its own leader profile. **Blue** and **Red** each had two members who identified themselves and were identified by other members as leader-directors. In both groups, the directors saw themselves as responsible for or contributing to the group’s success, but in each group they realised their responsibility differently. **Blue** directors adopted a more controlling approach, which led to conflict about directions to take and decisions to make. **Red** directors aimed to guide and motivate the group and experienced conflict over the right to lead. **Yellow** group had no clear individual leader-director. **Yellow** group members reported that they decided group direction by mutual consent; a sub-group of students decided group direction and sought agreement from the other members.

All three groups had at least one person who functioned as leader-administrator and kept the group organised. The role was the same across all groups, with the administrator disseminating information, such as reminding group members of tasks, meetings and deadlines. The administrative role was free of conflict.

5.5 Member roles: *People's ways of behaving*

Other member roles, which contributed to PBL or group processes, resulted from the customary behaviour of particular group members during PBL (refer Table 5.1). These included knowledge people, researchers, involvers, jokers and non-contributors.

5.5.1 Contributors

5.5.1.2 Knowledge people

Knowledge people were a valuable group resource; usually they had relevant previous work or educational experience, often in the field of health sciences. This was essential to the group's core task of pooling knowledge during problem analysis (refer Section 7.2.1) In **Blue**, **Paula** was the main knowledge source.

Angela: Paula because of her past, her history, she wouldn't necessarily do background reading or evidence based research, but she would contribute her opinions and her past experiences to when we get the DLP, the cues, the trigger. She would interpret simple things that we hadn't learnt yet and she knew of.

Paula herself said she "knew" which topics the group ought to select as learning issues, which underpinned her leader-director role. **Sam** described Paula as a "resource" for the group; from in-person and video observations, I noted that the group regularly asked her to explain things or provide answers. **Red** group had several knowledgeable members, for example, **Julie** told me "We had Morgan and Freddie [with their previous work/study experience²] and Thomas who has some sort of biological-based degree". **Rosanne** said she drew on her experience working in a doctor's surgery. Concerning **Yellow** group, **Bruce** said, "In my group there was maybe two, two people that knew more than the rest, which was helpful". **Amy** said of **Yellow**, "Sylvie has studied at university level before, in a science degree of some sort, so it means that her knowledge is actually greater than us". However, the presence of knowledge people could be a 'double-edged sword'. Some students contrasted and assigned themselves, at least initially, into an opposite role of no knowledge, which influenced group discussions (refer Section 7.2.1).

² Details of **Morgan** and **Freddie's** particular previous experience is deleted for confidentiality reasons.

5.5.1.2 Researchers

Researchers specialised in gathering information, which was the main activity during research for the group's learning issue summary (refer Section 7.3.1). In each group, particular students were relied on to produce research material in quantity and quality. **Alice** said, "Sam was quite on the ball, he would research quite a bit but Adrian was a good researcher too". **Paula** also said that "Adrian and Sam both did a lot of research out of the group, probably more so than any of us". **Julie** said that Morgan, Thomas and she regularly contributed to the research, while the others had variable input on different PBL cases. **Morgan** also reported that he and one or two others were mostly responsible for research. **Cathy's** view was that research in **Yellow** was done by whoever had the time and interest to do it for each PBL case. However, it was **Amy's** opinion that Carol was the main 'worker' in **Yellow** because she did so much research. (**Amy's** view is similar to Carol's descriptions of her participation in **Yellow**: refer Section 6.4.2).

5.5.1.3 Involvers

Involvers regularly attended to group process and supported individual involvement. Their function included monitoring participation, attempting to involve everyone in discussions and where necessary, attempting to manage difference and conflict. **Angela** described her function as "instigating"; she said, "There were a lot of quiet people and so instead of ignoring them I'd try and include them". **Martin** agreed, "Angela managed to make everybody talk". Likewise, **Julie** explained "I always tried to push Ruth³ into trying to make a contribution to the group [...] you did little things just so that everybody would have a go and get to say something". **Ruth** told me that Julie and Rosanne would both ask her from time to time if she wanted to say anything. **Amy** said the involvers in **Yellow** were herself and Peter.

Amy: I felt that Peter and I were probably the two people who tried to involve the rest of the group. And my way of doing it was when people were throwing two conflicting things at me [as scribe] I would say, 'Bruce, what do you think?' and 'Neil, what do you think?' and 'Carol, what do you think?', 'Sylvie, what do you think'

5.5.1.4 Jokers

Jokers specialised in humour, sometimes for its own sake to make group-work fun, but otherwise deliberately employed to enhance or maintain group relationships. As **Sam** said, "Well there were the serious people and the jokers". **Sam** used jokes to "... keep the

³ **Ruth** was identified by herself and the other members of **Red** as a "quiet" person.

mood light” because he believed that otherwise the “... ideas [would not] come out as easily” in discussions. Despite the mixed views about the group dynamics in **Blue** (refer Section 6.2), **Angela** and **Alice** described Sam as humorous or a joker. Similarly, in **Yellow**, Peter was the ‘joker’ who involved people with humour. **Amy** said, “Peter did it in a very comical way, [...] it was a good way because it sort of broke the ice and there was no tension and it was all a bit of fun”.

Peter: I know that a lot more people are quieter and reserved. I guess from the start, in the first couple of days in the group and we didn’t really know each other and then I started making jokes, I guess I was one of the ones who gets people the most involved. And that’s just how it stayed.

Humour, however, was not a feature of **Red** group and there was no joker described or observed. Group members attributed this to poor relationships and group conflict (refer Section 6.3).

5.5.2 Non-contributors

Among the non-contributors, the excused had extenuating circumstances that exempted them from the responsibility of contributing to a group learning issue summary. At any given time, each group allowed an excused member not to work. **Sam** said, “Everyone was involved in the meetings but maybe once or twice one person couldn’t make it because of another commitment and that didn’t really matter”. Reasons included other course-work commitments or extra-curricular matters such as family issues, moving house, or work commitments. **Cathy’s** comment typifies the attitude toward the excused: “They were aware that other people had other commitments, so they wouldn’t push you into doing all this work that they know you wouldn’t get done. They were very understanding”. This was an integral part of how groups approached PBL group-work, where the group shared the burden of work (refer Section 7.3.2). **Rosanne** explained, “There were times when you couldn’t pull your weight but that was good because everyone else did”.

In contrast, avoiders also made little or no contribution to group-work, but, unlike the excused, they did so without group sanction. Other students assumed that avoiders could not “be bothered” doing anything, or may have “forgotten” to do their allocated work. Students usually referred to avoiders in a generic or anonymous way. However, **Angela** was unique because after telling me “... some didn’t contribute much”, she named herself as an avoider.

Angela: Well I can say that one hundred percent of the time Sam and Adrian were involved completely in research, every single DLP. Half of the time, me and Martin wouldn't really submit anything for research because, you know, it's under control, kind of thing. We just, I don't know, we thought that and probably Paula once or something submitted something.

Julie's comment illustrates how students differentiated the two roles.

Julie: Most of the time a lot of the group contributed. I found that sometimes some people would forget to do the research or wouldn't be bothered, or thought other people would do it and sometimes others would have really good reasons, like Diane. In the beginning, her house being broken into and her moving, we were all really understanding and so we were '*Don't worry about doing the DLP we'll figure it out, just worry about yourself for now*'. So, that was good, so we were always really supportive if anyone had troubles or if anyone was sick, so that was good in that respect.

5.5.3 Explaining member roles: *People have it in them*

Students explained uptake of roles in terms of people's individual characteristics. They attributed role suitability to students' personalities or the knowledge and attributes that they brought into the group. Since in any group, there would be members suited to different roles, group structure would evolve on this basis. **Sam** explained that roles "... just happened, whoever ended up, people have it in them to do this and we found that out eventually". **Julie** told me that, at the start "We had just met, so, I guess we still didn't know what each other's strengths were, what role we played and all that kind of thing, so the group just wasn't a group at that point".

When students spoke of why people adopted certain roles and their group's development there was an element of naturalness about the process, which suggested it was almost inevitable.

Paula: Maybe subconsciously you don't even realise you are doing it, but you just slip into how the group will work and I think, maybe, I don't know with other groups but we just kind of - from the start it was just going to be that way, you could see who was going to - where it was going to go and how it was going to happen and it happened that way [laughs]. So that's what I mean by you assume these roles, it's that you just get into these positions without, like it's not conscious and it's not spoken or anything like that and never was spoken about, but it just happened.

Julie: Going back to the high school thing, you know what everybody is like, so you don't really get the whole group effect, it's more of a friend thing you know, working with friends, but here it was more of the - you know how you read about the group and you have the dominant person, the introverted person and the shy person and you know and you've got the mediator. I could actually really see all of those people in the group, so that was interesting for me, the whole analysing thing [laughs].

Students frequently described the naturalness of people's finding a role in the group according to personal attributes. **Angela** explained that "People had different roles, it's kind of natural to let the people who like to do a lot more work step up and let others contribute in different ways", as result, "... someone like Adrian or Sam would do a lot more research". **Angela** thought that Adrian, **Blue's** leader-administrator, was "... really comfortable in that kind of a role, he's natural to it. We didn't force it upon him, he just rose up as that kind of role". **Alice** thought the division of labour in **Blue** happened "naturally" because some members were "... the kind of people who dominate and they like to talk". **Cathy** explained her role, "I liked being the leader, the organised person, so I just take on that role naturally I think". **Amy** adopted the role of scribe due to a mix of personal characteristics. "So because I feel I'm quite a decisive person, that made me take on almost the leadership role in being the scribe and actually getting the work done"⁴. She explained, "I tend to be the scribe because I can't concentrate unless I've got something really specific that I'm doing. I have a really short attention span". This process of role-finding provided a measure of certainty about group work.

Bruce: You learn everyone's personality, how they work and what's the best way to get them to do something [...] So you might say, '*You're good at finding stuff, so you go and find stuff*'.

Amy concluded of role-finding, "So that was the good thing: we knew what to expect from people".

5.6 Group dichotomy: *Dominant and quiet*

"Dominant" and "quiet" were two basic categories of group member that students frequently used to explain the overall group structure. Students did not describe quiet people in the sense of a group role with a PBL function, but considered them as a category of members within the group structure that existed in opposition to dominant. As I noted above, leaders were associated with being dominant and I show in this section that a core aspect of PBL group structure and function was the distinction between dominant or loud students on one hand and passive or quiet students, on the other.

5.6.1 Quiet people: *Quiet but valuable*

When describing their group, students often spoke of the quiet people in a generic sense. A noticeable feature of those in this position is that they had no overt input to group direction or organisation and tended to wait for the leaders to make decisions about the

⁴ By "getting the work done" **Amy** meant having concrete evidence of work in the form of a record on the whiteboard.

group and group-work. However, students did not construct quiet people as non-participants or non-contributors; they were considered to be working in their own manner. **Angela** told me “The reserved people usually wouldn’t say anything. They could probably go a whole DLP without saying anything, but that doesn’t mean, who am I to say, they’re not focussed or working hard”. Students characterised such members as ‘quiet but valuable’ participants in the group’s undertakings.

Peter: Most of the time when we stopped and actually asked them, they came up with something good. They came up with things of their own accord as well, but when prompted, they came up with things as well.

Rosanne: The people who talked less, when they did talk, they put in really valuable things because they’re waiting for other people to say it, but they didn’t, so they just say it and it was worth it.

My international interviewees echoed this view of silent participation. For example, **Ruth** said, “I was really quiet, but I was trying to listen and trying to make myself try and practice thinking that way”. Another participation strategy was to find another role. **Alice** and **Carol** took up research roles. **Alice** said that she did not know much to contribute to discussions, but explained “You just give me the work and I’ll look for information” (refer Section 7.3.2). **Amy** explained Carol’s role:

Amy: And Carol, her role became exaggerated in that she used to do a lot of research [...] She would take on a lot of the workload. I think she felt she needed to do a lot of the work because she wasn’t contributing to the group discussion.

Students referred to quiet people as a generic category and by name. This group comprised both local and international students: **Alice** (IS) and **Martin** (IS), **Diane** (local), **Ruth** (IS) and **Thomas** (IS) and **Bruce** (local), **Carol** (IS) and **Neil** (IS). It included all my international interviewees. **Alice** (IS), **Diane** (local), **Ruth** (IS), **Bruce** (local) and **Carol** (IS) all self-identified as members who were not very vocal during group discussions. Another clue to their identity and role was their implied invisibility through omission: students frequently forgot quiet people in their group descriptions, or recalled them last when listing members, as if their quietness had rendered them invisible.

5.6.2 Explaining quiet people: *It’s natural*

Quietness was considered an intrinsic characteristic and so a normal behaviour of certain people. **Bruce** said, “The ones who stayed quiet, I don’t think they felt they were forced to stay quiet, it was just their personality [...] some people are just naturally quiet,

so they don't say anything". Each group consequently had a particular sub-group profile of loud and quiet individuals.

Rosanne: Thomas, wouldn't talk that much, that's his nature overall. Julie talked a lot. Morgan talked a lot. Freddie was just moderate, if he wasn't quiet, he wasn't too talkative. Diane and Ruth, Ruth was quieter than Diane but, you know, everyone talks, but Ruth was quieter. Diane was probably between Freddie and Thomas. So, yeah, you had the variations.

Amy: Carol [pause] tends to not say as much at all, but when she does say something it's usually quite valuable [pause] Bruce [...] doesn't say anything at all [...]. Sylvie doesn't like to put in her ideas because she doesn't think that she's smart enough to come up with ideas to put on the board, as where, Cathy, Peter and I we're just like throwing out random ideas [...]. Often, you know, Peter, Cathy were sort of throwing these ideas up and they're not meaning to push the other people to the side but their voices and their opinions are quite dominating.

Angela explained, "Within every group there's dominating people and you could tell straight away that there was about two dominating people and, you know, the rest were quite reserved, quite quiet".

This difference in member natures, which led to the difference in roles, shaped group function in a natural way. **Peter** said of **Yellow**, "I think everyone knew who was louder and who was more passive. Obviously some people are quieter and some people are louder, so that's normal". **Carol** explained this as, "Some people were more active, they knew each other and had more experience and confidence. These people were organisers of the group and they put in more ideas". On the other hand, quiet people undertook non-leadership tasks. **Paula** described **Blue** as a "hierarchy" of "people's personalities", telling me "We had a few dominant people, a few not so dominant people and then we had the people who just did whatever, just followed". At the top of her hierarchy **Paula** placed Angela and herself as most "dominant", then Sam and Adrian "in the middle" and Alice and Martin as "submissive". **Alice** understood it as, "They're two kinds, active and passive, so the passive one will do, wouldn't mind doing the work and the active one will be the one that allocates the work". In comparison to herself, "... one of the most quiet", **Ruth** said, "Discussion-wise, as in during class times, most of the, some group members they are very (slight pause) they are very - *dominant*, I'd say". **Diane** explained that the difficulties in **Red** were due to personality, "There were a couple of people who were quite dominating and you know, you can't have two of these people in the same group and expect everything to go smoothly [...] if they have a *conflict*, then there's trouble because they're both dominating".

However, some students in the quiet role gave other or additional reasons for their behaviour, attributing their situation to external and social rather than internal and individual factors. Local student **Bruce**, who described himself as “... quieter, not the quietest”, explained that, “It was easier to be quiet because other people think the same thing and will say it”. Some students were not satisfied with the quiet position. **Diane**, whom I observed to be an outgoing, talkative local student in interview and social settings, told me that choosing to be quiet in the group was her response to having her input “shunned” by Morgan (refer Section 6.3).

Diane: If you’re constantly voicing an opinion and, you know, it’s not being accepted then, you know, you’re going to think ‘oh well what’s the point?’ ‘What’s the point’, you know, ‘I’m probably wrong’ so I just kept quiet about it.

The International students, **Alice**, **Carol** and **Ruth**, attributed their quietness to having an Asian cultural background. They had not learned to speak freely and offer opinions in class. **Alice** said, “The Asian schooling system is different, the term they use is spoon-feed, they don’t make you think”. **Ruth** explained, “Our education system has not taught us to speak out, speak up in class, it has not trained us to think on the spot, it’s more spoon-feeding for us during class sessions, it’s very passive, everybody listens to what the teacher has to say”. **Carol** highlighted the consequent differences between herself and “The local students, they know a lot and can think really fast”. For **Alice**, **Carol** and **Ruth**, doing PBL was a process of cultural adjustment and learning to speak out in class, which became more difficult due to the local students’ speed and accents when discussing. (For **Carol**, the cultural difference was exacerbated by the social aspect of her group; refer Section 6.4.1).

In contrast, only two local students referred to ethnicity when discussing quietness or passivity; they alluded to ethnicity in connection with English language ability, suggesting that communication problems arose for International Students due to their “language barrier”. **Cathy** thought that language was an issue for Carol (refer Section 6.4.1) and **Paula** explained Alice and Martin’s “submissive” roles as due to “communication” and having “English as a second language”.

The exceptions to this pattern of identifying the group as composed of dominant and quiet people were **Sam** and **Martin**. They shared similar perceptions of **Blue** as a “balanced”, equitable group without any dominating or quiet personalities (refer Section 6.2).

5.6.3 Group dichotomy: *Summary*

To explain general group structure, including quietness, students used a form of personal attribute theory. They broadly classified group members into two categories by inferring personality from behaviour. Students who spoke more in discussions or who guided the direction of the discussion or group activities were classed as “loud”, “dominant” or “active”, while their opposites, who spoke little and did not influence group discussion or group-work activities were “quiet”, “followers” or “passive. This person-role dichotomy informed group function: dominant members became leaders and quiet members were followers. Quietness and its opposite characteristic dominance, were regarded as essential characteristics of people, which provided the main explanation for behaviour and group function.

5.7 Group structure and function: *Summary and conclusion*

In this chapter, I have shown that each PBL group shared some core, structural features concerning group development and roles. All three groups developed spontaneously and informally, without explicit planning of roles or responsibilities. In all groups, informal roles emerged according to how students contributed to PBL process or group process. However, not all roles were equally available to each group member; students occupied various “unofficial” roles to which they were “naturally” suited. Students applied a lay theory of psychological determinism to explain group structure and function. Each group member’s role or position was the result of their having particular personalities or other individual attributes, such as previous knowledge or aptitudes.

Each group had a basic structural dichotomy of dominant and quiet people. Leaders emerged from among the dominant members and they either directed and/or organised the group. In contrast to the dominant members were the quiet or passive people, who were not directly involved in decision-making but often fulfilled other functions, such as doing work. Each group developed a distinct structure of leaders and followers, either a vertical hierarchy (e.g. **Blue** and **Red**) or a split into sub-groups (e.g. **Yellow**). In this hierarchy, local students tended to be leaders or dominant; International Students were the quiet followers. The International Students explained that they were in a new and challenging social and educational environment.

However, students did not consider the quiet people as non-contributors; they considered them as participants and valued their contributions. Although quiet people had

minimal input into group discussions they contributed in other, often material ways, such as finding information during research. Students did classify some members as one of two types of non-contributor. The first were regarded as avoiders because they evaded work without a legitimate reason. The other type of non-contributor, the excused, had group approval for not doing any work because they had legitimate competing obligations (I discuss the issue of workload and the role of the group further in Chapters 7 and 8).

Students' understanding of group structure and function raises a number of points for discussion. Students remained fixed in roles within their current level of capacity, they did not share and develop their skills by adopting new roles. A major ramification of students' understanding of group structure and function was that people's participation and contribution to their group was limited to certain roles and functions.

Students' constructions of leadership, in particular, have important implications. Students believed in fitness for leadership based on personality, which meant that group direction and organisation was limited to certain members. Only those who took the role for themselves became leaders and only those whose fitness for the role had group support had approval as leaders. In some cases, leadership was associated with conflict, which had a negative impact on group function.

Also of particular importance is the fact that some students were assigned to a quiet role and students' assumption that this was natural and that quiet people were content with their position. Since each group developed its own particular dominant-quiet profile, which shaped how the group functioned, group decisions (such as topic focus or choice of learning issue were guided) were made by the dominant members, especially the leaders. Therefore, some group members, in the quiet role, were excluded from full participation in the group.

In this study, students did not identify gender as a shaper of group structure, nor did I observe gender to have a major role in group structure. Males and females were just as likely to be leaders as to be quiet people, or to take up other roles. On the other hand, ethnicity in the form of cultural background was an implicit shaper of group structure by influencing which roles local or International students (regardless of ethnicity) came to occupy. Local students were more likely to be in dominant roles and have more input into group function, while the opposite held for International students, who were more likely to

be in a quiet role and have less influence over group function. Yet the main attribution for this was personality rather than culture or ethnicity.

I address group function further in the next chapter, Chapter 6. As this chapter has focussed on how a number of individuals combined to form a particular role structure, in Chapter 6, I show how the interactions between individuals shaped the group as a unit and each group's approach to working as a group.

Chapter 6. Group dynamics and function: *Getting on with each other*

6.1 Introduction

In Chapter 6, I develop my explanation of how first-year dental students understood the PBL group as a context for working together. Chapter 5 showed that group structure shaped group function and was related to students' beliefs about personality, roles and leadership. In Chapter 6 I show how group function was influenced by group dynamics. To build an overall picture of each group, I distil common features from diverse, individual accounts. I explain the nature of interpersonal relationships and interactions between members in each group, the resulting climate within the group as a whole and the way these influenced how each group functioned.

Through members' accounts of each group, **Blue**, **Red** and **Yellow**, I illustrate common patterns between dynamics and function across the groups. In Sections 6.2, 6.3 and 6.4, I show that each group had its own unique set of interpersonal relationships that influenced the way group members perceived the group climate and sense of team spirit. I also show that members could have quite contrasting experiences and perceptions of the same group.

6.2 Blue dynamics and function: *A mixed bag*

The members of **Blue** had quite different experiences of group dynamics and perceptions of group function. In spite of this divergence, all spoke of **Blue** as a reasonably constant entity throughout the Semester. After a brief, familiarising period when the group was new, students reported no major changes or developments. Members also spoke of **Blue** in two, quite separate contexts and in which the group functioned differently: during group discussions in class and during independent work out of class.

Sam and **Martin** described positive interpersonal relationships and group climate, while **Alice** and **Paula** believed poor relationships had marred the group climate. From listening to their accounts, I would have thought that they had been members of different groups. However, **Alice's** view of **Blue** links these disparate accounts into a complex picture of **Blue** dynamics and function. For **Sam** and **Martin**, **Blue** was harmonious, for **Alice** and **Paula** it was uncomfortable, and for **Alice** it contained both of these opposite elements. As a result of their different involvement in group dynamics, some students felt that all members were free to speak and others felt the group climate constrained free

speech either for themselves or others. Members' accounts show that during independent work (done between classes), **Blue** was very loosely engaged and undertook little or no whole-group work.

6.2.1 Blue discussions: *Friendly fun or awkward tension*

Martin and **Sam** (International Student and local student, respectively) shared a view of **Blue** as a group that worked well together because of individual- and team-level rapport. **Martin** began his interview by telling me “Quite early we had some good friendships going on”, then “... later on we were all friendly with each other”. **Sam** said “We were really friendly and good to each other”. Good relationships were the basis for an enjoyable group climate: getting on well meant having fun. **Sam** said interacting with the others “... made it fun as well”; it meant “You could joke, no-one was too serious about it”.

Martin made a similar observation:

Martin: The good thing was that we had jokes in the group also, it was good and fun. It was a fun discussion, we also do the work, but we would have little jokes about things we'd say, so it was a kind of fun experience. It made the work part enjoyable.

Martin summarised his group, “I think we had a nice group, a nice collection of good characteristics”, explaining, “... those are the reasons why I liked the group” and **Sam** said that members of **Blue** “... fit well together”.

Associated with these positive interpersonal dynamics and group climate, **Martin** and **Sam** described a group characterised by cooperation, equity and consensus. **Martin** emphasised balance several times, for example, “Nobody was too shy to talk or too aggressive to talk, it was all well balanced”. He explained that members respected differences; “No one was too strict with their opinion, we observed other member's opinions and then we tried to figure out, balance, how to get the best result”. **Sam** echoed this view of an equitable and cooperative group.

Sam: No-one was shy, no-one didn't want to say their part and everyone was ready to the listen to the others, no-one put down another person because of what they said and everyone was very interested.”

In contrast, neither **Angela** nor **Paula** mentioned friendship or balance. The core issue was a poor relationship between the two of them, which dominated their experiences of **Blue**. As contenders for group leadership, **Angela** and **Paula** were involved in a contest for control that marred their relationship¹. **Paula** spoke of “... a clash maybe in both Angela

¹ Both students spoke of the lack of accord between them and the way each individual student responded was different but private; however a detailed discussion of their individual experiences is not within the scope of

and I's personalities". Concerning the rest of the group, **Paula** told me "I didn't really get along with the people"; she explained "I didn't really enjoy the company of my group, all of the people, they would not be people I would probably normally associate with socially". **Paula** believed the quality of group discussion was directly affected by her poor relationship with Angela: "It put *strain* on working with everyone because there was tension between us". She explained that,

Paula: I think that rubbed off onto everyone, I think everyone felt that within the group, even though I didn't feel any other tension between anyone else, but you could really feel it: everyone else responds because you are in that group situation.

Of the group in general, **Angela** said, "We definitely got along quite well", yet she said of the conflict for leadership, "Me and Paula always disagreed". She described the group climate as "socially awkward" and explained this was due to her own wariness about dominating discussions.

Angela: So, sometimes it was a bit socially awkward, you know, you don't want people to think you're - you don't want people to judge you. So, it was a bit awkward, not as relaxed as I thought it would be.

Fun was absent for **Angela**, which she found disappointing, she said "I thought it would be a lot more fun because when I think group work, I think fun".

In **Alice's** experience of **Blue**, some members developed good rapport and other remained distant, which she described as a "sad thing" about her group.

Alice: I felt that some within our group, there were some people who didn't really like to be there, to be in the group, but other people do like to, if you come in the room they like to joke around and stuff like that.

She said of group relationships, "Certain members, we don't know each other, some members, you get to know them better through [the] group, so you get closer, but for some people you still treat them like just a normal classmate, which is just 'hi'". Concerning Angela and Paula, **Alice** explained there was "... some conflict because people had different opinions"; "There were only two people who were involved, but [they] were really strong on what they believed". She had overheard one of them telling someone else that "... she really didn't like one of the members in our group".

this chapter. **Angela** said she aimed to resolve the situation by reflecting on the problem and avoiding further antagonism by changing her behaviour: "I learned the way of the words a bit more". **Paula** told me that she felt uncomfortable to address it directly, but did try by bringing chocolates to a group meeting as a form of bonding, but this was unsuccessful. Conflict with Angela and the perceived group tension dominated **Paula's** DLP experience and interview and shaped her more negative overall experience of Blue.

Of group dynamics, **Alice** said “You have to try to maintain a group relationship with people because, [if] not, you won’t be able to get things going on, or finish up your work”. She believed that good social rapport fostered a supportive group climate, “When people joke around and then people respond to your jokes and when someone gives his opinion you try to support them and encourage them”. However, a lack of social rapport among other members influenced the group climate. However, **Alice** told me that “Some people in the group, there were a couple, they just want to get the work done, they just don’t care about the relationship”. Therefore, for **Alice**, the group had a work-only focus: “We discuss more on the work and not really casual stuff, we do that once in a while, but it’s not really like *friends*”

It is important to note that **Alice** was an International Student, which shaped her initial experience of PBL. She described how the contrast between PBL and her “Asian schooling” (refer Section 5.6.2) and her lack of knowledge (refer Section 7.2.1) affected her ability to speak up. However, her discomfort with participating was eased by the social rapport she eventually developed with some group colleagues.

Alice: Once you get to know each other better, even though you don’t know anything about the topic, because you’re comfortable with each other and you can you just talk about something else, you can ask questions and you get to share your opinion because you are comfortable, with them, so it’s easier.

Alice said some **Blue** members encouraged and supported her, explaining, “... that’s how you get friends”.

6.2.2: Blue independent work: *Laidback or un-united*

Independent work was undertaken between PBL class sessions and the group was required to research, discuss and produce a group summary of their work. All member accounts and my observations show that **Blue** operated out of class as a loose collection of individuals with almost no whole-group decision-making or activity and which relied on the organisational efforts of one member in particular (refer Section 5.4.1). However, members offered contrasting evaluations of how **Blue** functioned in this stage of PBL and this was associated with their varying perceptions of group dynamics. The group was either “laidback” or “easygoing” in its approach, or “un-united” and “on different wavelengths”.

Nevertheless, a common feature of member accounts of **Blue** concerns the way the group system of functioning developed, without any group decision-making. **Martin** explained that ‘There was a system without any discussions, it just appeared’. When I asked **Sam** to explain how **Blue’s** ‘system’ came about, he also told me “It just happened”.

Angela explained that **Blue's** independent work approach "... just evolved". **Paula** also offered the evolutionary explanation, telling me "... it just happened".

Students' interpretations of the out-of-class climate and the quality of group function varied in relation to their perception of the group climate when in class. **Martin** and **Sam**, whose experiences of **Blue** relationships and climate were positive, described group function out of class as low-key, making minimal demand on individual members, which suited each of them. **Sam** thought this conferred the freedom of limited commitment to the group. **Martin** also thought **Blue** had a relaxed style when it came to completing work.

Sam: I heard other groups were much more rigid in the way that they structured it, they had meetings and delegated tasks to this person, tasks to that person. I don't think I would have liked that as much because it doesn't give as much freedom, like, everyone has to compromise, but here no-one really compromised, they could have done their research whenever they wanted as long as they got it done by that deadline of Friday and the only commitment we had was when we had to write the summary and that's not much of a hassle anyway because we had the structure, we had the information. So I liked the way our DLP group worked.

Martin: We do the work but we don't pressure ourselves, it was just an easy working group. It's not like we were being slack, but we do our work but we don't pressure ourselves. We tend to, what is it, enjoy and do it the most convenient and easy way.

Angela's perception of the group's relaxed style of functioning was similar, she told me "We wouldn't *stress*, we were quite laid back, happy because we knew it would fall into place". She attributed this to a reliance on **Adrian** as organiser.

Angela: [long pause] From my understanding of the other groups, we were pretty [slight pause] laidback and we seemed to pull things together, kind of, I don't want to say in the last minute, but you know, without that much effort. And we had a clear kind of director which was Adrian. He was the reliable one and we always knew that he'd be reliable and we always knew that, you know [pause] if it came down to it, he would be looking after us.

Like Sam and Martin, **Angela** evaluated **Blue's** 'disconnected' approach positively due to the limited commitment required; "... it's lessening your workload because you have the reliable people like Adrian and it freed me up for other things or just not even having to do the work at all". However, **Angela** also described **Blue** as "unbalanced" and a "mixed bag", because group roles were not discussed and some members (particularly the "researchers", Adrian and Sam), did more work than other members (refer Section 5.5.1.2).

Paula, like Angela, cited Adrian as the driving force in **Blue**, "... he would get us organised"; and of the rest of the group she said "... we all just followed". She also described how the group made few demands on members, "We never paired off, or made

big decisions, it was all individual work”. However, she did not describe it as freedom and relaxed consensus, like Sam, Martin and Angela. **Paula** regarded it as a lack of cohesion, reflecting her experience of **Blue** dynamics in general. More than Angela’s “unbalanced”, **Paula** described the group members as being on “different wavelengths” and the group as “un-united”.

Vicki: So what words would you use to describe the group?

Paula: [Pause, laughs – self-consciously? Ruefully?] Well, I don’t think we were organised or unorganised. I don’t think we worked very well. I don’t think we were really a group, sort of un-united.

Vicki: Un-united?

Paula: Is that a word? It is now [laugh].

Vicki: It is now [laugh]. Can you tell me what do you mean by it?

Paula: Because I don’t think we actually worked as a group, basically.

Vicki: Not worked as a group. I need to make sure I understand what you mean, so just explain it for me. What characterised that?

Paula: I think we were a group and we got our work done, but I don’t think we got it done efficiently. So in that sense we all weren’t connected with each other, everyone was on different wavelengths. We never really communicated in the sense like ‘this is how we should do it’, we just did it and there was never really communication within the group. So that’s probably what I mean by the group wasn’t united, I think we didn’t function as a group [laugh], we kind of ‘function individually within a group’.

Alice, who saw **Blue** as fragmented when members were together, was also disappointed with **Blue** climate and the way it functioned. She said “My main issue with the work to do [pause] we don’t really do it together”.

6.2.3 Blue dynamics and function: *Summary*

Members of **Blue** gave diverse and contrasting accounts of their group. For **Martin** and **Sam**, friendly and supportive social dynamics supported good working dynamics and effective group function in class. This meant perceiving that they and others could participate equitably and freely in group discussions. These two members were not involved in any leadership and did not experience or perceive any conflict in the group. For **Alice** and **Paula**, poor social dynamics led to poor working dynamics and ineffective function in class. As the two most “dominant” group members, they conflicted over their attempts to lead **Blue** and the result was a feeling of themselves and sometimes others being constrained by tension and social awkwardness.

All members described **Blue**-group function during out-of-class periods as notable for minimal contact and little engagement among group members over how independent work was done. However, members’ judgments of their group’s success as a work-team varied widely. Evaluations ranged from positive descriptions of “balanced” and “laidback”

to negative descriptions like “awkward” and “un-united”. This was related to members’ experiences of group dynamics: **Martin** and **Sam**, who had the most positive views of group dynamics, evaluated group function most positively. **Paula**, who had the most negative view of group dynamics, rated **Blue** function very poorly. **Alice**, who perceived that group dynamics had both positive and negative dimensions, also considered that group function had a dual, even divided, nature, with some members working well together and others not becoming part of the team.

6.3 Red dynamics and function: *Non-functional to functional*

A similar pattern, of positive dynamics being associated with effective function and *vice versa*, occurred in **Red** group. However, in contrast to **Blue**, **Red**-group members spoke of their group as developing during Semester. Further, **Red** dynamics and function were similar in and out of class.

Over the 12 weeks, **Red** dynamics and function changed markedly. As in **Blue**, **Red** members also spoke of the initial period when students were new to each other. Then there were two major periods in **Red’s** history, shaped by two significant factors. All five interviewees described an initial period of the group not working well due to issues with dynamics, followed by its development into a “functional” group with improved dynamics. The shaping factors were one member’s influence on group dynamics and a special group meeting to discuss group function.

6.3.1 Red dynamics issues: *Different priorities*

Group bonding in **Red** was difficult because of the social differences between one member and the rest of the group. Relationships with Morgan, a mature-entry student several years older than the other group members, were shaped by an age difference that presented a barrier to rapport and understanding on both sides. As a result of relationship difficulties, **Red** climate was initially uneasy and group discussions, both in and out of class, for some were constrained (which was similar to the experiences of some members of **Blue**). However, members reported that this eased with time.

Morgan said little about interpersonal dynamics in **Red**, apart from noting the age difference and alluding to a lack of social rapport between himself and the rest. Although I tried to explicitly address group dynamics, he generally appeared to side-step the issue.

However, during the interview he made several references to working with “teenagers”². For example, he observed, “The people I socialise with might not have the same level of intensity over what’s on their iPod”. He highlighted the social distance between other group members and himself, “I like to invite them into my world now and again”. **Morgan** concluded that “You can’t make a social group out of such a diverse bunch of people, it’s just not going to happen”.

My other four interviewees expressed stronger issues about relationships with Morgan. Age-related differences in values and priorities created problems and conflict. For example, when trying to organise the group for its independent work, the other members opposed Morgan’s proposals for several meetings and a Friday night deadline for submitting research. A fundamental issue was balancing study with having a life. **Diane** said “We got really *annoyed* because one of the members was suggesting so many meetings yet *again*, so we got annoyed and we just said, ‘*Listen, we’ve got better things to do*’”. **Rosanne** said of their different priorities and the disagreement over deadlines, “He has got his life, at home with his family, I don’t know, his partner, whatever. *We’ve got our* life with our friends, it’s different, you know”. **Rosanne** also commented on her perception of Morgan’s attitude to social bonding during PBL.

Rosanne: In DLPs we will be sitting there talking [...]sometimes you’ll say something that is a little bit off track. [...] ‘*How was your weekend, Thomas?*’ You need the little friendships that grow. I think Morgan wasn’t too impressed with people doing that. He said we’re here to work [...] Because it is your first year, you don’t know anyone, you need to form those bonds so it can progress later on.

Relationship difficulties between the group and Morgan were exacerbated by how others regarded his leadership style. As I explained in Section 5.4.2, Morgan’s attempt to model good practice was interpreted negatively by his group colleagues as being dominating and controlling. **Ruth** said Morgan “... would want to take control of everything”, while **Diane** expressed it as “enforcing” his opinion. Consequently, the group climate was unpleasant for these members. Students used words like “annoyed” (**Diane, Julie, Rosanne**), “frustrated” (**Julie, Rosanne**) and “intimidated” (**Julie, Rosanne, Ruth**), to describe their reactions to Morgan’s behaviour.

Group function was impaired as a result. **Julie** said “some of our DLP meetings were very confrontational”. A major issue was that members felt unable to contribute. **Diane**

² **Morgan’s** tone was slightly mocking, but I am not sure if he was patronising the “youngsters”, as he called other members of **Red**, or being self-deprecating about his own age; whichever interpretation fits, his tone underscores his awareness of the age and social differences.

said, “If I had an opinion and I voiced it, it would be shunned”. **Rosanne** felt this way too, “When he was scribe he would cut off other people”. **Julie** explained that “When we did contribute it didn’t really feel as if we were contributing something that was relevant and useful to the actual assignment”. This created conflict in the group; **Ruth** said, “During discussions you could see that every time this person made a comment that the rest would be shooting back at the other member”. **Rosanne** summed up her view of **Red** function, “I think our group was fine [drawn out, qualified tone]. I think, if anything, he would be the person that made the group a little bit not work properly”.

However, **Morgan** attributed **Red’s** initial non-functionality to his colleagues’ youth and inexperience.

Morgan: There are always people like me that have to shut themselves up so others can talk and then there are young members of the team who have not been out of home ever, may never have had to speak up for themselves, they’ve got through school quite comfortably answering the minimum questions. It doesn’t mean they’re not motivated, not bright, it just means that their opportunity to find their voice may not have arrived yet.

He encountered different attitudes to his own toward group activities. For example, **Morgan’s** “wish list” was to have regular meetings with “a formal sort of start and finish and some sort of agenda”. However, he said his colleagues preferred meetings “to take place before or after a lecture, so it would just be pretty informally in a lecture space rather than in a seminar room” (refer Section 7.3.4). **Morgan** thought that “People’s overriding ambition on the course is to be here as little as possible”. Like his colleagues, he found it frustrating working with people who had different priorities and values.

Morgan: You think that people might value the chance to get together and produce a decent paper and the truth of it is that people value their own free time more than they value the DLP experience.

6.3.2 Resolving Red issues: *Growing as a group*

In addition to experiencing the previously described interpersonal problems, **Red** group was having difficulties during independent work. **Morgan** described it as “non-functional”.

Vicki: So, non-functional, do you want to talk a bit more about what you mean by non-functional?

Morgan: We would make an agreement to meet and then wouldn’t meet. And we would agree to present material and then it wouldn’t happen. So, for instance for the first, the very first meeting, I had produced a two-page summary and no one else had done anything.

In response to this situation, **Julie** decided action was needed.

Julie: I finally gathered up the courage to tell the group that ‘*Look, we’re not working as a group*’, I didn’t care whether or not we got the DLP finished but I thought it was more important that the group become more cohesive and we worked well together, and I put it all forward because we weren’t.³

As a result of **Julie’s** “courage”, **Red** had an extraordinary and significant meeting. **Diane** said “We had a meeting about meetings”, to discuss how they worked as a group. **Julie** called it “... that *big* conversation” and **Rosanne** said “It was “*huge*, at least half an hour”.

One of the issues addressed at this meeting was group relationships. **Julie** proposed they “work something out so we have minimal meeting time but enough to make sure that we get the work done and keep it just *purely* work-related rather we’re there for with friends”. Therefore, in the interests of getting the work done, **Red** eventually developed functional, work-only relationships, although students were regretful about the absence of social rapport.

Ruth: But basically, how we interacted, we are not really that close outside, we only come together when there’s a group thing. So it’s very [pause] everything is very oriented towards what we are learning, because we weren’t really friends outside classes, so it was kind of a very formal interaction.⁴

Diane called it “... just meeting up, not with strangers, but people that you don’t generally hang out with”. **Julie** concluded of having work-only relationships, “That’s the type of group we were, which is a bit upsetting because I would have liked it to be a little bit more fun”.

However, this change improved how **Red** functioned as a work-group. **Julie** called it “... a turning point” in the group’s development and **Diane** said “In the end what came out of it was really good”. **Rosanne** explained that the meeting “... made the structure, I think, because some of us missed one meeting, so then we said ‘let’s fix it up then’”.

Diane: We had a meeting about meetings where we just worked out everything that we were going to do and, you know, it was really tense because we had lot of disagreement⁵. But it was better getting it out rather than continually having a disagreement about constantly having meetings.

³ Although **Julie** addressed the group problem of lack of cohesion publicly, she said she managed the conflict over leadership privately (as did **Angela** and **Paula**, refer 6.2.1) by talking to her sister. As a result of her sister’s advice, **Julie** responded (like **Angela**) by trying to avoid further conflict and re-appraising Morgan’s behaviour.

⁴ **Ruth** described to me how she experienced **Red** from a dual perspective in much the same way as **Alice** did in **Blue**. As an International student, she felt socially and academically distant from her colleagues; however, she shared with them the feeling of being dominated by Morgan. Her interview focussed on her need to adapt to PBL as an International Student and the group need to manage dynamics and function. This comment about “formal” relationships was given in the context of describing the post-meeting group climate among all members and not in relation to her status as International Student.

⁵ The “disagreement” was the difference of opinion between Morgan and the rest of the group over meetings and deadlines, described in 5.3.1 *Red group issues*.

As a result, **Red** became “organised” (**Diane**) and “focussed” (**Ruth**). In **Morgan’s** eyes, **Red** became ‘functional’.

Morgan: “Well, we started off a pretty non-functional and then we got our ideas together fairly rapidly and we became reasonably good at what it was we were trying to do, where the mechanism of getting together and getting the work done became easier.

Another outcome of the meeting was a positive change in group climate overall. **Julie** said “After that point it just sort of smoothed over slightly and we started working better, as a team”. **Rosanne** explained that, “... then it was to a set agenda and everyone pulled their weight”. As result of their structured approach, the group became more cohesive because each member could contribute.

Diane: We know what we’re doing and it’s just so straight forward, whereas I’ve heard from friends that their group’s work is left till the last minute. They’ll be like, ‘*Oh you do it*’, whereas ours is very - we all had a part to play.

The change in climate coincided with **Morgan** ‘fading’ his leadership and taking a “more back-seat role” (refer Section 5.4.4). Students noticed that group dynamics had improved.

Ruth: I’m not sure if someone had a talk to him, but after that it slowed down because [pause] I think he became more considerate after that, of what the others were thinking and everybody else’s feelings.

The development of **Red** group dynamics and function can be summarised in **Julie’s** words.

Julie: Our group grew as a group, we flowered (laugh).
Vicki: Blossomed (laughs).

Julie: We blossomed (laughs) we did. We did end up working a whole lot more - once we had structure and we all knew where each person was at.

6.3.4 Red dynamics and function: Summary

As with **Blue** group, the quality of interpersonal relationships shaped **Red** group climate and function. However, whereas students’ experiences of **Blue** dynamics and function were either positive *or* negative and relatively constant, all students in **Red** reported a change from negative to positive.

Initially, members of **Red** struggled to establish good social relationships. Social bonds did not easily form between the younger members (**Diane**, **Julie**, **Ruth** and **Rosanne**) and **Morgan**, a mature age student, who was some years older than the rest of the group members. **Ruth**, as an International Student, also felt like a social and academic outsider with local students and this also contributed to her experience of **Red**. A major contributor to the problem between **Morgan** and the others was a lack of shared values and priorities, explained by students as due to age and personality differences, which impacted

on the role structure of the group (especially leadership). This affected the group climate and caused issues with smooth functioning. For example, group discussions were unbalanced and member contributions during independent work were uneven.

However, **Red** group addressed its dysfunction directly. Members established positive work relationships and negotiated (not without some initial conflict) a structured approach to independent work; this included a commitment to meet regularly to review progress of work. Consequently, each member felt able to contribute to the group effort and the group began to work together more effectively. At the same time, the group climate improved; all members (including **Ruth**) reported feeling more involved and committed to the group.

6.4 Yellow dynamics and function: *No disagreements*

In **Yellow**, social relationships also shaped group dynamics and function, with positive relationships supporting member involvement in group function. Members described **Yellow** dynamics and function as similar in-class and out-of-class and mostly constant over Semester. All members said **Yellow** was cooperative and conflict-free. Yet as with other groups, members had different experiences of the social dimension of the group and their participation in group activities. Cultural and social distance was a major factor in **Yellow** group dynamics and function. However, all members said they worked toward inclusion.

6.4.1: Yellow discussions: *Turning social*

A sub-group of four members enjoyed good social relationships and consequently they easily blended work discussions with social conversations⁶. Other group members were less involved with the social dimension of the group. Partly as a result of the close integration of the social sub-group's social and work dynamics, the others were also less involved in group discussions and decision-making (refer Section 5.4.3).

Amy, Cathy and Peter, all local students from the same city (and Sylvie, whom I did not interview) belonged to the social sub-group and all three perceived group dynamics and function very positively. **Amy** said, "We were quite close with the people that we did our PBLs with, it turned into a real social affair and I think it was the combinations of people". **Cathy** described the group climate as enjoyable and noted the absence of conflict,

⁶ Observing **Yellow** from day 1 I recorded that the group appeared to comprise two sub-groups, four socially close local students, who had most input (refer Section 5.4.3) and a less involved group that included one quieter local student and two International Students (refer Section 5.6.1).

“The atmosphere when you got together, it was a happy, friendly atmosphere, there were no disagreements, nothing like that”. **Yellow** climate was described as relaxed and easygoing, everyone was able to express themselves freely and without constraint or conflict.

Cathy: Everybody was just happy to let everybody’s personality be exactly that. There was no need to adjust yourself or make yourself a little bit quieter or anything like that because people were just happy to let the group flow.

Peter: From the first day, I was pretty happy to be in that group because there was lots of easy going people but no-one was really stressed or taking it too seriously. They just wanted to have fun whilst studying and so that was good right from the start [pause] and we all seemed to co-operate pretty well, no disagreements or anything. Just jokes and things like that. It was good fun, basically [laughs]⁷.

However, the social harmony and ready mixing of work and social did have a negative aspect for these students. In **Amy’s** view, the group was “inefficient” because “... we get distracted way too easily”. She explained that “Someone will turn around to the next person and say ‘*Oh what did you do on the weekend?*’ and it turns into a real social thing”. **Peter** concluded that it diminished the group’s performance.

Peter: Although it’s good to have a lot of happiness and an easygoing group, I think it could have been preventing learning to some extent because [pause] generally when you’re more serious it’s when you offer better ideas and when you stay on task, rather than when you’re making jokes and just having a good time.

One of the other local students, **Bruce**, did not mention being close to colleagues although he spoke positively of social relationships in **Yellow**. He identified an advantage of group-work as getting to know people and establish relationships beyond the classroom.

Bruce: I guess, with the people in the group you get to spend quite a bit of time with them and, outside of the course, then you can make friends with them. Like, some people you find you really like, (small laugh) some people you don’t mind.

Bruce also evaluated **Yellow** climate and function positively. Like other students who enjoyed the company of group-mates, **Bruce** spoke of ‘fun’ interactions during PBL sessions: it was “... really fun [...] to hang out with people in class”. Although **Bruce** was one of the quiet people, he explained that his quietness was partly personality and partly choice and not due to the group climate and being “forced” to stay quiet (refer Section 5.6.2). He described **Yellow** as “laidback”; his explanation of the term reveals that his

⁷ **Amy** and **Peter** explained that humour and jokes were also used in **Yellow** as a means of involving people in group discussions (refer Section 5.5.1.4).

experience of **Yellow's** working dynamics and function was similar to that of Amy, Cathy and Peter.

Bruce: When I say that our group was laidback, it's because we didn't argue with each other. We had heard other groups where there was tension, because there were people wanting what they want, not what anyone else wants. But I think the people in this group were willing to compromise, like, 'I'll have things my way this time, but you can have yours next time'.

Carol, an International Student, had a different experience of **Yellow**. When she described the social dimension, **Carol** distinguished between *their* relationships and *her* relationship with them.

Carol: Sometimes I was embarrassed because I couldn't one hundred percent enjoy the discussion. This was because some of the others were close and friendly all the time and with PBL I got nervous, maybe this was because I wasn't close friends with the group.

She said, "My PBL group was very friendly and they often would chat and talk about their own experience". The others so readily mixed work and social chat, that for **Carol** the boundary between social and work talk was obscure. She told me "Sometimes they would give their dental experience, but they may spread the discussion out to social chat." As a result of this blurred boundary, **Carol** said "I would get confused and think, '*Is this relevant?*'". She told me "It was frustrating not being able to join the discussion"; when I asked if she meant work or social, she replied "both".

Social distance combined with other cultural factors to shape group dynamics. For example, local students unintentionally excluded **Carol** by the way they talked; this included use of unfamiliar local knowledge and the rapidity of their exchanges, which made it hard for her to enter the discussion. In **Carol's** words, "... they gave responses to each other very quickly, I didn't have a chance to join in". It was difficult "... especially when local students talk and relate the discussion to things they know, that I might not understand". **Carol** also explained that to participate in English she needed more time than was made available by the local students, "Sometimes it's hard to explain in English what I'm thinking, sometimes it's hard to understand and I need to think longer before I can speak". She added that "Sometimes my confidence with English is not so strong". **Carol** contrasted this to working in her study group: "We can talk more freely because we're friends [...] my friends are more patient, they understand what I'm saying and how I speak English and my accent".

In contrast, her group-mates mostly attributed Carol's low level of participation to Carol's personal limitations, such as being naturally quiet and her problem with English.

Carol had been assigned to the position of quiet people (refer Section 5.6.1). **Cathy** said of Carol, "... even in the first session we knew that she was a quiet one". **Cathy** also told me that Carol's difficulty with English may have contributed, "... the issue was with English, just the language and how fast we were talking and that also wasn't helped by the fact that she was very quiet, wasn't a very loud person". **Cathy** said "Those two factors combined meant that she didn't input a lot into the conversation"⁸.

Therefore, their approach to including Carol in discussions meant helping *her* overcome her quietness and her language problems. **Cathy** explained that "It was up to the rest of the group to help her with that and to try and deal with that". **Peter** told me "A couple of times the louder people tried to stop and actually ask the more passive people for their input". This generic approach was designed not to focus just on Carol and her difficulties.

Cathy: If we were having a conversation, we would stop every ten minutes and ask the whole group, not just that particular person that we knew might have been having difficulty, '*Does everyone understand, does anyone want to say anything?*' We tried to make her come out a little bit more and make a bigger input in the discussions, what she thought and her ideas.

Students included Carol in their social geniality. **Amy** explained how Peter used humour to involve Carol (refer Section 5.5.1):

Amy: One time Carol said '*Let's write it in a table*' and so every time Peter would turn to Carol and say '*And Carol how would you put this in a table*' or something like that [laughs]. You know, he used to pick up on a lot of things, just quirky things and that would be his way of involving the rest of the group.

The group had a tacit understanding that they needed to involve Carol. **Cathy** explained, "It wasn't like we got together and said '*We need to do this*', it was more like everybody knew that it was to make the group dynamics a bit better".

Carol employed her own invisible strategies to participate. She said "I was participating in my head, I listened and followed the discussion and joined in when I could".

Carol: Sometimes they were talking about other things, not the DLP. While they were talking, I was thinking about the topic and working out what I wanted to say about the DLP.

⁸ This awareness developed later in Semester, after the Week 8 student development workshop about effective group-work (refer Section 4.7.5). **Cathy** said "One person in particular wasn't that good with English and we didn't know that at first, so I think the conversations at first were a bit fast for her and I wasn't aware that it might have impacted on her understanding."

To join the discussion, **Carol** said she would “... wait for the dead air”; she explained that this meant waiting for a moment when no one else was speaking, “... then I could give my opinion or idea”. **Carol’s** contributions were appreciated; **Amy** told me “**Carol** tends to not say as much at all but when she does say something it’s usually quite valuable”. **Peter** made a similar observation (refer Section 5.6.1). Although she did not become ‘close and friendly’ with the group, **Carol** concluded, “As an International Student, it was good for me to be able to talk to local students. It improved my confidence by talking with local students”.

6.4.2 Yellow independent work: *Rely on each other*

During independent work, all members including Carol identified cooperation and commitment to the group as features of **Yellow**. Whereas **Blue’s** system ‘just happened’ and **Red’s** was the result of a crisis meeting, **Yellow’s** system arose from the sense of support and commitment within the group. Everyone was struggling with the workload, so one member (Bruce) volunteered to make the group learning issue summary document in order to get it “out of the way for everyone else” (refer Section 7.3.2). Each member gave similar accounts: **Amy** told me “I think Bruce was the first one to do one all on his own and then from there on in we all starting doing it like that and it seemed to work better”. **Carol** told me that “all of us agreed” and as result “... we had a pattern of how our group worked”. **Peter** explained that “... we decided to get just one person to do it”.

Core elements of **Yellow’s** out-of-class climate and function were trust and cooperation. **Carol** said that a feature of the group was “...supporting and helping each other” with the work. Members would contribute in some way to assist the group effort.

Cathy: I mean researching as a group, everybody was really helpful. So they’d say, ‘*Okay I can go back and do this tonight*’ and then even if it was five minutes the next day, they’d come and report back on what they did. So they were all willing to do something, so that was good about the group that I was in.

Yellow group had a strong sense of reciprocity. **Peter** told me that when it came to turn-taking at being editor, “We all trusted each other I think to fulfil their role when it came to that time”. **Bruce** explained this as “You could be really lazy if it wasn’t your turn but when it did come to your turn everyone was actually quite hard-working so they could put something together”. As result members could depend on each other, **Carol** said “We knew somebody would come up with something”. Both **Cathy** and **Amy** used the word ‘rely’ in connection with group-work. **Cathy** told me that “I’ve got other people to rely on

[...] and other people who are depending on me to do things” and **Amy** said that for various tasks, “We knew who we could rely on”.

In spite of her quiet role in discussions, **Carol** felt and was recognised as a part of this climate of trust and cooperation. Her commitment to **Yellow** involved her finding other ways to participate in the group, compensating for her lack of involvement in discussions. Her other participation strategies included attending all meetings arranged by the others and doing a lot of research. Research meant finding a lot of information for the group (refer Section 7.3.2); **Carol** told me “I found a lot of information and gave it to the others”. This ‘compensatory’ participation was noted by **Amy**.

Amy: Carol, her role became exaggerated in that she used to do a lot of research [...] She would take on a lot of the workload. I think she felt she needed to do a lot of the work because she wasn’t contributing to the group discussion.

6.4.3 Yellow dynamics and function: *Summary*

In **Yellow**, one sub-group of members were closely connected (including interviewees **Amy, Cathy, Peter**), to the extent that social interactions were integrated into and sometimes overtook work discussions. The other members (including interviewees **Bruce, Carol**) were not really a sub-group as such, but were distinct by being less socially bonded and less overtly involved in group discussions; sometimes this was by choice and sometimes not. It was particularly an issue for **Carol**, an International Student. The barrier to her participation was socially constructed in the interaction between all group members, with social and cultural differences mediating her exclusion. In spite of general goodwill on the part of all members and all members’ attempts at including everyone or joining in, **Yellow** remained to some degree a site of unintentional exclusion; **Carol** never achieved full social inclusion. However, by all members’ accounts of **Yellow**, the overall climate was supportive, the group was free from conflict and members communicated and cooperated well as a group during independent work. So **Yellow** was described by its members as committed and engaged as a work team.

6.5 Group dynamics and function: *Summary and conclusion*

In Chapter 5, I showed how group role structures developed and I highlighted how leadership and dominant roles or membership and quiet roles were associated with personality. As a result, group direction was not a whole-group matter. In this chapter I have shown how group dynamics contributed to group function. The social dimension of

the PBL group affected individual member experiences of their group and also shaped the way the group worked as a group.

Although each group had its own distinct pattern of interactions that shaped group function, in all groups there was a common pattern: students desired to be on good social terms, preferably friendly, with their group colleagues. In each group, students briefly mentioned a short period of newness and not knowing each other when the group was first assembled. In this period, social bonds were forming, students were getting to know their classmates (sometimes forming friendships and sometimes experiencing conflict over differences). This was the key shaping factor in each group, which determined individual members' ongoing experience of their group and how the group functioned as a group.

In all groups, good social bonds enabled a comfortable working climate in class, characterised by fun and jokes, which in turn enabled individual members to feel able to participate in group discussion and activities. A positive group climate also made it more likely that group members would communicate and/or meet between classes and coordinate their independent activities as a group. In the opposite situation, lack of rapport prevented students becoming comfortable and impeded the group working closely as a group.

However, there were important variations between the groups. **Blue** dynamics and function were experienced throughout Semester by two members as positive, two members as negative and by one member as a mix of positive for some students and negative for others. As a work group, **Blue** was not highly cohesive (it was either "laidback" or "united"). In **Red**, a similar initial pattern of poor social bonding led to a poor climate and function. However, members made a concerted attempt to rectify the situation and developed a structured work-only approach to dynamics and function. This meant that **Red** was able to develop a cohesive team approach to group-work in and out of class (all members "had a part to play"). Finally, members of **Yellow** had different experiences of the social dimension of the group, with one International member being socially excluded to some degree. However, there was no overt negativity, as in other groups and members exhibited goodwill and members considered it a cohesive work team (they could "rely" on each other).

The relationship between group dynamics and group function raises issues for further consideration. There was a tension between the role of the group as a social and personal

setting and its role as an educational and professional setting. On the one hand it was a place where students were able get to know some of their classmates, which allowed them to engage and have fun while working and learning together. On the other hand, it was a place where demands were put on students to work together in spite of personal preferences about whom they would or would not choose to socialise or work with. This tension was not necessarily comfortably resolved.

The social aspect of the first-year PBL group must be also considered in the broader context of students' transition to Dental School. Students came from a variety of backgrounds with differing experiences of groups; some were school-leavers and others had previous work or professional experience. Their conceptions of (and needs for) the group may have varied. Ethnicity and gender must also be considered as shaping factors. The findings show that the overall connection between rapport and team belonging was the same for male and female students. However, there were some shared experiences that were unique for the International Students: social and cultural distance was a factor in their group experiences.

Chapters 5 and 6 have focussed on group structure and dynamics and how they shaped group function. In Chapters 7 and 8, I focus on students' accounts of groups and how they went about work and learning during PBL.

Chapter 7. Groups and work: *Assembling knowledge*

7.1 Introduction

Chapters 5 and 6 provided an overview of group structure, dynamics and function. I explained how group function was shaped by group roles and relationships and highlighted the significance of members' personalities and friendships for shaping groups. The focus of Chapters 7 and 8 is to explore the purpose and value that PBL groups had for students.

Chapter 7 is about students' understandings of what their group did during the course of a PBL package investigation. As I showed in Chapters 5 and 6, each group had developed its own particular approach to working as a group, which was shaped by the structure and dynamics within that group. However, in addition to their particular group style, all three groups developed the same basic way of undertaking PBL group-work. Each group approached PBL as a linear three-stage process and each group developed similar practices at each stage and had the same basic rationale for these practices.

I have used the concept of three stages to provide the structure for Chapter 7. Stage 1 took place when the group was presented with the problem scenario (Section 7.2); stage 2 involved the independent research and group-work (Section 7.3); and stage 3 occurred during the final session of each case (Section 7.4). For each stage, I explore the way students interpreted the tasks and activities the group was to undertake while it investigated a PBL case. Then I present students' explanations of the advantages and disadvantages of the group for each aspect of a PBL case. Throughout, I show that students interpreted group-work in PBL as assembling knowledge by summing the contributions of individual members.

I use the term knowledge assembly to distinguish what Adelaide students did as a distinct activity from knowledge construction or knowledge building, which are the terms generally used in the PBL literature. As this chapter shows, students assembled knowledge by adding separate quanta of information together. My point is that the product of group work was a larger knowledge product, but not necessarily a qualitatively different type of knowledge or understanding. This was a different group activity to the PBL ideal of knowledge construction, in which the group jointly develops new knowledge and understandings through discussion. I consider the significance of this difference further in Chapters 10 and 11.

7.2 Stage 1: *In the group*

This section is called '*In the group*' because this stage is where students located most of the whole-group work. As I show in Sections 7.3 and 7.4, individual activity was more necessary than whole-group activity.

7.2.1 Group purpose: *We're supposed to know something*

Students interpreted the group purpose as to combine what all group members knew about the PBL scenario. The importance of knowledge, information and product was conveyed by students' comments about the frustrations and anxieties they experienced in this session. Interviewees used expressions like "supposed" and "should" know and there was a sharp contrast between the ideal and the reality of what the group was doing.

Students believed the group was supposed to produce correct "answers" for each PBL step.

Rosanne: I think 'causes' and 'consequences' was one where we were like, '*We don't know anything about this*'. We're supposed to know how, say, I don't know, just randomly, 'periodontal disease', what's the cause for it and what's the consequence for it. We know nothing about periodontal disease, how are we supposed to come up with this? And that is part of the first session.

Students' understandings of group purpose focussed only on the knowledge outcome and their inability to produce it; students did not speak of the process of reasoning about their ideas as part of the group purpose.

Cathy: I don't have the knowledge base behind me to go through it properly. To go through all the steps properly, I don't have the knowledge base to do it.

As a result, groups experienced uncertainty or frustration at being unable to achieve their goal, often identified as due to a lack of formal or 'taught' knowledge (which could be remedied by the tutor).

Julie: We're all sitting there going '*But we all know the same amount, which is absolutely nothing*' [laughs]. Unless you've done something like DA-ing, or BOH before, you could never come in and know¹.

Peter: The whole time you don't really know what you're doing is the right thing and I know there's tutor assistance, but I'd probably prefer to, say, we did brainstorm for an hour but then for the other hour someone actually told us.

A sense of worth as a group member was attached to how much knowledge one could contribute; students did not speak of other forms of input (such as group process or questioning and raising issues) as valuable contributions. **Ruth** explained that her own

¹ DA-ing =Dental Assisting; BOH = Bachelor of Oral Health

satisfaction depended on how she “contributed” to the group whereas **Alice** said “I felt that I didn’t contribute much [...] because I don’t know a lot of stuff”. When describing their groups to me, students often listed, ranked or compared people according to how much they contributed in group discussion (**Angela, Alice, Paula; Julie, Ruth, Rosanne; Amy, Cathy, Carol, Peter**). Students noted that when the quiet people in their groups spoke, they made “valuable” contributions because they added to knowledge (refer Section 5.6.1).

Rosanne: I think Thomas didn’t talk that much, you know. Thomas, he talked a fair bit when he talked: I think of all the quiet ones he would come up with the most valuable information.

Peter Sometimes their viewpoint that they expressed was very good, because they just listened to what we had to say the whole time and then they just thought about it and constructed their own idea or whatever, input.

On the other hand, **Amy** criticised some group colleagues for ‘not contributing’ to the group, which meant not offering their knowledge. She explained that Sylvie had done a year of university, “... therefore it means her knowledge is actually greater than us but [...] she doesn’t really give much to the group”. **Amy** also criticised Bruce’s lack of contribution; she did not consider querying or disagreeing as valid contributions.

Amy: Bruce, he may say something, it’s usually like ‘*I don’t think that’s right*’ or ‘*Nup, that’s wrong*’ or ‘*I don’t think that we should do that*’. So it’s never really anything positive. He doesn’t really contribute much to the group at all.

Since the group objective was knowledge-assembly, members’ knowledge levels influenced their comfort in participating. **Amy** explained about her first experience of PBL, “It was *daunting* [...] to discuss something where I was supposed to know something, actually know information, that was the daunting aspect of it”. At the start of Semester, **Alice** “... didn’t really feel comfortable because I didn’t know anything” and **Ruth** was initially “shocked” in the first PBL case, which revealed her lack of knowledge². In contrast, **Paula** said “Because I have got knowledge, so it was easy for me to go, ‘yes, caries’”.

Therefore, knowledge shaped if and how members participated. **Amy** told me, “Basically, I told them straight off that I don’t know anything, so don’t expect anything great from me”. On the other hand, **Alice** said that “Paula would contribute things that we hadn’t learned yet and she knew” (refer Section 5.5.1). Students associated having valid information with providing answers, so they refrained from offering information about

² **Alice, Ruth** and **Carol**, all International Students, clearly distinguished between their reticence due to lack of knowledge on the one hand and on the other, the impact of group structure and dynamics on their ability to speak up and join discussions, refer 5.6 *Group dichotomy* and Chapter 6 *Group dynamics*.

which they were doubtful. **Bruce** said that he would think to himself, “Did I read that somewhere? I think it’s right but maybe it’s not, so I won’t say it”. **Alice** had a similar attitude, “When I voice up my opinion [...]I’ll say it out, because, yeah, if I’m sure about a topic I’ll have some information and things to back up with what I say”. To explain group difficulties, **Rosanne** said that “People just sit there quietly going, ‘cues, consequences, I don’t know if I should say it, maybe they’ll think I’m wrong’”. **Ruth** said “When I’m not so sure I feel held back, I think, ‘*Should I say it now, is it relevant, does this make sense, is it a good point, is it an issue that should be brought up?*’”.

Members’ lack of knowledge hindered the group’s progress at knowledge-assembly. The board was a place for the finished product; students did not speak of it as a working space to record various ideas or hypotheses. **Amy** regarded her role of scribe as arbiter: “A lot of the time if people’s opinions don’t meet then I’m the one that has to mediate because I’m the one that finalises it by writing it on the board”. Knowledge deficits made it difficult to achieve the product on the board. **Rosanne** said “You don’t know anything about it, yet you’re supposed to write all this information down” and **Cathy** complained “That’s what frustrates me: that you don’t know anything about it and you’re expected to do this whole big thing on the whiteboard”. Ideally, the group was producing as much knowledge as possible about the scenario. In reality, as **Bruce** explained, “Not much work gets done at all because [...] if you don’t have much knowledge, you can’t approach the situation very well”.

7.2.2 Group activities: *Stuff we did as a group*

Students identified this session as working together and several spoke of being *in* or *with* the small DLP group, in contrast to both independent work and the final in-class session, when students either worked separately or outside the group (refer Section 7.3) or in a different group (refer Section 7.4). For example, **Paula** referred to it as: “... in the group sessions, when we were actually together” and **Cathy** spoke of it as “... in the group, before we were split up”. **Diane** described the class sessions with the small group as ‘group-work’: “... we’d do the group-work for the two or three hours that we had”. **Sam** spoke about the first in-class work as “... the stuff that we did as a group during DLPs”. **Rosanne** called this being “... in the group ...” and **Amy** also described it as “When we’re in the group ...”.

Knowledge-assembly during the first in-class session required whole-group activity. Most students referred to it as “discussion” and used various other terms to indicate a

group effort, where all students were engaged (ideally) at the same time and place on the same task (subject to the constraints of group structure and dynamics). In addition to “discussing”, students used “brainstorming” (**Angela, Paula, Julie, Cathy, Peter**); “conversation” (**Alice, Bruce, Cathy**); “interaction” (**Carol, Sam**); “talking about it” (**Angela, Sam, Martin, Rosanne, Bruce, Peter**); and “our little group discussions” (**Amy**) or “our DLP meetings” (**Julie**). To describe participation in group discussions, students used words like “contribute” (**Angela, Alice, Paula, Ruth, Rosanne, Amy, Cathy**) or “input” (**Sam, Julie, Cathy, Carol, Peter**).

7.2.3 Group advantage: *See all of the problem*

The main benefit of having a group was that the information yield and hence knowledge product of the combined group effort was greater than that which could be produced by any individual student. With a group, more information was available to be pooled. For example,

Angela: Good things? (laughs) Definitely the first sessions, where we got the trigger and we discussed it because, like I said, people like Sam and Adrian, they just bring so much ideas to the table that you would never have thought of on your own.

Students appreciated the amount of information that their colleagues contributed because it enabled them to ‘see’ more of the problem.

Sam: Well like, you can’t come up with all the ideas by yourself so other people have different ways of seeing things so I would have always been concentrating on this particular aspect of the DLP and then someone would say something and then it opens up a whole new area for us. In that way it was helpful.

Vicki: (Pause) So, what for you were the good things about working in the group?

Ruth: First thing is that you share a lot of knowledge between your friends. Like, different people know different things and when you come together you get this pooled knowledge from everybody, that’s a good thing.

Peter: One person comes up with two ideas and if every person comes up with two ideas, that’s 14 ideas. But, you yourself would probably only come up with 4, if you thought about it for a long time. That’s probably a bad example, but you come up with more ideas and that was useful.

Students also valued group diversity because it expanded the type of information available. **Carol** explained that she benefited from others, “Some people are quite creative in their thinking and they have lots of good ideas”. Others made comments like, “Everybody has different backgrounds and different ideas” (**Martin**); “Having diverse people’s experience was good” (**Morgan**) and “Getting a different viewpoint is very good” (**Peter**). **Martin** described the outcome as, “I get multiple views, so I get a more, wider

thinking”. **Bruce** said “When you’ve got a group everyone has to have a say [...] so it gives you a broader view”.

The result was a single, more complete view of the problem. Taken together, the sum of the knowledge and ideas of all group members meant that the PBL problem could be ‘seen’ in much greater detail.

Julie: It was just good because we saw what - other people saw what we wouldn’t have normally seen. Like, when we’re given a picture for the DLP, I might look straight away at the teeth, whereas Morgan would look somewhat at the back teeth and I would just look at the foreground and he’d look at the background and putting all together, whatever we looked at together made it just more, a bigger, more comprehensive picture.

7.2.4 Group disadvantage: *Different ideas*

Although students endorsed the group for producing a better outcome, they experienced difficulties working as a group because of the nature of the task. **Paula** described the initial in-class discussion as “... all about brainstorming all of the different people’s ideas” and **Rosanne** said “In group-work you have to analyse all the ideas and see what’s best”. So, although the group was a valuable pool of information, having to manage everyone’s ideas was the initial source of problems.

The difficulty with managing ideas was related to students’ questionable knowledge status. Part of the discussion concerned decision-making about what was right and what was relevant and how to record it. **Julie** said of the discussions, “It definitely caused frustration because everybody had their own idea of what happened and some people thought they knew more than other people”. Students complained about being confused by the different opinions being offered. **Rosanne** said “Everyone puts their own ideas in, which is good but a lot of them are just completely random and contradictory to what someone else has put in and then you just get confused”. **Paula** explained that her frustration with the discussion was that they never arrived at an answer: “Everyone has something different to add or whatever and, it’s more just talking things through and never actually reaching an outcome”.

Students experienced this aspect of discussion as frustrating delays that diverted the group from its task of compiling information. Part of the problem, according to **Angela**, was the group going “totally off on a tangent” when members wanted to discuss “something low on priority”. **Rosanne** told me that “people disagree about something and that would take 10 minutes and well, what’s the point?” **Peter** was “frustrated”, because in

his group “We seemed to take really, really long to do things because, I guess, everyone had a little bit of input and we couldn’t decide”. These delays hampered the group’s progress at finding ‘answers’.

Cathy: I wouldn't have been one of the most vocal people in brainstorming because I just prefer to get the right answer straightaway and that's just the way I work, like I don't want to have to do all these things that are wrong, when I know they're wrong. That's just the way I work.

Other purposes for group discussion apart from information giving were not reported. No one (apart from **Morgan**) spoke of discussions as opportunities to explore and test understandings or hypotheses, or to raise uncertainties or issues for group consideration.

7.2.4 Stage 1: *Summary*

The group role in the initial stage of PBL was public knowledge-assembly. It involved recording group members’ contributions of information and facts in a visible or tangible format, such as scribe notes on the whiteboard or group recorder’s notes on paper. The product of this stage was the summed knowledge that group members had brought in to the group. Students valued whole-group work in stage 1 because through working together they could assemble more knowledge. Essentially, more ‘heads’ meant more knowledge and ideas and diverse ‘heads’ meant different knowledge and ideas, which together resulted in a bigger, better product. However, each group experienced issues with process because students were outcome-oriented, which meant finding answers and maximising product. The discussion process was constructed as a means to finding answers; it was not constructed as a way of exploring and developing knowledge. When students were not sure of the accuracy or relevance of their information, this caused individual and group anxiety and confusion and impeded progress on knowledge-assembly. Students were frustrated with delays associated with trying to evaluate and reconcile group members’ contributions.

7.3 Stage 2: *Doing the work*

‘*Doing the work*’ indicates students’ main focus during this stage. The group purpose was described as doing the “work” of producing the group’s *Learning issue summary* document³. However, in contrast to the initial knowledge-assembly session, which required

³ The directions for the group in the Student PBL Guide suggested that students should spend the time between class discussing their research as a group and considering how it helped them to understand the problem better. This was so that they could discuss and apply their research effectively in the final session. The Learning Issue Summary was intended only to be one part of this process, to help students learn to

a whole-group effort, group summary production involved members individually doing work on behalf of the group.

7.3.1 Group purpose: *The group summary*

In this stage of PBL, the group purpose was to assemble knowledge in a tangible form, which was a written summary of the group's learning issue research. Students were outcome-focussed, when they described what their groups did between PBL class sessions, summary-production was the sole group task and all activities were directed to this purpose. Students used terms such as doing "the assignment" (**Julie**), "the project" (**Rosanne**), or "the final document you produce" (**Angela**) and "the final product" (**Bruce**). They did not talk of group discussions or group learning as goals in themselves. **Morgan** was an exception, he regarded process and content as relevant and I describe his understanding in Section 8.5.

A common descriptor for what occurred during the independent stage was 'the work'. For example, **Peter** ended his description of the in-class discussions with a brief comment about summary production as work, "... it was good fun, basically (laughs) and then when it came to the work [...] we ended up with eleven pages of group summary". **Julie** explained that the goal of **Red** group's extraordinary meeting (refer Section 6.3.2) was to organise summary production, "... so we have minimal meeting time but enough to make sure that we get the work done". **Paula** distinguished between what the group did together in class and just working out of class, "When we were outside the group [...] it was more just doing the work".

Work involved assembling knowledge through a series of information-handling activities. These included locating texts and information, collecting the information from various texts, collating all the information into a single document and distributing a copy to each group member. The main activities referred to by students were "research" and "editing"; the nature of these activities meant that work could be undertaken by individuals and separate work combined to make a final product.

Research was the product-oriented work of gathering information. To describe what they did during research, students used expressions like "gathering all the information" (**Martin**), "get information" (**Rosanne**) and "finding stuff" (**Bruce**). It was the main work

identify and organise key and relevant information. It was also a guide for tutors as to what the students had learned.

done by most group members during this phase. **Alice** said of her compensatory role in the group, “Just give me the work and I’ll look for information”. Students often identified research work as distinct from other abstract PBL activities like discussing, contributing one’s own knowledge and facilitating. For example, **Amy** explained that “**Carol** used to do a lot of research, take on most of the workload” because she “needed to do a lot of the work because she wasn’t contributing to the group discussion”. **Alice** believed that “... the researchers would do a lot more work”, while others would “... contribute in different ways”. **Diane** also told me that “The researchers did a lot more work” in comparison with other group activities.

However, research work was not only what each member did, it was also what they produced and so it could be handled as a material object. **Martin** explained that to make the summary “Somebody collects other people’s work”. Students described giving or sending their information to the group editor, who was designated to produce the summary document. **Alice** explained that “We will just give the person the information that we found and then the person, the one person will just do the summary”. Sometimes the hand-over was done in person, at other times groups used electronic delivery (this also became a substitute for face-to-face meetings, refer Section 7.3.4). For example, **Rosanne** explained that **Red** group had a series of deadlines for handing over information, “Thursdays we meet up and give your (pause) and show your information and then if we can’t find any more or whatever and then on Friday you send it to the editor”; **Angela** told me that “Everyone would do the research and then send it by email to the editor of that DLP”; while **Carol** said “I would put information on the discussion board on MyUni”⁴.

The research work of individual members could be added together to make a whole-group effort. The final summary was a compilation of work; the document was physically assembled by collating the separate pieces of research into a single text. Students described the process as to “collect all the information” (**Alice, Martin**), “put it/all the information together” (**Angela, Paula, Sam, Ruth, Rosanne, Bruce, Cathy**) and then “type” (**Alice, Sam, Peter**) or “write” it up (**Rosanne, Amy**). Once the document was complete the editor emailed a copy to all group members.

⁴ MyUni was the online curriculum environment provided by the University. Staff could upload course information and course documents and students could upload assignments and download course documents.

Students called the job of making the actual summary document, “editing” and this was done by one group member, the “editor” (refer Section 5.3). Editing was mechanical, information-handling work. It involved “sorting” members’ information contributions, culling “overlapping” information, then “collating” information in the pre-arranged “template” and “typing up”. The following descriptions illustrate the similarities of the role in each group.

Sam: He’d collate all the information and type it up from all his sources in a one page order. And, so others would just highlight or underline the important parts and then that person would use the structure - we would have decided during the PBL, we would have decided on a structure on how we’re going to set up something - so the person that was designated to type up the summary he wasn’t really doing anything, from his own head, you know what I mean? He was just typing up and putting in the information into the slots, kind of thing.

Diane: And the person who collaborated it all, they had to do a lot of work and they are getting a pile of information from every group member and they had to sort through it and make up a summary sheet that’s comprehensive, relevant to the topic. And, you know, that’s a lot of work and to chase up people for the information and all of that. So that one person would get a lot of work. Sorting through information is just really pain, you know, really painful. I mean, you get so many emails and overlapping information that’s useful to it in making up this sheet that has to go through the template, fit on the two pages and have references and all that.

Cathy: You didn’t talk about what everybody else had learnt, you just get their information and cut and paste and make your two pages to send off.

Although **Morgan** considered editing to be clerical, he had a different understanding of how editing and research linked and of the role of editor⁵.

Morgan: I tried to explain that [editing] didn’t absolve you from doing the research, but often that’s actually what it meant to people because they thought, ‘*Well I won’t do any research, I’ll just wait for it to roll in and make the document*’. For those that understand, that, what you’re actually trying to do is sort of, you know, summarise and synthesise. Sometimes people that do that, they just take everything that arrives and bundle it into a document and you can see there’s been no editing and if you ask them what’s in the document there’s been no understanding either.

Over the course of the semester almost everyone in each group had a turn at each type of work.

Ruth: For the research part, we would take turns to put the information together. So in that way we would rotate it around. So, basically everybody would be doing the research except for one person who would put that information together and it’s optional if that person wants to go and research the topic, that’s really up to the person. So everybody took their turn to put the information together, so basically everybody went through the same step.

⁵ Morgan explained that he had suggested having an editor as a way to let all members have a role in the group.

Morgan: So giving them a sort of coordinating role for editing the document is just a way of perhaps you know preparing them to get on and do it and feel like they had some responsibility.

As **Peter** explained, “Eventually everyone had to take a go at typing or gathering information”.

7.3.2 Group activities: *Subdivide and allocate work*

Since work could be sub-divided and allocated among group members to be done individually, the involvement of the whole group was limited to organising the work allocation among group members.

Vicki: You said before that not much was group-work, can you explain which work was?

Ruth: The individual work was research, where we would have our sub-topics. The group work was basically identify what exactly we need to research and how was it supposed to be, like if we'd clarified the key issues involved and then we would allocate it, that would be the group-work. And then the individual work, you take your own topic, you go and research it and then you pass it on to the editor and the editor will put all the information together.

Each group had the same basic system of work for each PBL case: members shared the research load and the group editor produced the summary document on behalf of their group. The way such group-work occurred varied with group dynamics and function (refer Chapter 6). **Red** and **Yellow** had whole-group meetings to decide who did what and monitor progress and members sometimes worked in sub-groups (although this diminished over time, refer Section 7.3.4). **Diane** said “We were really organised in the way that we set out tasks for each of the members”; she explained “it would be like, you know, you do this, this, this, this and this and we'll all email it to one person and it's done”. **Julie** described how they coordinated their efforts within the group, “We split up into groups and two or three people were researching the same thing”. **Carol** told me “In our group we divided the learning issue and the work”. **Amy** described how **Yellow** sometimes coordinated sub-group efforts, “Sometimes if the question's split up into about three parts we'll go in pairs”. On the other hand, **Blue** was loosely organised with minimal meetings; members relied on **Adrian** to direct the group (refer Section 5.4.1, 6.2.2).

Paula: By that stage we had our allocation of what we were going to work on and then somebody put it - each week it differed - and somebody just put it together each week. So I think it was, except for the organisation in that sense, it was all very separate, because we had very separate work, like very separate [pause] topics that we were covering.

Alice described **Blue's** separate approach, “we discuss together who will do what, but we don't do it together, so you do your own individual part”.

Therefore, in stage 2 the major whole-group activity was to sub-divide the research topic into discrete sections to be done separately (by individuals or sub-groups). **Alice**

explained that “We have the sub-topics and we’ll just choose who’ll do sub-topics”; **Julie** said that “We split up into groups and two or three people were researching the same thing”; **Amy** described **Yellow’s** approach as “We usually just hang around afterwards and say ‘*You do this bit and I’ll do this bit*’”. The division of research labour varied according to the nature of the learning issue topic.

Martin: We just separate it, ‘*You do incisors and others do canines and you do premolars*’ and that kind of thing and then you would get all the information.

Rosanne: We either split up the job, if it was like (pause) differences between gender, race and age then we’d split that up, you know. Say, two people do gender, two people do age, two people do race, you know. But if it was something like ‘just describe this’ we’d all get information.

The other initial group task was to identify an editor for that week’s problem, each group had a voluntary turn-taking system for this: **Alice** said “We all shifted the responsibility of being the editor”; **Ruth** told me “For the research part, we would take turns to put the information together”; and **Carol** explained “People take turns to do the summary”. Therefore, although the group’s work was summary production, group-work was not necessarily undertaken as a whole group effort

Sam: The way we structured our group-work was to have everyone to do the research for a particular DLP and then one person would put it all together.

Rosanne: Once I had to do the group-work, because every week we took turns in being editor [...]

Cathy: You didn’t have to put as much work into the group-work, it just happened individually.

7.3.3 Group advantage: *More information more easily*

The overall value of the group was quantitative, more information could be found in less time through the efforts of all group members than could be located by an individual student. **Martin** told me that he didn’t have to read a lot of books because “... with group-work [...] I can get the whole information easier”. Sharing the research reduced individual workload.

Carol: There would be lots of study to do if you had to do it all by yourself, it would need a lot of discipline to organise yourself to do it all. Also, you can have access to the information in lots of references because everyone can share what they found, it would take too long for one person to look at all the references.

Sometimes group members specialised in particular resources, which increased the potential amount of textual knowledge that could be accessed by individual members.

Paula: I'm a bit guilty of not going to the library and getting journals. So I'm more a textbook or internet type person. And when I work with people they are always sourcing journals or working with references that I would never even look at because that's just something I don't do. So it was really good because, like you find much more relevant information or whatever, or vice versa.

Julie: Like, I can find your odd one or two articles that are half-decent now and again, but I can't ever find them that easily. If you give me a book that I need to, like I can go and find a book, I'm better at books. Other people are better at web pages and things. And it's good to get a wide range of information, it's good to see all the different ones and it's good working together in that sense because we do get more resources.

The group could also help to fill gaps in information and so ensure greater coverage of their topic (this was done in the brief corridor meetings or via email and phone, refer Section 7.3.4).

Rosanne: Some things, that I can't find in a book, I'll ring up someone and say *'Hey, I'm just doing the project, I can't find anything on this, do you have anything?'*

Having a group enabled optimal use of time and material resources because it avoided "doubling up" or "overlap". This occurred when resources were consulted more than was necessary to obtain the required information, or when the same topic was researched repeatedly so that information was gathered in duplicate. Having allocations avoided this.

Julie: We had two or three people on each little sub-bit. [...] You could do individual research and tell each other which parts you were going to do and where you were going to research, so you didn't double up on stuff.

Of course, the converse problem occurred if the learning issue was too small: there was not enough work to do without research overlap.

Sam: [Learning issues] weren't big enough just to split the topic into different parts because in the end you just go over onto the other person's topic, the research you'd find would just cover someone else's.

The advantage of subdividing the topic or resources among group members was that research was more efficient. Each resource was only consulted once by the designated member or sub-group and each part of a topic was only researched once, yet maximum coverage of the topic was ensured. The following excerpts from my observation records illustrate these concepts.

Observation notes Week 11, 26-04-05: Blue

(Arranged meeting with the group to talk about how it works)

[...] **Sam** said that "the group's important when you're doing the cues and interpret" but "when you do the summary" it's "not useful". **Angela** did, however, speak up in a 'yes but' sort of tone. She said that there was one DLP where the group "work was really useful" because of the complexity of the

learning issue, they did different classes of teeth and it “wouldn’t have been possible to research it on their own”. At this **Martin** added that the size of the learning issue “should be big enough” so there’s “enough” for everyone to do. I wanted to make sure I understood. I asked, ‘so is everybody of that opinion, that the group is useful for discussing the scenario but then the rest of the work is more individual?’ [this is similar to what yesterday’s group had said]. They all nodded at this and a few people made comments like because everyone can comment/add information. The comments were that if the learning issue is “big” then the group is useful for managing it and if the learning issue is small, to quote **Angela**, “you don’t depend as much” on the group. **Paula** came up to me after the session to respond to the questions, she said that fewer people work on a small learning issue and the larger the topic the more structure there is.

Observation notes Week 9, 11-05-04: Red

(Arranged meeting with the group to talk about how it works)

[...] **Morgan** explained that they divide the topic, sometimes into two groups or into pairs⁶. **Freddie** said they each do a bit of the topic but there’s always an editor. **Rosanne** gave the example that for the one where they did ‘age, race and gender’ [DLP 1.2 Buried teeth] they had one person as editor and the rest of the group worked two per sub-topic on their learning issue, that way “not everyone is doing everything”. I asked what “the logic” was behind this format of sub-dividing the research. **Freddie** explained it was to “minimise the workload” not for “one person to have to do all the research” and **Rosanne** added that by doing it this way you could get “more in-depth and relevant information than if just one does it”.

Observation notes Week 8, 5-05-04: Yellow

(Library research with group, 8.30 am, morning after the PBL session)

[...] Then **Amy** suggested that they could “divide up the learning issue” while they were waiting for **Sylvie** to arrive. In response to this, **Peter** suggested they identify the resources first and then allocate those so there was “no doubling up”⁷.

[...]

(Follow-up talk with group about how they did their research)

[...] They explained that “this topic was hard to split” (compared to past ones) so this time they “split the resources”.

7.3.4 Group disadvantage: *Wasting time*

In spite of the advantage of *having* a group, students said that working *together* as a group was inefficient and unproductive, even though they acknowledged that it was a curriculum requirement. They described it as “time-consuming” (**Angela, Bruce**); a “waste of time” (**Sam, Diane, Peter**); “painful” (**Julie**); “tedious” (**Sam, Ruth**); “a hassle” (**Cathy**); “silly” (**Paula**); “not productive” (**Diane**) and “inefficient” (**Amy, Bruce**). This is because students had interpreted working together as all group members doing the same

⁶ Although this is how **Morgan** described the group approach to managing research, he told me in his interview that he regularly researched and summarised the whole learning issue. I discuss Morgan’s understanding further in Section 8.5.

⁷ These notes are from an early session when **Yellow** went as a group to find resources in the Library, which they then allocated to sub-groups. They later abandoned doing this as a group because it was inconvenient and left it to individuals to find their own resources.

activity at the same time. This meant physically finding resources together, simultaneously selecting information in each resource and co-composing each sentence of the final document together.

Sam: Well, when you're sitting together in a group you don't really get as much done. When you're trying to research on the same computer, you might click on something else, you might want to do something else. I don't think it would work as well. It's the same when typing up the summary, if everyone's around the same computer, everyone has different ways of phrasing it. I don't think we'd get much done with this kind of thing.

Julie: Well, it was like teeth-pulling painful. Just the idea that we had to sit together and nut this thing out, all as a group. We all had to decide on every single point and we had to decide if we liked the way it was written and if the information was correct. It was just painful. It's not conducive to group-work.

Amy: Seven people cannot sit around a computer and say, *'Well how do you want to word this?'*. You can't actually physically all do the learning issue together. You can't seven of you go to the library and all be looking at the same book going, *'Oh, this is important'*. Like, you've got to, you have to split it up.

Working together required superfluous effort because groups were focussed on the outcome rather than the process. **Peter** said "What's the point of researching the same thing seven times? Writing the same thing down in seven different ways and [...] put it together in one piece of work?". **Angela** told me "It's like six people doing the work that one person could have done, six people doing the same work but only needing to hand up one piece of work". **Rosanne** had a similar view, "Everyone just put their own input in and it's needed, but the outcome was the same in the long run, the same information was there".

Working together also wasted time because it involved managing opinions versus getting the work done. According to **Amy** there was "... a time issue if you try and talk about it", the problem was, "... you have to deal with everyone's opinion". **Diane** noted that when **Red** worked together, before deciding to work separately, "... it would take so much longer to organise it". Therefore, students considered working individually to be easier. **Alice** said that "Group-work might be harder than individual, because in a group there will be different opinions but individually you can do it to what you expect it should be like". **Peter** said "I prefer to work by myself, I could usually get the task done quicker"; he compared this to groups, "You have to organise meetings, you have to discuss it and think about what you want to do and what I want to do, let's find a compromise".

Time was a valuable commodity consumed by group meetings. **Ruth** said "People don't really like to spend time getting together". **Cathy** explained that "finding time" was the problem: "... the difficulty in trying to find everybody and find an appropriate time to

meet.” The full timetable exacerbated the time issue. **Diane** said “We’ve got long hours nine till five, we don’t want to stay back and have another meeting here and cut up our lunch and have another meeting there”. The exception to this view was **Morgan**, he expressed a preference for formal, regular meetings to discuss research and the summary content (refer Section 5.3.1).

To save time, students minimised the frequency and duration of meetings. Meetings became short and opportunistic. For example, to subdivide and allocate work, groups had a brief discussion immediately after the PBL class session. **Sam** explained, “... just like five minutes after, I wouldn’t call it a meeting, it was like a mini-meeting, we’d just say ‘*We’ll do it like this*’ and then the person that’s going to write the summary up, he just takes a quick note of it”. **Red** group also took this approach: “We found that it would be just so much more convenient to stay back 5 minutes after we got the topic rather than once again meeting up afterwards” (**Diane**). **Amy** said “We never have meetings, we might, when we get given our topic, we usually just hang around afterwards”. If groups had meetings through the week to monitor progress, I observed that they occurred in the corridor or lecture theatre immediately before or after another class, when group members were already present, which avoided the need for a separate meeting.

Students also saved time by substituting face-to-face communication with electronic exchanges to monitor research progress. This was possible since the main purpose of meetings was to deliver research or information or make requests for information “gaps” to be filled. **Martin** told me, “Actually, we didn’t even have group meetings at the end, we just used email”; he explained “We didn’t find any purpose in meeting each other, the work we found, we just found it more comfortable and more convenient by sending it through email”. **Ruth** said that **Red** group used to meet to discuss their research “... but that became too tedious so we would email our contribution”. This was one of **Morgan’s** complaints, “Rarely did we meet to discuss the final document, so it would just end up as an email document to all the group members”. **Yellow** also aimed to save time with technology.

Bruce: So we found a really efficient means [pause] we would - I think towards the end our work was getting a little sloppy but it was still passable [laughs] - and it sounds awful: we would just meet after the lecture, after the PBL session and just say ‘*Okay since you did this last week, I’ll do it this week*’ and then we would just say ‘*We don’t really have time to meet so we’ll just communicate via email, what you have, send it to me and I’ll put it all together*’. And someone would volunteer to do that every week and it just got it out the way for everyone else.

Time was also saved through the editor system. **Paula** explained why discussing the summary was unnecessary, “You would never actually sit there and go, ‘*Well, this is actually an interesting point, should we put this in here?*’”. Students regarded discussions about what to include or exclude and how to organise and express the content as stylistic matters of personal preference and opinion, rather than academic decisions. Therefore, students said that discussing the content and organisation of their summary was a waste of time.

Angela: But [working together] wasted a lot of time and I suppose that’s where it [i.e. editing] came from because it was so time consuming for everyone to throw in their ideas and someone to type it up and then, you know, erase it because that person didn’t like the way it was said, you know.

Rosanne: Someone would say ‘*Nah but that’s not needed*’ and you say ‘*Yeah it is*’ and someone would start on a tangent. Why are we talking about this, when we could be actually working on the assignment?

Amy: That’s also where the time difficulties come in, that if you are trying to do it together, there’s so many other things to deal with beyond the sheer academic piece of it. It’s dealing with meeting up, where do we meet, when do we meet, what do we really think is relevant?

So the impetus for sub-dividing and allocating work was to find an efficient alternative to working together. **Sam** explained that “If we all just did it separately and brought it together it is much quicker”. Nominating one person to be editor was especially helpful. **Peter** told me that “We decided just to get one person to do it; I think that was more productive”. **Alice** said “It was easier for one person to represent the whole group”. This meant that the editor became a proxy for the group and not only physically made the group document but also made decisions on behalf of the group about what to include and how.

Angela: We all kind of learnt on our own and then forwarded a summary of what we learned, to the editor and he pretty much ‘collaborated’ it on his own [laughs]. Solo collaboration.

Vicki: [laughs] Solo collaboration.

Angela: It was easier and more efficient.

Rosanne: I think one of the arguments was we don’t need on Friday to meet up again. If Thursday we’re meeting up about the information, discussing it and then we go home and change it if there is any need to. Friday we can send it to the editor. We don’t need to meet up again to check it all again and then send it to the editor again. What’s the point of revising it if you have an editor?

Cathy: When I was editor, I found a lot of the information that people gave me just repeated itself. So you could just delete one thing, because it’s all on the computers, just copy, paste what they’ve written because they’ve put it in their own words and referenced everything as well, so okay, that one is exactly the same as what this person said but this one sounds better, we’ll get rid of this one and put this one in.

When I sent **Angela** a copy of her interview transcript to amend and approve, I asked her to explain further what she meant by ‘solo collaboration’. This is what she wrote:

Solo collaboration: brainstorming was done together, but we did personal research on our own, find our own understanding of the topic, then email our part through and someone would collate it, this is the collaboration bit, to get the whole picture.

To manage their resources and time effectively, students had substituted working together with “solo collaboration”. Group members would “... all work together, even if it was working individually, it would be because you were all working together” (**Cathy**).

Cathy: I suppose the only sad thing is, though, that the best way to do it isn’t in a group and that takes away the idea of you know, group PBL, when you work out that the best way of doing this is not in a group and that’s what the aim of it is, but that’s just how it works out.

Therefore, the knowledge-assembly process was simply instrumental and the group product was the sum of the individual parts, which was deemed to be the equivalent of a whole-group effort.

7.3.5 Stage 2: Summary

In stage 2 knowledge assembly involved adding together information found in texts. The group purpose was to assemble public knowledge in the form of a summary document of group members’ research on the PBL learning issue. This was undertaken as work, which could mean the overall group summary or its separate components, in the form of raw materials for the summary, such as copies, notes and extracts from reference texts, as well as work activities such as researching and editing information. As a result, the group summary embodied knowledge in the form of authoritative information sourced by all group members from textbooks, websites and journals. The advantage of a group in stage 2 was to allow access to more resources and information. However, students considered that working together as a group was an inefficient way of using time and resources. Therefore they developed a system of subdividing and allocating research work to individual members, which was then delivered to the group’s editor, who compiled the final learning issue summary document on behalf of the group.

7.4 Stage 3: The mixed group

Students often referred to this session and the group itself as “the mixed group” to identify it as distinct from the rest of PBL when they were with their other, small PBL

group⁸. Students did not speak of the mixed group as a collective undertaking in assembling knowledge (as for their small-group undertaking), instead, they talked of the mixed group as context for exchanging knowledge.

7.4.1 Group purpose and activity: *Exchange knowledge, present summaries*

Students constructed the purpose of the mixed group as a public forum for exchanging the knowledge embodied in each of the group learning issue summaries. This was achieved through students taking turns to present their small group's learning issue summary to the rest of the group. In this setting, students swapped with their class colleagues the pieces of knowledge that had been collectively assembled by each of the small PBL groups during their investigations.

Presenting group summaries was the main activity and the final information-handling task of PBL⁹. It was mostly a process of transferring information and the flow of information was one-way from speaker to listeners.

Angela: With the mixed groups it was just pretty much presenting our research to them and maybe a little bit of discussion afterwards but not much.

Information contained in the group summaries could be swapped through the reciprocal processes of presenting and listening. Every student I interviewed used the term “presentation” or “present” to indicate the task. For example, students used expressions such as “present it to the group” (**Paula**), “give the presentations” (**Diane**) and “people presenting their group summaries” (**Peter**). Sometimes students referred to the reciprocal activity of listening to others' accounts of their group's work. For example, **Bruce** told me “You give a presentation, for maybe 10 to 15 minutes on your group summary and you listen to everyone else's”. **Alice** said that “people will just present to you, so you just listen to them”.

The mixed group session was temporally and conceptually distinct from the small-group work. Presenting was the linear end-point of the small-group knowledge-assembly. **Sam** described it as “we got the learning issue one week and then the next week we had to present what we learnt about it”. Likewise, **Amy** said “we come back as a group to like

⁸ For this session students were re-assigned to larger groups of 14 students, each one comprised of one or two students from each of the ten small PBL groups in the class (refer Section 4.7.2).

⁹ The instructions in the Student and Tutor Guides were that groups were to discuss their research, using their group summaries as guidelines and consider how it applied to the explanation or management of the problem situation and also to include a critique of resources used. The format was that the small-group representatives were asked to summarise their own group's learning issue, listing the main points and their significance to the PBL problem as a starting point for discussion and questions and answers.

present our learning issues”. **Morgan** had a different perspective on presenting. He also described PBL as “research and presentation to other groups, when we come back into the large group we present to the mixed groups”. However, he explained that this was a learning process (i.e. not just exchanging information).

Morgan: I was thinking, well, the clinical discussion will come later in the course, but the tools for doing it will be built through you know research and presentation to other groups. When we come back into the large group we present to the mixed groups, then it’s a way of clinically explaining what it is you’ve found out that other people may not be aware. And you might - you know that’s perhaps some sort of a metaphor for later explaining to other people what it is you know in your little area of expertise.

Unlike the initial PBL session, this session did not involve problem-solving or offering different opinions and ideas. **Alice** found it a more comfortable experience: “I felt better because I actually had a chance to contribute some information, you know? Yeah, so I didn’t, I guess I didn’t feel that passive, like the passive one”. **Rosanne** also found it easier to talk, “In the second week we’d be fine with the different groups and talking about our projects”. **Ruth** explained how the nature of the task differed.

Ruth: It was different because this wasn’t so much of a - it’s more like the guideline is there, it’s a set thing and you just have go there and present it, whereas the other group discussion is more using your thinking skills and you have to know the right way of thinking and know how to go about answering the questions and starting from scratch and building your way up. Whereas this is just, you go there, you have everything there, you just talk about it to the rest.
Vicki: So you’re really talking about something that you do know about?

Ruth: Yeah [pause] it’s not a problem-solving thing, it’s just something that you’re presenting there.

7.4.2 Group advantage: *Don’t all have to research it*

The advantage of the mixed group format was quantitative and reflected students’ concerns with outcomes and efficiency. Since the purpose of the group was to enable a class-wide exchange of knowledge built by each of the small groups, the knowledge accumulated was greater than what any single small group or individual student could produce in the time available, or for the amount of work done.

Alice: And the good thing is you don’t have to do your research on the other topics and people will just present to you so, you just had listen to them and you get to find out some basic knowledge on it.

Diane: The good thing about these mixed group sessions is that different topics, different main topics, all of us were coming together and everybody sharing their information with us.

Amy: I think the point - sometimes I think that the point is, is that there is so much information that we need to know, that the reason that we do this is to split it up and we don’t all have to research it. We can just get the information from someone else’s summary.

The summaries became knowledge itself in the form of textual information to be learned. Students spoke of downloading and learning (or discarding) group summaries as sources of personal knowledge gain when preparing for examinations (I discuss and learning and assessment in Chapter 8).

7.4.3 Group disadvantage: *Solo collaboration*

In this session, process issues associated with working in a group were only partly related to the mixed group itself, they mostly flowed on from the way the small groups had responded to group-work issues during independent work. The efficiency initiatives meant that students often presented their information poorly, which reduced knowledge assembly.

The first efficiency strategy of subdividing work meant that most group members had only researched and learned their own section of the learning issue and had no knowledge of the whole topic (refer Section 8.4). The other efficiency initiative of reducing meetings also affected the value of the mixed group. Instead of having a final meeting to discuss the whole learning issue and its application to the PBL case, the editor emailed a final copy of the summary document to every member; this was possible since the goal was to distribute information. **Sam** said the editor would "... just type the summary together and email it to everyone". Often there was no time to meet so email was necessary; **Ruth** explained "Time was a bit cramped, so we ended up just emailing it to each other". **Amy** said they asked the editor, "Please get it done early enough so the rest of the group can read it before we have to present it". However, often it was sent at the last minute, for example "the night before" (**Alice**) the PBL session next morning.

As a result of these strategies, presenters had little time to familiarise themselves with the document contents and were often uncertain about much of the material they presented. Students were quite open with me about their negative experiences of trying to present in these circumstances. **Angela** explained that "If you don't do the research then it's hard to get your head around the two, it's only two pages". **Cathy** said her preparation involved "... madly trying to memorise two pages". **Julie** said that because of this system, as presenters they "... were really just up in the air".

Since most students had limited knowledge of their learning issue, presentations frequently consisted of students reading from the sheet. Presenters were literally presenting words on paper: "Most of us we just read our summary" (**Alice**). **Amy** told me that "people just read slabs of information and just re-read it, they don't actually understand it fully".

Paula: But even in that we all worked individually and somebody would just put it together and then we had to present it to the group, just read off a sheet, kind of like. I mean, you had an understanding of what you were doing of course but you didn't - it wasn't really that effective.

7.4.4 Stage 3: Summary

The final in-class session of PBL was the culmination of knowledge-assembly for each case. In the mixed group setting, students swapped their knowledge products by presenting their groups' summaries. The end result of the process of summary presentations was a collection of pieces of knowledge pertaining to all the learning issues relevant to the particular PBL case. However, the quality of presentations was sometimes inadequate due to the way the group summaries had been prepared. The efficiency strategies of subdividing work and not meeting to discuss the group's work meant that presenters did not have detailed understanding of the whole topic and this impaired their ability to transmit knowledge effectively.

7.5 Groups and work: Summary and conclusion

In Chapter 7 I have shown that students understood the purpose of the group during PBL to be assembling knowledge by adding quanta of information together. Therefore, they constructed PBL as a linear series of knowledge assembly stages in which students gathered and distributed information within and between groups. In the stage 1 scenario discussion, the small groups pooled the current (uncertain) knowledge of all group members; during independent work the small group collated knowledge from texts into a group learning issue summary document; in the final session groups exchanged knowledge when representatives of the small groups (uncertainly) presented their group summaries to the mixed group. Further, knowledge-assembly could be done either by the whole group working together or by individuals working separately on behalf of the group because it did not necessarily require a whole-group effort to make the final product. In the case of producing the learning issue summary, one member was able to work as a proxy for the whole group.

This account shows that students were outcome-focussed and that process was simply instrumental toward achieving this. Discussing, researching, writing the summary document and presenting were all processes oriented toward producing a knowledge outcome. Therefore, students negatively evaluated any process issues that impeded or delayed knowledge production. Further, efficiency was another major concern for students and so another group benefit was being able to organise work efficiently so that individuals

devoted less time and effort to PBL work. This was another advantage of working as individuals on behalf of the group.

The main group advantage in knowledge-assembly was quantitative and its value lay in its ability to access more information and produce more knowledge. In the scenario discussion, a more complete picture of the scenario could be built. During research, more researchers could access more and varied resources and gather more information so the summary could be more complete. The mixed group potentially enabled more knowledge than a single group could assemble. The knowledge generated by the group was available for individual members to learn. Students' construction of the group task and how they organised it also shaped the role of the group in learning. I address this in Chapter 8 Groups and learning.

Chapter 8. Groups and learning: *Transmitting knowledge*

8.1 Introduction

Chapter 7 showed how students interpreted the group task in PBL as knowledge-assembly and preferred their group to work in ways that maximised knowledge production and efficiency and avoided delays and time-wasting. In Chapter 8, I explain how students understood the role of the group in learning and how this related to group-work in PBL.

I organise my discussion of learning around the three stages of PBL that I presented in Chapter 7, since students distinguished these as different learning opportunities. I show how students expected to acquire knowledge in each stage and why some of their expectations were not met. I explain that students understood learning to be taking in information and show how students' conceptions of work and learning in PBL shaped the role of the group. I also explore how broader issues, such as the curriculum context, shaped the overall purpose and value of the PBL group in learning. I show that students constructed PBL groups in response to demands other than those of PBL.

8.2 Stage 1: *Pick up information*

Since the group purpose in stage 1 was to assemble knowledge about the PBL problem (refer Section 6.2.1), group-work at this stage provided an opportunity for learning as personal knowledge gain. However, the extent to which students increased their personal knowledge was linked to how well they rated their colleagues as sources of information.

8.2.1 Knowledge gains

Students' responses to being asked if being in or working in a group had contributed to their learning signified that they understood learning to mean taking in information and gaining knowledge. They spoke of learning in terms such as “getting” or “picking up” information and “increasing” or “adding” to knowledge; teaching was constructed as “saying” and “telling” each other things.

Learning in stage 1 happened when people who knew or had information told others what they knew. **Alice** said that “During discussion, information wise, they know a lot of stuff as well, so I was able to increase my knowledge from what they say”. **Sam** also valued the scenario discussion, “Coming up with ideas and working through the scenario: that was very helpful”. He told me that “When we came in the group to discuss the

scenarios, I really got information out of that”. **Ruth** said the discussion was a chance to “share knowledge” between people. **Julie** described the scenario discussion as a “learning thing” because group members could increase each other’s knowledge.

Julie: It was actually also a learning thing because whatever we learnt during the past week we could tell each other and say, ‘*OK, this is what it could be because of rah, rah, rah*’, which was really good for me because I didn’t really do much study and so I learnt off them a lot: little bit of a sponge, but I really liked that and after a while I could do that as well and then I could input more into the group.

Information could also include knowledge about meanings, such as dental terminology. **Angela** told me that she did not learn much directly about the “content” of dentistry from her colleagues but their input did facilitate her own independent learning during individual research.

Angela: I think DLPs made it easier, made learning easier.

Vicki: Do you just want to explain that?

Angela: Well for me, if I had a trigger on my own, my individual DLP, say, I’d read through the text and words that I didn’t understand I’d just disregard, pretend I did understand. Whereas, with the group, other people that know what that word means, can say, ‘*Oh that word means rah rah rah*’ and that makes it so much easier. So then you have a stronger building block to start your research from.

Other students said they did not learn anything from the group discussion because they did not consider their group colleagues to be worthwhile knowledge sources. **Bruce** said that “You learnt random bits of information, which people remembered and might relate, but I think, in terms of, substantially, for the time that we spent there you don’t learn much at all”. This assessment was based on his view of PBL scenario discussions as an exercise in collective ignorance; he concluded it would be easier to learn as a group if “... you were prepared beforehand and pooled it all together”.

Bruce: Well I think the PBL was different - from study group - because you’re meant to talk to someone who doesn’t know [slight laugh]. They’re meant to talk to you and you’re meant to gather something apparently and then, yeah [slight laugh] I don’t know. But in terms of working in a group to learn, I don’t think you can do it if you don’t know anything.

When talking of their shared lack of knowledge, **Peter** contrasted this to his school experience.

Peter: In school you’d have a teacher teaching you something and at least you knew what you were learning was what was right. You had, obviously, trust in the teacher, so what they were teaching was truth because they’ve studied it, they’ve gone to uni or somewhere else.

Paula and **Rosanne** also told me that they did not learn during the scenario discussion due to their colleagues’ lack of knowledge. Students also pointed out that the

learning occurred later (refer Section 7.3.1). **Paula, Blue** group's knowledge person (refer Section 5.5.1), told me she did not learn because she knew more than her colleagues: "... a lot of people don't have any idea about anything to do with dentistry or clinic or whatever". **Rosanne** also said that students "don't really know much" until they do their research. Both students concluded that the first session was not about learning knowledge.

Paula: See, I think it was, because, the PBL sessions we actually had, like where we were actually in our groups, DLPs, we didn't really - like I didn't really learn that much because you do, like maybe the thing that I learnt the most was to look at like to have a broader view of things maybe not being specific, which is really good, but in terms of actual knowledge-base maybe not that much.

Rosanne: You do learn stuff during stuff, during the first lesson, Professor will say things, but most of your learning is after your learning issues have been identified and then you go alone to research things. That's when most of the learning happens.

Vicki: When you are researching on your own?

Rosanne: I think so, because during the first lesson, it's 'what does the scenario say?' We don't really know much about that at the time, so what does the scenario say and then you would say, I think we have to learn about development of teeth.

Peter also said that in the first session group discussion "We weren't learning anything specific, about caries, for example [...] it wasn't actually learning anything new because the actual learning came after". **Amy's** view of stage 1 learning was similar.

Amy: It's good [drawn out, qualified tone], but I don't really think that we're learning anything new in that one session. I think the learning comes from when you go away and research or when you come together the next session and do the little group discussions and you can present what your group did.

Cathy also expressed frustration with the group discussion because she was impatient to go away and start learning.

Cathy: And I'm just sitting here going, '*Just give me the learning issue and I'll go learn it. Don't make me go through all of this stuff that has no basis for anything. Just give me what I need to learn and I'll go learn it*'.

In fact **Amy** and **Peter** said that the first session ought to be much shorter for that reason. **Amy** said, "I do feel at times it's a bit of a time waster, I could be *actually learning something* at this time". **Peter** had a similar view, "I'd probably prefer to say, yeah, we did brainstorm for an *hour* but then for the other hour someone actually told us".

8.2.2 Stage 1 Learning: *Summary*

Learning in this session was constructed as picking up information in the form of facts and meanings from group colleagues during the knowledge-assembly process. The group was a potential source of knowledge but students had variable views on the value of the group for learning at this stage of PBL. Some students considered that their colleagues imparted useful information and added to their own knowledge. However, others focussed on students' lack of knowledge, which was an issue that not only impeded member contributions and group knowledge-assembly but also hindered personal knowledge gain during the scenario discussion. These students said that for this reason they learned little or nothing during stage 1 group discussion. Students often located learning in the research stage of PBL.

8.3 Stage 2: *Only know your bit*

Learning during independent group-work was informed by the way in which students constructed and organised the work of assembling knowledge as individual sub-tasks. The ramification of this approach was that learning was a mostly individual activity of increasing one's own knowledge, in which the group had an auxiliary role.

8.3.1 Knowledge gains

Research and learning were closely linked activities for students. It was possible for students to increase their own knowledge while they were doing their research because (i) the work of research was constructed as gathering information and (ii) learning was understood to be gaining knowledge through taking in facts and meanings. **Sam** explained to me that doing research was the route to learning, "Everyone understood because everyone did their own research".

Students did most of their learning alone, away from the group while researching. For example, **Peter** explained that "... the actual learning came after" the scenario discussion: "... in the actual self-directed learning when you go off home and do it". **Rosanne** said that "Most of your learning is after your learning issues have been identified and then you go alone to research things". **Paula** also told me that "The only learning that was done was outside [the group] when we had to go away and do our learning packages".

However, students' learning during research was shaped by the way groups organised their work. The sub-division and allocation of research sub-topics meant that students concentrated their information-gathering on their own sub-topic. **Alice** said that

“You allocate the small topic and everyone will do their own topic and you tend to not read what other people are doing”. This meant that students’ knowledge, or learning, about their group’s learning issue was often incomplete. **Ruth** told me how, ideally, “We should know the whole picture of the topic that’s being researched”, but in reality, “Three people take [subtopic x] and three people take [subtopic y] and the ones researching [subtopic x] don’t know anything about [subtopic y] and vice versa”. Only the editor had any knowledge of the entire learning issue. **Amy** explained “We’re supposed to at least learn our learning issue in detail and really what happens is one person takes on pretty much the whole workload”. **Alice’s** comment captures the knowledge problem associated with students’ construction of group summary production: “That’s the thing about group-work, if we don’t read up, we don’t know about it”.

In this context, the role attributed to the group in learning was supplementary to individual efforts. Students only discussed what they were researching or learning if there was a problem. **Bruce** said that he might contact a colleague when “I’m having trouble finding information on this”. When group members met in person (briefly) or communicated by email, they engaged in collating, sorting and clarifying information from different people and different sources. This activity supported individual learning by ensuring the completeness and accuracy of information.

Rosanne: If we’re all in a group talking about what we’ve learnt, then you say ‘*Okay, this is what I learned*’, then someone will say, ‘*Oh, mine said different*’ and then if three of us have the same information, one person has different, then we’d say, ‘*Your book, you must have written it wrong, or read it wrong*’ and then we’d learn from what we all compiled together.

These learning discussions sometimes occurred informally between research sub-groups if students encountered difficulty, rather than with the whole group. **Bruce** explained that “When we were putting together our summaries we would always work with a small sub-group, I mean in the same small sub-groups, because it was just easier that way”. **Martin** said **Blue** discussions involved members researching the same subtopic, “... the small group within the group, like two or three people with overlapping information”; this information was then circulated: “... then they tell the other groups what happened”. **Julie** found having sub-groups helpful, “Putting it all together, if you didn’t, like, if you had an understanding but not really, then both of you together could put it together”.

The group was also useful for finding information when research was difficult. The following extract is from my observation notes about a **Red** group discussion on references, which I observed during a brief meeting of the group immediately after a lecture.

Observation notes Week 8, 6-05-04: Red

(Mid-week group meeting to discuss research progress)

[...] The discussion about what they'd found started as soon as **Freddie** and **Morgan** were together and kept going, just incorporating newcomers. It immediately became apparent that the group have a problem: difficulty finding information about their LI question at appropriate level for first year. It appears there was nothing in text books that anyone found and the only journal articles found were very complex, technical, advanced. People had brought whatever they had found and everyone gave a brief summary of both the content and the difficulty they had had finding anything. At first I was curious about the fact **Morgan** seemed to be 'reporting' to **Freddie** until eventually it emerged that **Freddie** had the role of 'compiling' everyone's work. At the same time **Diane** had got her student diary out and was leafing through it, I was vaguely aware of her doing it and thought it may have been something non-DLP until she spoke to **Freddie**. "Do you want this **Freddie**?" she said as she held out the diary and explained. **Diane** had things written in her student diary (about one page of a B5 book) - it was neatly copied text and some very carefully done drawings of the process of root resorption. She went through the information. They decided this was a good start as it was the closest to the type of information they needed. The group reaction to **Diane's** information seemed positive and grateful and relieved - they seemed pleased they had some information that looked possibly relevant and was at the right level for their experience and understanding.[...]

Since the group enabled more information from a wider range of sources to be found (refer Section 7.3.3), the learning benefit of the group was to augment individual research and learning.

Diane: With group work it's kind of like it completes your study [...] your information is more comprehensive and you learn what they've learnt and they've learnt what you've learnt. It's just, there's just so much more there.

However, this was the extent of group members' involvement in each others' learning during independent work.

8.3.2 Stage 2 Learning: *Summary*

Learning during independent work on group summary production involved gaining knowledge from texts. It was a process of taking in facts and meanings while doing the work of gathering information. However, since research work was a solo activity, students did most of their learning alone while researching. The group supplemented individual learning. Members verified information and explained things to each other during brief group or sub-group meetings or when group members communicated about their research via email.

8.4 Stage 3: *Not 100% reliable*

Students' conceptions of learning as transmission and intake continued to shape their expectations of the mixed group sessions in stage 3. Since the group was a forum for exchanging the group learning issue summaries (refer Section 7.4.1), students expected that the learning outcome of this session would be an increase in their personal knowledge about the other groups' learning issues. However, learning outcomes were shaped by how groups had organised their learning issue work in stage 2 of PBL.

8.4.1 Knowledge gains

Students thought they ought to increase their knowledge about other groups' learning issues from the mixed group session. Students talked about *ideally* learning topics and information from other groups' summaries. For example, **Peter** referred to how he didn't learn much in "...those sessions where we were supposed to learn off each other and benefit off other people presenting their group summaries". **Ruth** told me "The good thing about these mixed group sessions is that different topics, different main topics, all of us were coming together and everybody sharing their information with us".

Learning was constructed as a quantitative increase in knowledge and the learning process was constructed as taking in information, mostly by listening to others talking or presenting. Learning was thus a one-way transfer of information.

Alice: Different groups have really different topics, so I was able to - it was good to find out more about this issue from different groups.

Diane: Oh we learnt about other [pause] well, I guess it applies for every group, you know when we had the group presentations? When they talked to us about their topic you really learn a lot.

Amy: The only time that I learnt in a group was when we come together, to present the material. [...] I started to build up my knowledge.

However, some students expressed concerns about the value of the mixed group as a context for learning. For example, **Sam** told me "In the next session the next week and presenting it to each other, I don't think, well, I didn't really learn from what other people said". **Bruce** said, "I don't think I was really picking up that much from other people's summaries". **Rosanne** also commented on quantity, "We don't really learn that much from it, like, you've got information from the other groups, but you do learn a fair bit about yours".

Part of the problem was the trustworthiness or quantity of knowledge offered by colleagues in both written and oral form. Although **Diane** spoke of ‘learning a lot’, she qualified her comment by adding “... it’s not one hundred percent reliable”. Other students were concerned with lack of reliability.

Paula: Well, PBL itself, I found very unreliable, because although we all did these group summaries and whatever and you know they were on the internet for everyone to see, you didn’t know if it was - like a lot of things were wrong. And I found it like - some of them weren’t checked over and so it was a very unreliable source of information.¹

Peter: I guess the biggest thing for me, is being uncertain as to what I am learning, is it actually correct. Because when we learn something off another student, or we learn something off a tutor, it’s a very different thing, because if I learn something off a tutor, I know that’s a correct thing, but if I learn something off a student, I am always wary.²

Amy was also concerned about the limited amount she learned from these sessions, “I do pick up, you know, one or two things but can you *really*, can you really call that learning? It’s *such* a small amount”.

Students attributed the unreliability to how they had worked during stage 2. “Solo collaboration” not only had a negative impact on the effectiveness of students as presenters (refer Section 7.4.3), but it also limited students’ learning. Groups ideally aimed for timely delivery of the summaries, “so we had the chance to learn it for the next session” (**Sam**). However, students usually had little time to prepare because the document arrived too late for detailed consideration. **Ruth** said “We would just read over it”. **Amy** told me “If you don’t do the learning issue and somebody else does it, you’ll read it the lunchtime before you go in to present it and you’ll rote learn it”. **Alice** explained the consequence of this process, “When we had DLP, the big discussion, what we found and everything, [...] we don’t know much about other topics so, so sometimes it’s a bit hard”.

As a result, each presenter had learned just their own section and had just a superficial understanding of their whole learning issue.

Vicki: So just - you’ve said you were presenting research (short pause) and you’ve said that not every week everyone did research, was that right? Did I get that right?

¹ Although tutors provided written feedback on the group summaries and oral feedback during the session, it seems students still doubted their colleagues’ information.

² A core problem with group learning for **Peter** was the lack of teacher instruction and having to rely on other students:

Peter: In school you’d have a *teacher teaching* you something and at least you knew what you were learning was what was right. You had, obviously, *trust* in the teacher, so what they were teaching was *truth* because they’ve studied it, they’ve gone to uni or somewhere else.

Angela: Yep, yep.

Vicki: Yes, so some weeks some people do research and others wouldn't. So, how would you go if it was a week when you haven't done any research and then you're in a mixed group?

Angela: Tough! (said emphatically, laughs). The editor would send us out all a copy at least the night before or something. We'd print it off and try and, because that would be like the main points and then we'd try and read it, try and learn it, but it's not the same if you don't do your research, do you know what I mean?

Vicki: Yeah.

Julie: We split up all the work but when we came to mixed groups and had to present, that was just shocking on my part, because I didn't know what I was talking about. I know we all had the same problem because Diane came running up to me and she was like, '*I didn't know what to say, I couldn't, other than my bit, I didn't know what else to say*'. That was when we decided that we try to get the review summary thing to each other earlier, which never happened (laugh). As much as we pushed and pushed for it to happen it never happened

Cathy: Because of the fact that we didn't discuss things, so I wouldn't know what the other four people may have studied so I wasn't confident in discussing that with the bigger group without my notes there in front. So I think that goes back to our group work and how much time we put into actually researching it, coming back and putting it all together.

This meant that presenters did not understand what they were talking about and so felt and were judged to be inadequate teachers.

8.4.2 Stage 3: Learning: Summary

Students expected to continue the process of learning as intake by gaining knowledge from the presenters. However, the value of the mixed group for individual learning did not meet students' expectations. This was a result of how independent group-work was constructed. In stage 2 each group had subdivided and allocated research and nominated one person to assemble the summary for the group in order to maximise efficiency. The consequence of these decisions was that students only partially and superficially learned their group learning issue. Most students hastily rote-learned the summary document (i.e. not the actual topic) shortly before the mixed group session and had insufficient understanding to discuss the learning issue clearly or comprehensively with colleagues. Therefore, students judged the value of the mixed group session poorly for learning.

8.5 Other views on PBL learning

Three students spoke differently of learning in the context of a PBL group. One student was completely satisfied with learning in a group (**Martin**) and two spoke of learning as more than just knowledge gains (**Peter** and **Morgan**).

Martin, an International Student, was satisfied with learning from his group colleagues and the amount and quality of his learning. Like the previous accounts of learning, he considered that his learning from a PBL group involved taking in facts and information and that the group was able to supplement his individual efforts. However, in contrast to his colleagues, he was satisfied with the value of his group's summary for learning; extra work was only needed on occasion.

Martin: But if you do the group work, we get the essential knowledge that we have to know. So it's not like I have to look up this book and that book or read a lot of things, I just have to study my bit and then we gather our information and then we make the group summary and after that, I just read off that group summary and get an understanding of what I have to know in the course. If I had more questions then, after that then I can look at some more books, but with the group summary, I do this work but after all I get the whole information easier.

Martin was also satisfied with the value of the other groups' summaries for exam preparation.

Vicki: You were talking about the summary being useful.

Martin: Yeah.

Vicki: So, did that help your learning in any way?

Martin: Yeah, I just like download, because someone loaded every group's summary on MyUni³, so I just downloaded, to study, instead I would look at the topic and look at those and to figure out what I had to learn, I would get the group summary and study from that. It's very convenient and it's essential knowledge. So it saved me a lot of time. It was easy to study because it's a summary, so it's not like reading a whole book, easy to understand.

Morgan, a mature-age student, also considered that learning from PBL group-work was more than he needed for exams and that it placed a demand on his time and resources (refer Section 8.6.1). However, unlike his colleagues, he did not judge it to be superfluous to needs but saw it as an integral part of his learning in the BDS.

Morgan: I still don't think people understand what the group was supposed to do. I mean, I know what I think it's supposed to do: introduce us to interesting dental ideas, sort of 'pad out' the more structured, traditional areas of learning in dentistry. We have a resource session and it might be very clear, lots of ideas ...and we do research to pad it out and whether it's relevant now or relevant in the future it's all relevant. And I don't think the group ever really figured that out. So most people in the group saw the group work as an imposition and an inconvenience and a sort of unnecessary overhead to the BDS. At times they'd ask questions like '*Why are we doing this?*'

When I asked **Morgan** to explain what he meant by "pad out", he said that the group sessions were "... a forum for broader, relevant discussion". Therefore, he did not want to

³ From Chapter 7: MyUni was the online curriculum environment provided by the University. Staff could upload course information and course documents and students could upload assignments and download course documents.

“... leave it to the last minute” and for **Morgan** this was the source of conflict between him and his younger colleagues (refer Section 6.3.1). Also in contrast to other students, **Morgan** regarded each PBL case to be cyclical rather than linear, (which was another source of conflict between him and his group-mates).

Morgan: Some group members failed to appreciate that one of the core DLP summary messages is supposed to be how our research relates back to the patient. For instance, if we researched a broad range of tooth formation problems, we should always indicate what problem we think the patient has. This was often lacking in others’ research even though the effort is supposed to be patient/diagnosis centred.

He thought that the mixed group concept had value, “... the whole class provided research for the benefit of others”. However, to compensate for any shortcomings in the group summary, **Morgan** said “I produced my own documents about each DLP”, he explained that this was because “content was culled” from the group document and it never arrived in time.

Finally, I showed in Chapter 7 that students were outcome focussed and that the process of PBL represented a means to knowledge-assembly. However, there were two exceptions to this view of process. **Morgan** and **Peter** both said that it was part of their learning. **Morgan** explained that “... learning how to interpret clinically” and how to “... discuss cases with colleagues” were integral parts of his learning throughout Semester. **Peter’s** view of learning is documented in the previous sections, since his concept of learning in and through a group was like those of his colleagues. However, during his interview he explained that he had had a retrospective insight into the PBL process when preparing for exams during study-break. He explained, “It’s necessary so that we have like a systematic approach towards like when we go and treat people in the future and that’s what I found good”.⁴ However, both **Morgan** and **Peter** spoke of process learning as something they did as an individual in a group, not with colleagues as a group.

8.6 The value of the group: *It frees me up*

The overall purpose and value of the group in student learning was shaped by the broader context of the BDS curriculum and students’ extracurricular lives. The driving forces were time, assessment and the need to prioritise attention and effort.

⁴ **Peter** described his insight in great detail, so I have included the segment of his interview in Appendix 18.

8.6.1 Assessment and priorities

Time was a major issue for students. Concerns with time shaped the way groups worked, leading to members sharing the PBL workload and reducing meeting time (refer Section 7.3.4). But students also referred to broader workload issues and the need to balance the various demands on their time; they had “other things” to do. **Carol** explained to me that “There was no time for group-work, we had lots of study to do as well as PBL”. **Diane** said the reason she struggled to meet **Red** group deadlines was “... time restrictions, you know, you’ve got other things to do and living at college - there’s distractions”. **Amy** said “We’re under so much time restraint - there’s other things that need to be done, you know, this isn’t the only thing that has to be done”. **Bruce** detailed the various demands facing first-year dental students.

Bruce: We had other things to worry about, such as assessments, because they were all coming up. We had to worry about our clinical performance. We had to learn about every other thing, every other aspect about dentistry and (pause) and then we just found that we didn’t really have the time for PBL as well.

Students spoke of their concerns with PBL, time, other course-work and assessments during my informal chats with groups during the observation period.

Observation notes Week 11, 26-05-04: **Blue**

(Arranged meeting with the group to talk about how it works)

[...] I was trying to work out why they might work this way (suspecting that they don’t give DLPs a very high priority) but was having difficulty thinking of a question and it was almost 2pm. I just asked if DLPs were low down in their list of things to do. **Paula** immediately mentioned that they’re not assessed, **Angela** said laughingly that they do “need to do something for Prof ” to avoid embarrassment, since he expects them to know things and **Sam** said they might need to do some work to understand the summary that someone else has produced. **Adrian’s** comment was that he “just does the work unless there’s a big assignment.” There were a few comments from others about huge assignments etc. The last comments were a bit rushed but related to time and having a week to do the DLP. **Sam** raised the issue and said that they did not have a lot of time for too many meetings, in a week they “don’t put much effort” into it, but that a week was long enough to “get it done”.

Observation notes Week 8, 4-05-04: **Red**

(Informal conversation after videoing the group)

Morgan replied that in DLPs he was “learning things that he wouldn’t usually learn” but that DLPs “impact on other things in the curriculum”. I asked him what he meant and he explained that he might be learning things that were interesting but “might not be examined” but at the expense of “stuff they need to study” for exams. **Thomas** said that DLPs were “time-consuming”. I asked about the relevance of DLPs, (if they perceive they are doing things not examinable or core). **Morgan** said they were “relevant but difficult” and **Thomas** expanded by saying that they spend time “sifting through irrelevant material to get relevant material.” After this both **Freddie** and **Thomas** had to leave so I said thanks. **Rosanne** and **Morgan** stayed and continued to offer comments. [...]

Wind up question with just **Morgan** and **Rosanne** present: what sort of priority do you give to DLPs? **Morgan**: “It’s a commitment to other people in the group not to the DLP as such”. I asked **Rosanne** if she agreed and she said “if it were not such a rigid thing” (i.e. their meeting system) then “DLP would be the least done thing” as it would be done after “normal DHS” (I asked what she meant by ‘normal’ and she said labs and tutes etc).

Observation notes Week 9, 11-05-04: Yellow

(Arranged meeting with the group to talk about how it works)

[...] **Amy** referred to the recent Group Review session that had been held to discuss how group processes were being managed. Things addressed were roles and responsibilities, having agendas and other meeting related issues. **Amy** said that in the session they were told to have a Chair and other roles at their [independent] meetings, but that this was just a “time-waster”. She said this emphatically and the others laughed. **Peter** said with a smile, “I was chair last time” (he was making a reference to referring to his jokingly volunteering to be chair when they were starting DLP 1.5, which I’d just observed their group investigate). I smiled and said, “I noticed”. **Sylvie** clarified **Amy’s** point about time and not having group roles, she explained that “in an ideal situation” this would work but that DLP was “done in spare hours” (there was laughter at this) and that they must “prioritise”, often there were things that must be “desperately done” and since for DLPs they only received “feedback” and they were “not assessed on DLPs”. **Carol** now joined the conversation, she said that for DLP it’s mostly done “late, by yourself, at home” but “you can’t ask everyone to meet then”. **Amy** agreed and added that you have to be “realistic”. **Peter** nodded at this and added that “it’s more efficient”, you’ve got “to bite the bullet” and focus on other things. **Amy** said that she spent her “non-contact time on other assignments which are summative”. **Peter** added that they “tend not to worry about stuff which is formative”.

Some interviewees told me that PBL or group-work was low in their list of priorities. A key issue was other submissions and assessment. **Amy** told me, “If we’ve got other things that are due on the Tuesday, it just gets put on the back burner and doesn’t get done until lunchtime beforehand”. PBL summaries were assigned lower priority because they were not assessed⁵. **Bruce** said “Since PBL wasn’t assessed, then it just wasn’t really a priority”, which is why it “... came pretty near the bottom” of his list; he continued, “It’s just that you want to cover everything that’s going to be assessed before you cover other work, like PBL”. **Paula** said **Blue** group made no attempt to do more on their summary work because “We could still get a satisfactory outcome but probably no more than that and that’s because it wasn’t graded or whatever, all you need is satisfactory”.

Another factor that contributed to PBL having a lower priority was its relative worth on the criterion of need to know. Students judged this on relevance to exams. **Angela** told me “I did print out all the DLPs, every group summary, but when you start reading them, you find it’s just a bit more information than you need in the exam”. **Sam** said PBL was

⁵ Tutor feedback was provided to guide learning, but marks were not given.

“... just extra padding, extra depth and knowledge, so I guess we could have got around without having them”. **Cathy** said of the group summaries, “You would realise that this never came up anywhere else, so I don’t know whether I need to know it for the exam sort of thing”. Therefore, the criterion of need to know guided students’ learning for exams⁶; students preferred the DHS1 Manual and lecture material for learning, rather than the group summaries.

Angela: They were for broadening knowledge about the core stuff we needed to learn, in the DHS Manual and just extending for DLPs, gives us a bit more of an understanding, but not for writing in the exam. You kind of suss out what kind of questions they’re going to ask you in the exam.

Sam: In the end for the exam I ended up really learning for the exam and not learning for knowledge and so I just used the manual in the end and that’s really all I did. (pause) That’s what I studied for, because the manual was like the condensed form of what we need to know, I think.

Cathy: When you go to study for exams again and you’ve got this pile of people’s two-page notes, you realise that ‘*I don’t need this right now*’.

Since I did not explore the priority of PBL group-work to any length in individual interviews, I addressed it in detail during follow-up focus groups with interviewees. All focus group participants⁷ made comments like PBL summary work “came last” or “wasn’t high” in priority. Student responses showed that they found the workload demanding and so they gave higher priority to work that was (i) immediately and directly assessed for grades and (ii) individually accountable. They relegated to lower priority work done for feedback only, work that was shared across a group and learning not relevant to passing exams.

Therefore, in this context, the main benefit of the PBL group was to reduce individual workloads. According to **Ruth**, “Your workload’s definitely lighter because of group work”. **Angela** said “It’s pretty much halving or even more, you know, lessening your workload [...] and it freed me up for like other things or just not even having to do the work at all”. Rather than being a learning task, students constructed PBL and particularly the summary production, as work that needed to be expedited. **Bruce** explained that by

⁶ The exam questions were also in PBL format, students were asked to analyse and respond to a scenario in a systematic manner using the PBL steps (refer Table 4.3); however when talking about exam revision, all students in their interviews and conversations (apart from Morgan and Peter, refer Section 8.5) focussed on knowledge learning only. Morgan and Peter were the only students to indicate the relevance of process.

⁷ I received follow up feedback from twelve of my fifteen interviewees: ten participated in follow-up focus groups, one (Peter) replied to my follow up questions via email and I conducted a separate follow-up interview with Morgan; one (Martin) accepted but did not attend and two (Angela and Sam) declined due to study commitments.

sharing the editor role across the group, "... it got it out of the way for everyone else". **Julie** said "in the end" she was just concerned that "something was submitted".

The overall advantage of the group was to enable students to cope with other aspects of their study and their lives.

Alice: And [pause]) and another good thing about [group-work] is, yeah, we can allocate, we can allocate jobs and take turns. So, if, like somebody has something to do this week, they don't have to do it they can do it next week, something like that, yeah. So it won't be too hectic for the group members [pause] yeah, that's a good thing.

Rosanne: With the group work [pause] it helps with that load because you're not, you don't have a whole assignment to yourself. If you have something, we can split up, we split up the work and [pause] if it's not splitting up into, like I was saying before, just age, gender, race and you just, it's got the whole, you're doing the whole assignment each and putting it together. So it helps, the group work, with having a group as a DLP, helps with assignments, school work and juggling living away from home and doing all that stuff, you know

Cathy: If one person has a really busy week then another person in the group would take over and do most of the work and then for the next DLP it would sort of rotate. So I think in that way, it helped a lot of people. I mean because I work a lot, I work like every weekend and stuff like that, so if I was having a really busy week then I would take the back seat on one of the DLPs and then do more work on the next one.

So although the way students constructed groups had shortcomings for their learning in PBL, it was valued in the broader context because it helped students cope with the other (more important) demands on their time. The value of the group for learning was to enable students to lighten the PBL workload and focus on their other individual learning and assessment. **Bruce's** view typifies this approach.

Bruce: So I just don't feel that [pause] like, the way that the Dental School talks about it, it seems like PBL's this really important thing, but the way that the students treat it, it's just, I think we intentionally create it so it's less stress, so that we can concentrate all our efforts elsewhere.

8.7 Other group outcomes: *It's about group skills*

In addition to learning dental science content, students identified other outcomes from being in and working with a PBL group. Different students described various group skills and understandings associated with group dynamics and doing work as a group. This learning was driven by the demands/nature of PBL and all students⁸ valued these group skills outcomes.

⁸ **Peter** is the only person who did not talk explicitly about group skills. He talked about getting to know people but this was because it made learning fun and because students would be together for the next 5 years.

8.7.1 Group skills

Working in a group developed group dynamics skills such as understanding group-mates and communicating effectively and also personal insights. **Alice** said “We have to learn how to work in a group, if you have to work [together], you have to maintain relationships”. Students described specific outcomes such as: “It helped in terms of to be able communicate with people and how to work in a team “(**Bruce**); “... learning to deal with people and other people’s points of view” (**Paula**); and learning “tolerance” of others (**Julie**). **Angela** and **Julie** spoke at length about their inter- and intra-personal development as a result of conflict in their group (refer Sections 6.2 & 6.3).

Angela: I learned how to interact [...] I just probably I learnt a way of the words a bit more. Not getting upset that my views weren't getting put on the board, which was just, yeah, just don't take it personally, you know. I'm not taking it personally, she's not attacking me, she's just - it's probably what I learnt, yeah.

Julie: I think I just learnt to tolerate things better. For me personally I learnt to tolerate criticism and what I thought was he was criticising me when maybe he wasn't, I still haven't clarified and I don't think I ever will. [...]. Now I don't mind Morgan, now after working with him. I think that the way he works even though it's so different to mine - it's a good thing that it's different - it still brings a lot to the group - it just took me some getting used to.

Learning also developed from working with students from diverse backgrounds and cultures. **Rosanne** told me it was good for “... meeting all these different people and cultural differences and beliefs and opinions, it's a good people skills development”. **Paula** said PBL group-work was valuable for learning about others, “... especially people who have come from different backgrounds, not just culture, but school, uni or whatever”. **Cathy** said of her insights, “It opened our eyes to the fact that some people might not be at the same speed with the conversation that was happening around them”. My international interviewees, **Alice**, **Carol** and **Ruth**, commented that although they were in the role of quiet people, through PBL group-work and interacting with local students they began to learn how to be more outspoken in class; this was in contrast to their Asian schooling experience (refer Section 5.6.1).

Another outcome was learning about working together as a PBL group. This included learning how to understand and capitalise on group members' personalities and related aptitudes (refer Section 5.5.3). All students told me that through working in their PBL group they got to know people better than other classmates. An advantage of this for some was, “You get to meet everyone and you get to find out strengths or weakness” (**Sam**), “... you learn how they work” (**Rosanne**), “...you learn who's best at doing this and

who's best at doing that" (**Bruce**) and who "... if we ask them, it's more not likely to get done (**Amy**). Several students indicated this type of learning was useful to apply when working with others in clinic (**Paula, Julie, Rosanne, Cathy, Carol**). Some students also learned how to organise the group. **Carol** said "We needed to learn about teamwork, we needed to learn how to organise our group, because PBL was new for all of us". **Bruce** told me "You learn how to use all the elements together and you also learn how to appreciate each other's time". **Alice** made a similar comment about learning how to make the group function.

Alice: And I think if after you, after being in a group a while, you get to know each, everyone's character so you know that [pause] sometimes you know better like how, who can do what, who's able to do this and who you can joke with, you know that kind of thing.

Vicki: [I misunderstood] Who you can ... sorry?

Alice: Joke with. Yeah, who's more cooperative, that kind of thing.

Rosanne and **Diane** said they developed organisational skills transferable to other group-work and different groups. For example, their Semester 1 group learning provided "... a good base for group work in Semester 2" (**Diane**) and, "... this Semester, it's aided in the 'let's get organised'" (**Rosanne**).

Some students spoke of learning to be an effective group member and developing a sense of obligation or responsibility to colleagues. **Cathy** said an outcome of group-work was realising that "it's also more responsibility having that group work, knowing that it's not just your learning, that you're involved in other people's learning as well". Similarly, **Alice** told me "you have to be disciplined to do your job, yeah, because you can't let your group members down". **Martin** also spoke of obligation.

Martin: I developed the skills of doing the group-work - I don't know how to explain it. Like, I feel responsibility and [long pause] I can't really remember. The major thing was that I feel responsibility and I learnt to act well to responsibility. Saying, like I have to study reasonably hard to - it's like sharing the information and if some part of the information lacked, then it's not very useful. I feel like others are working hard and if I don't work hard it's like I give disadvantage to other people and I feel it's not good, it's unethical. I tried to study hard and least I do my job right. It's not like I had to do all the work, I just had to do it reasonably so other members of my group can understand the topic I had covered.

Morgan, in contrast, was focussed on developing the "younger members"; he told me he tried to "give [others] some responsibility" for input to the group summary to help them "become an effective team member".

Some students linked learning PBL group skills to dentistry in general and/or their future dental careers. For example, **Angela** said, "... you're going to be with them for the next five years, closely studying with them and even as a job you'll be working in a small group". **Carol** linked her learning through talking with local students to working with patients: "It helps me to learn for the future, when I'll have to explain to a patient, to train my spoken English and know more about Australian background". **Morgan** was of the view that "learning to be an effective team member" was a foundation for future practice: "There's a strong connection between small, functional groups and dental practice and that helps later on, in clinic". **Bruce** valued his group-skills learning: "Group-work isn't something that's restricted to PBL, it's in every single aspect of dentistry, so it's good we got this experience".

The general view of students was that the group was more useful for learning group skills and for personal development than it was for content learning and knowledge gains in dental science.

Alice: When I think DLP, I think the interactions, that's the things that I remember the most about my group learning for me, about how to interact and what I've just described before.

Julie: I was just more concerned with the actual group itself, rather than what we learnt.

Cathy: I think that the experience was more about group work rather than what we learnt, like looking back at the semester and looking back over PBLs, the things that I remember aren't about what I learnt and the facts of it, it's about how the group worked and how it should have worked and how it might be improved for next semester.

When I asked **Paula** if the group was useful for learning, she replied, "Learning in the sense of knowledge, no, but learning in the sense of experience, yes". In concluding his interview, **Bruce** said, "To sum it up, I think we didn't really learn all that much about dentistry from it, I think we learnt a lot in terms of group skills and that's what made it interesting".

8.7.2 Other group outcomes: *Summary*

As well as supporting individual content learning, the group had an additional role of enabling students to develop a range of group skills through working with their group colleagues. Outcomes included inter- and intra-personal insights into group dynamics and related skills and understanding of group function and related organisational skills. Students valued the group positively for all group skills outcomes. Some students found

the group experience more valuable for learning these types of things rather than for content knowledge gains.

8.8 Groups and learning: *Summary and conclusion*

In this chapter, I have shown that students understood learning as an increase in personal knowledge, which was an individual activity. Learning in a PBL group involved sharing knowledge. It was a one-way transfer of information from one person (the knower) to another/others (the learner or learners). The relationship between groups, work and learning throughout each PBL case investigation can be summarised as: the group worked at assembling knowledge and individuals learned by gaining knowledge, the group supported learning by providing knowledge that was missing and could not be provided by the individual. Therefore, the PBL group was of value if the student had gaps in knowledge (facts or understandings) and others in the group could effectively fill the gaps.

However, students' constructions of learning and group-work limited learning in PBL and restricted the role of the group. In the scenario discussion, the group was a context for learning where members with knowledge supplied information about the scenario during knowledge-assembly; here, learning was limited by the inadequate dental knowledge of first-year students. During research, students increased their knowledge from texts. The group was of some use at this stage if individuals could not find information or could not understand; members were able to supply facts and meanings and fill gaps in each others' knowledge. However, the practice of subdividing research meant that students only researched and learned part of their learning issue. This practice also limited learning from the mixed group session. The student presenters had inadequately prepared and learned their own learning issue, which made them ineffective teachers/transmitters of information and so others did not learn from the presentations (or the summaries).

The reason that students devised a form of group-work that limited their PBL learning lay in the broader curriculum context. Students' main concerns were time, workload and assessment. When planning their work and learning, students placed top priority on other work, especially summative assessments and/or individually accountable tasks, such as preparing for clinic and tutorials. Students also perceived that devoting a lot of effort to the PBL group summaries was not directly relevant to passing exams. Therefore, PBL, as non-assessed work with group accountability, was placed last or low in students' priorities. However, the PBL group was of significant value to students. The

main value of the group in the demanding curriculum was to enable students to reduce their PBL workload and so direct their attention and effort to other more important work.

These insights into students' practices related to work and learning in groups suggest that the way students understood the purpose and function of the PBL group differed from that of the conceptual ideal in a number of ways. I consider these further in Chapter 10 The interpreted curriculum. However, I was also concerned to see if students' constructions of PBL groups, presented in Chapters 5, 6, 7 and 8 were unique to Adelaide. Therefore, the next chapter, Chapter 9 PBL groups in Dublin, presents an account of my investigation at Dublin Dental School and Hospital in Ireland.

Chapter 9. PBL groups in Dublin: *PBL groups in another School*

9.1 Introduction

In this chapter I describe and discuss my investigation at the Dublin Dental School and Hospital (which I subsequently refer to as Dublin). The study explored themes developing from the Adelaide investigation. I was not aiming to compare curricula, methods of PBL implementation, or groups. Rather, I wanted to see how students in Dublin understood PBL groups and find out if my explanations about how students constructed PBL groups would apply to another site. I looked for similarities or differences in student practices and beliefs that would shed insight into our understanding of how first-year dental students respond to PBL and which would have broad significance for implementing PBL in dental schools.

The chapter provides an overview of the Dublin investigation and the results. In Section 9.2 and Section 9.3 I briefly review the Dublin study methodology and curriculum format, which were described in detail in Chapter 4. Then I present the results in four sections, each relating to the theme of one of the Adelaide results chapters: Section 9.4 to Section 9.8. I conclude the chapter with a summary of the significant points of comparison in students' constructions of PBL groups in the two sites.

The Dublin study demonstrated that PBL groups had many similar meanings for first-year dental students in Dublin and Adelaide, in spite of some curriculum differences and variations in how PBL was implemented. At each site, students developed corresponding group structures and practices and gave analogous explanations for these aspects of their groups. Adelaide and Dublin students had similar understandings of group structure, dynamics and function and similar ideas of the purpose of a PBL group. However, when the wider curriculum context was considered, the overall value of the group differed for Dublin students.

9.2 Dublin methodology

As I noted in Chapter 4, in both Dublin and Adelaide I worked with first-year dental students from the first day of their first year in the BDS. The research methodology was the same in both Schools (a naturalistic study using purposive recruitment for observation and interviews) except that I adapted my research program to suit the shorter timeframe of my stay in Dublin, (10 weeks compared to the full academic year in Adelaide, and I modified the plan further while in Dublin (refer Section 4.4.2; Appendices 1 & 2).

I present the Dublin results to illustrate the main similarities and differences between the two groups of students in order to develop my explanation of students' constructions of PBL groups. I have identified the observation groups as **Green** and **Purple** and when presenting quotes, the student names are printed in the group colour to identify their group membership.

9.3 Dublin curriculum differences

I chose Dublin as my second site because both Schools had 5-year, undergraduate, hybrid, PBL-based dental programs. There were also some curriculum differences that I described in detail in Chapter 4, Part 2 and which I briefly note here as: PBL format, group format, problem content and assessment format.

9.3.1 PBL format

Dublin adopted the Maastricht *Seven-Jump Method* and Adelaide employed a slightly modified Maastricht *Seven-Jump Method* (refer Table 4.3). The main difference in PBL format was that Dublin students remained in the same group and were expected to individually research the group's learning goals. In contrast, Adelaide students were expected to discuss and summarise their research as a group between classes and then reconvene in a larger group (refer Section 4.7.2).

9.3.2 Group format

Dublin groups of ten students (compared to seven in Adelaide) were required to nominate a chair and a secretary for each problem. There was no equivalent to the chair role in Adelaide and the secretary was equivalent to the Adelaide scribe (refer Section 4.7.3).

The chair was to ensure that the group followed the PBL steps and that all members participated in the discussion. To manage the group meeting effectively, the chair was not to take part in the discussion or contribute to the content of the discussion. The secretary was to record the key points of the discussion on the whiteboard as a running record, and like the Dublin chair and in contrast to the Adelaide scribe, was not to discuss the problem, except to ask or respond to questions for clarification about the record. The First-Year Coordinator, **Dr Green**¹, described these roles to the class in the PBL orientation session on day 1:

¹ I have used the pseudonym Dr Green, since this staff member was also the tutor of Green group.

Dr Green: The tutor will sit to one side and the students will take control, one student will be chair and one will be secretary and the others will be the general members of the group. The tutor will sit to one side, the chair will sit at the head of the table and read the scenario and then lead the group through the seven steps. The chair will keep an eye on the time and keep an eye on the secretary to see that they record all the important points. It might seem onerous but others have to do all the work. Everybody must participate and it's the job of the chair to make sure that people take part (in the nicest way).

9.3.3 Problem content

At both schools it was assumed that students had sufficient prior knowledge to begin exploring the problem and yet need to undertake further research and learning. The Adelaide PBL packages were clinical scenarios addressing basic general and dental science. The Dublin PBL problems were basic science scenarios, which included general chemistry and biology, similar to the content of students' secondary school curricula (refer Section 4.7.5).

9.3.4 Assessment format

Both schools examined students' learning in PBL within the formal examination system. Adelaide students were provided with formative feedback on their individual participation and their written group summary, while Dublin students were required to give a summative self-assessment at the end of each PBL session as a mark out of ten that contributed to their final grade (refer Section 4.7.6 and Appendix 10).

9.4 Dublin group structure and function: *Niche-finding*

Dublin students' understanding of the roles and functions of PBL groups are of interest because in Adelaide, group structure shaped group function, especially with regard to who was able to contribute and in what way. The main Adelaide finding was that group roles were unplanned but pre-determined on the basis of personality and aptitudes, therefore, not all members were able to take up all roles, especially leadership.

Chapter 5 described how Adelaide group structure developed early, without planning or discussion and remained stable throughout semester (refer Section 5.2). Most roles were "unofficial", emerging from member behaviour (refer Section 5.3). Students understood that members found or were assigned "unofficial" roles or positions in the group according to their personality or the attributes they brought in to the group (refer Sections 5.4 & 5.5). The structural feature of Adelaide groups that most influenced group function was the division of members into "dominant"- "loud" or "passive"- "quiet" categories, which was seen as a natural aspect of groups (refer Section 5.6).

9.4.1 Group development and roles

As in Adelaide, Dublin groups took shape naturally and developed a group character according to the attributes and abilities of group members. In addition to the staff-designated group roles of chair and secretary, students took on or were assigned unofficial roles early in the life of the group. As **Deidre** said of **Purple** group after four weeks of doing PBL together, “I tend to notice that everyone has their own wee roles now”.

Students described and explained overall group structure and function in terms of the types of people in the group. Each group developed its own member profile, which in turn shaped how the group functioned. When students described their groups they listed members individually, relating their function and personality. For example, **Liam** said “Kerry’s very quiet usually and when she gets involved it’s usually really good, she usually only ever talks when she has something relevant to say, so she usually rescues the group”.

Dublin students also classified group members dichotomously on the basis of how vocal or quiet they were in the group, which was accepted as a given or natural. In an informal conversation, **Shona** told me “We’re the loud group [laughs] we’ve got some very strong characters, there’s a few quiet ones and we’ve got a few louder types”. **Kerry** described **Green** as having “... a lot of very dominant personalities”. **Maeve** said of **Purple** “I like our group because it’s a mixture [...] there are some people, I think, not dominating but more outgoing than others, but you’re going to get that in every group”.

Students attributed loudness or quietness to qualities that members had brought in to the group, such as shyness or confidence. Therefore, being able to speak up in group discussions was considered to be largely the result of individual abilities. For example, **Aileen** said “Some people, a lot of people do have a problem like speaking in public or whatever, so it’s difficult for a lot of people”, whereas, she said, “I don’t really mind it, I did debating and it’s good for me, I love a bit of discussion”. Similarly, **Brendan** told me “There would be some members who are not confident in expressing their views”; he also contrasted this to himself: “... and then there’s me [said with a ‘smile’ in the voice] who says everything”. Like Adelaide quiet people who were seen as quiet but valuable, Dublin quiet people were not criticised for their quietness if they were seen to be doing work, since quietness was natural.

Kevin: Um, it’s weird, it’s very different, like, in school you’ve twenty people all from the same stretch of land. Here we’ve got A-level people, Leaving Cert, Hugh, the mature student and it’s just um, we get along well, but obviously

some people are more vocal, some people are less vocal, but, um in terms of learning, you know that the less vocal people even if they don't speak they still have all the work done, you know they've done it, it's just they don't necessarily speak.

9.4.2 Leaders and leadership

The leader role had the most influence over Adelaide group function. Each group had unofficial but identifiable leaders who directed and/or organised the group, making decisions about problem analysis (leader-director) and/or administering task progress (leader-administrator) (refer Section 5.4). Students believed that people with the right personality and abilities were most suited to leading groups (refer Section 5.4.4) and they generally approved of their group leaders unless they caused some form of conflict in the group.

Adelaide leaders came from the dominant members of the group. Students at the other end of the typology scale were assigned to the position of quiet people, which was understood to be their usual nature (refer Section 5.6). As result, these students had less say in group discussions and were less directly or overtly involved in group decision-making.

Similar beliefs about leaders and leadership informed group practices in Dublin as in Adelaide. However, in Dublin groups, leadership was more complex because there was the official role of chair, with certain designated leadership duties and there were also dominant students, who took on leadership duties of their own accord. This had a distinct impact on group structure and function.

9.4.2.1 The chair

The Dublin chair's official responsibilities were administrative and included managing group and PBL processes. Managing group process involved monitoring members' participation and enabling all members to have equal input. Managing PBL process meant ensuring that the group addressed each of the seven PBL steps in order without skipping any steps². Responsibility for directing group discussion fell to the eight participating group members (discussants).

Students' understandings of the official duties of the Dublin chair compare to Adelaide students' concepts of the leader-administrator and involver roles. The chair role

² The chair-secretary pair changed for each problem; **Green** and **Purple** group had their different approaches to filling the roles. **Green** group tutor prepared a roster of volunteer pairs several weeks in advance, while **Purple** group tutor asked for two volunteers prior to each upcoming problem.

was administrative because it enabled the group to complete its task by addressing each step, just as the leader-administrator in Adelaide ensured the group completed its group summary task on time.

The chair's involver and facilitator function was valued by students. **Brigid** declared that it was good to have "... a chairperson who controls conversations so it's not just people firing things out". **Kevin** said, "The chairperson really needs to control it and when people start rambling on, tell them to just relax and let other people talk". Dublin students also valued having a group member responsible for organising the PBL process. For example, **Aileen** thought that "The role of the chairperson, you need it to keep some sort of structure in it and make sure you get everything going in the time". **Brendan** explained that the administrative interaction between the chair and the secretary was important to keep role and group function, "You basically need a chairperson to actually talk to the secretary to liaise with the other group members and record points on the board".

However, within this official framework, students constructed an unofficial aspect of the chair role: in addition to the chair being a leader-administrator/facilitator, students also expected that the chair would act as a leader-director and steer the group discussion (as occurred in Adelaide). The chair was responsible for setting the discussion on the right track and preventing it going off-track or re-directing it if this occurred. For example, **Hugh** believed "The chairperson should take control of the group and not let irrelevance creep in". **Brigid** thought a chair should "... provide information where necessary and involve everyone but mainly direct the conversation". Directing the conversation involved asking the right questions to cover the topic adequately. **Fiona** explained, "If you have knowledge of the topic you can know which parts are important, you can ask, 'so what about this?' 'what about that?'". **Kevin** took a similar view, telling me that the chair should "... lead the group with directed questions". **Deidre** said that because of this demand, "It's hard being chair because you have to decide when enough is enough, what everyone's said".

Furthermore, not all chairs were considered equally effective. **Kerry**, my first interviewee, put this very succinctly: "When we have a strong chairperson everyone - everything goes according to plan but otherwise I think our group can go a bit pear-shaped". In subsequent interviews, I asked other students about their own experience of chairing and what made a "good chair". Their understanding of the role requirements

compare to **Kerry's**: a good chair (i) managed people sensitively and (ii) focussed the discussion in the right direction, for example:

Aileen: Somebody, first of all, who kind of stays out of the conversation, but at the same time, knows when to step in if the conversation is either going off on the wrong direction or it's getting too tense or, [laughter], '*Just relax, everybody, okay*' [said in an exaggerated soothing tone; laughs]. Just, you know, if there's something, you don't go into too much detail into a certain topic. If they ask a question, to make sure they do go into that detail and um, that's basically it really, but it does make a difference.

Deidre: You have to kind of able to [slight pause] not be harsh to people but kind of cut them off, almost. And things like that, make sure you are always sticking to the problem, the discussion hasn't gone too far away and kind of make sure your problem statements are all covered, so your learning goals can then be established.

Students attributed the effectiveness of the chair and often the PBL session itself, to the personal qualities and abilities of the student in the role. A good chair required the right personality and ability (to manage people), plus appropriate content knowledge (to direct the discussion). For example, **Fiona** described a good chair as "Someone who knows which questions to ask, which can include everyone in the discussion and someone who is assertive"; she added that "You need maturity to be a good chair". Leadership skills and authority were assumed to come with age³. **Deidre** thought that Hugh was "... the best chair", because he was "mature". **Brendan** believed that how well the group worked "...depends on how good the person is as a leader". **Aileen** explained the variation in chairing in terms of the amount of personal authority a student possessed, which determined whether or not the group would respond to the chair: "I think some people have more authority than other people and people listen to them and follow their instructions, whereas they maybe ignore other people more".

Similarly, poor chairing was due to personal attributes. **Hugh's** explanation for sessions being less successful was due to the chair: "... not being able to speak out and not trying to take control of the issues at hand". **Liam's** understanding of how he thought he was supposed to chair was contrary to how he saw himself as a person: "I'm not an aggressive person, I don't want to shout down people and say will you shut up please, it's

³ Dublin students' comments about maturity helped develop my interpretation of leadership qualities. From Adelaide data I had associated leadership with personality; however the Dublin comments suggested that it was associated with both in-born personality traits and also natural developmental or maturational skills. The common feature in each school was that students (apart from Morgan in Adelaide) did not talk of learning leadership skills.

not what I want to do”⁴. **Deidre** told me, “Maeve is a shy girl, she’s quite shy in PBL, it’s hard to be chair if you are quite shy generally, she kind of let the discussion go, because she doesn’t want to interrupt and stuff”.

9.4.2.2 The dominant people

Although students had definite ideas about the requirements and responsibilities of the chair role, the chair did not necessarily control and steer the group. Group control was related to the presence of “dominant” people. I observed that in each group particular students regularly monopolised the conversation and influenced the direction of the discussion.

Green group had a set pattern of talkers and non-talkers. I came to think of **Green** as a boisterous group: the same students constantly clamoured for airspace and talked over or interrupted each other and the same students were regularly excluded from the discussion. The dynamic in **Purple** was less boisterous but had a similar pattern. Although there was less unruliness, on my audio recordings the same voices dominated each session. The pattern of participation was seen as part of the personality role structure of the group. Students from both groups commented on this phenomenon, with varying degrees of acceptance.

Green students commented that the vocal students directed discussions. **Kerry** observed that the dynamic in **Green** was affected by the presence of the “dominant personalities”, which “... hinders the progress of the group because an awful lot of the time we spend all of us trying to say our bit, but no-one listening to each other”. **Aileen** also said that “... people who do speak out more than other people [...] are kind of directing the conversation”; she added, “If it’s not really going in the right direction, that’s not a great thing either”. **Liam**, like **Aileen**, thought the group was led by its vocal members, who “... are quite forceful with their opinions”.

Purple interviewees also noted that the vocal students led the group, although no one described it as domination in an oppressive sense. **Deidre** commented of **Brendan** and herself, the two most vocal group members, “Brendan, he could talk for Ireland, he’s just like me, we like the sound of our own voices”. **Kevin** simply noted that “Then there’s a

⁴ **Liam**’s interpretation of what was required of the chair was influenced by how he perceived his group, which I explain in Section 9.5.

couple of people who take it by the reins”⁵. **Hugh** observed that “Nobody’s kind of taking over, even though you can see that some people start telling, more or less, maybe all the time, telling us what we’re talking about here”. **Maeve** used the word “dominate” but qualified her usage: “Three to four just dominate the group and what they say goes [...] *no way* that they are bullying or anything like that”.

Consequently, in both groups the chair did not necessarily lead the discussion. Students’ responses to this varied. Some described and/or endorsed dominance as a natural feature of group role structure.

Brendan: The chairperson starts off, I would probably, anything the chairperson’s missed I give direction to and there is probably three members who, any facts and definitions they go on about and then there is probably three people who are normally silent and on the odd occasion they say something and then there is two more people who back up any other people who give information.

Kerry explained that for a group to function well, chair-leadership should be restricted to those best suited to it, as in a sporting team when players are assigned to a position that best suits their abilities.

Kerry: I think PBL works efficiently with the same few, in a way, like, you know when you’re playing football, you don’t just, ‘*Right - okay I’ll be goalie this week - you be goalie next week*’. You know like professional football, they stick to their jobs and they do it well. I mean, some people are brilliant better secretaries, they keep track, they’re clear, they’re - everything’s on the board, other people are brilliant chairpeople and other people just like to just go for the topic. I just think there are different skills within the group, different people are suited to different roles”.⁶

On the other hand, some students expressed frustration at this disruption of group function. In **Green**, **Liam** took the dimmest view; he thought that the group was totally dominated by its vocal members.

Liam: Three or four people are continuously dictating and never shutting up and everything is on their wavelength and it’s their confusions, their points, their notes, their questions, it’s their everything that the PBL session revolves around.

⁵ These were the ‘knowledge people’. **Kevin** had mixed feelings about this, on one hand it was natural, as they knew more, but on the other, it disrupted the dynamic; he was looking forward to it being “a more even playing field” when they did problems where everyone had knowledge.

⁶ For **Kerry**, the needs of the PBL group were in conflict with wider educational needs of individual students. After she had said this, **Kerry** paused and reflected, then said “And I think that would make PBL work more efficiently, but as an all round college education it mightn’t work so well. Because you know, if you’re like, chairing, people might just, okay they contribute their information but they’d never take charge during the year and I’m not sure how that would help them in their career”.

Only **Maeve** (who felt overpowered by the dominant people) commented negatively on this phenomenon in **Purple**: “The chairperson might as well not be present, because no matter who the chairperson is, it’s the same three, four people dominating”.

9.4.3 Other group roles

In Adelaide, other group roles were associated with particular behaviours contributing to group function, such as knowledge people, researchers and involvers. In addition there was the non-contributor category of avoider and excused roles, which indicated if and why a group member did not work on the group summary between classes (refer Table 5.1 & Section 5.5).

Due to the format variation of not having group-work between classes, some Adelaide roles had no equivalents in Dublin. For example, Dublin students researched individually and there was no group research task. Therefore, no group members were needed or able to be specialist researchers as in Adelaide, although some students noted that particular group members tended to do “a lot” of research, as evidenced by the large amount of notes or computer print-outs that they brought to the second session. No Dublin student spoke of group members undertaking an involver or facilitator-type role as occurred in Adelaide. The absence of independent group-work also meant there was no requirement for any group member to be excused from group-work. Although the group-work avoider situation had no direct parallel, some Dublin students expressed disapproval of those who appeared not to have done the expected work. This was judged on students’ behaviour in class, such as agreeing with other discussants without actually contributing new information.

The main similarity across sites was the role of knowledge person. Dublin groups valued members with knowledge because they could help the group, especially in the stage 1 scenario discussion when the PBL problem was presented. Dublin knowledge people were students who made possible the group purpose of pooling members’ knowledge in stage 1 (refer Section 9.6.1).

9.4.4 Group structure and function: *Summary*

Group structure and function were similar in both Schools. Dublin students also characterised group member’s roles in terms of personality and typical behaviour and made a loud-quiet distinction. They understood that the extent of a group member’s participation

in group discussions was due to what he or she was like as a person and so they expected that groups would naturally have vocal members and members who tend not to talk.

Dublin students also expected the group to have a leader who took charge of the group's progress and, ultimately, success. Ideally, the chair as leader was to manage PBL and group processes and also direct the problem analysis. The last duty fell outside the prescribed chair duties. Students explained the effectiveness of the chair and people's suitability for chairing in terms of personal attributes: a good chair had the right qualities to manage people and the knowledge to direct the discussion.

However, in spite of students' expectations of the chair, the incumbent did not always fulfil the role. In reality, the most vocal students regularly had more input into discussions and effectively directed the problem analysis. This aspect of group structure and function meant that the leadership function of chair (directing discussion) was usurped and the administrative function of chair (managing people) was undermined by the group's more vocal members.

9.5 Dublin group dynamics and function: *Being comfortable*

In both schools, the quality of interpersonal relationships and nature of the group climate were important shapers of group function. In Chapter 6, I showed how social relationships shaped Adelaide group interactions and function. Adelaide students experienced an initial period of discomfort and then established an ongoing pattern of interpersonal relationships that set the climate for the group. They expressed a desire for a good social rapport because this produced a comfortable climate, which enabled positive working relationships to form. Students who experienced their group in this way were more at ease joining in with group discussions, coordinated their individual activities out of class as a group and regarded group members as cooperating rather than conflicting with each other (refer Sections 6.2, 6.3 and 6.4 for details of each group). Dublin students also explained how their groups worked in terms of relationships and climate.

9.5.1 Green group

All students in **Green** group associated interpersonal relationships with group climate and function. My four female interviewees had similar experiences of social and group comfort. My only male interviewee, **Liam**, who joined the group in week 3, experienced the group differently, as a social outsider.

Green group experienced some initial awkwardness in dynamics and function. **Aileen** said “At the start everybody was kind of shy and nervous”; she recalled “We started just going into the group, it didn’t really seem to work, we weren’t really kind of getting into it and maybe people weren’t comfortable with each other talking that way”. Other students made similar comments but their reactions varied in intensity. **Kerry** told me that “At first I hated it, I was petrified, the idea of talking, like in a group of people was so intimidating”. **Brigid** considered that the hesitation in the group was about observing ‘social niceties’.

Brigid: Well, firstly you didn’t really know the people in your group (slight pause) and (drawn out, pause) you (slight pause) like it’s a discussion, so you wouldn’t be (slight pause) like if you don’t know somebody you don’t know how to react, well, you couldn’t really confront someone and say, ‘*Well, I don’t think that’s right*’ because it’d be impolite of me if I didn’t know the person, it be like, ‘*Well, you didn’t need to say that*’.

After members got to know each other and began to form bonds, **Green** climate and function improved: “Once you get to know each other it’s better (**Kerry**)”. **Fiona** said **Green** had a “friendly environment”, commenting that “... it’s more relaxed and you can share”. In like vein, **Kerry** told me “It’s like sitting down with a group of friends and discussing something”. The female interviewees perceived that **Green** became a comfortable group where members could freely express their views. **Aileen** told me “Everyone has kind of gotten just more comfortable with each other, we can all talk”; she also said “I think we work well”. Group members could express disagreement or difference without concern for manners: **Brigid** said “We’re used to each other now [...] there’s a lot of (slight pause) a person might say something and like one person might know it’s wrong, so it’s like ‘*I don’t think that’s the case*’ ”.

Green’s positive climate enabled cooperation. Students described how group members were willing to engage with and help each other. **Kerry** told me that “A lot of the time you know other people are confused and rest of us would help pick them up”. As **Fiona** said to me, “It’s good, it’s nice, when you don’t understand something you just ask and the others in the group they will actually explain”.

Brigid: Well I’ve got a really nice group, so I was just kind of like, ‘*Here can you just tell me the basics so I’ll have some kind of idea what you’re talking about*’. It depends on your, like our group is particularly nice, in some of the groups I’d say some people are, ‘*Well, why do we have to waste time explaining the basics to you?*’

However, **Liam’s** experience of **Green** was different. Like his group colleagues, he wanted to establish a social rapport and feel comfortable about participating. However, he

did not develop friendships or rapport and the initial awkwardness persisted for him. **Liam** told me that he felt apprehensive about continuing to contribute because of the group climate; he described it as “cliquey” and said “it’s very intimidating to speak to someone and say ‘do you mind?’, when you know that two or three of her best friends are sitting across the table and they can jump in”. **Liam** said of the factional climate in the group ‘that makes you feel uncomfortable’; as a result “that’s why I stay out of it now and I’ve barely been saying anything”.

9.5.2 Purple group

Purple group members considered that a good rapport with group colleagues paved the way for a pleasant climate in which to work. The pattern of climate development was similar to **Green**, except none of my interviewees positioned themselves as a social outsider.

The key features of dynamics in **Purple** were getting along with each other and enjoying working in the group. Students were comfortable and the mood was usually light-hearted. Only **Deidre** spoke of any initial awkwardness.

Deidre: Imagine if you’re quiet and shy, you know I think it would be a really hard for people who just don’t, don’t really talk, don’t really - they’re embarrassed to talk in front of a group sometimes. Actually, we were all like that in our group, the new group. We were like, ‘Ooh, I want to speak, I can’t say that’ [mock agony, laughs] but I don’t know, I think definitely our group’s coming- I think our group works well together though, a lot better.

Of group relationships, **Kevin** told me “We get along well” and **Maeve** said “I get along with everyone, I think everyone gets along really well and no one thinks little of anyone else in the group”. **Hugh** described **Purple** as “a friendly bunch” and said “I’m happy with my group”. **Deidre** and **Brendan** both said they found it “enjoyable” being part of **Purple**. **Deidre** said “We’ve got kind of a pattern going to get it sorted out and it works well [...] I *do* really like our group. I think I *couldn’t imagine* being in a different group”.

Like **Green**, members described a cooperative environment in which members endeavoured to help each other; teaching and explaining to each other were features noted by members.

Deidre: And then people in our group, people become more like teachers, they can help each other understand when we’re brainstorming. I mean, you can, see Bridie hasn’t done Biology so we had to explain to her about cells and fair enough, she can look them up herself, we’d always try and help her out.

Maeve said that if she had difficulty with understanding her personal research, “I print it off and try and read through it but if I don’t understand it, I’m going to get someone in our group to explain it to me when we are all talking about it”. **Hugh** explained that he was happy with his group: “It’s great that *they’re* there because they’re actually, in a way they’re kind of teaching me as well”.

9.5.4 Group dynamics and function: Summary

Positive group relationships and climate were important underpinnings for cooperative group-work in Dublin, as in Adelaide. If students judged the group to be friendly and comfortable, then they felt more relaxed about joining discussions. Dublin students explained that positive social rapport supported cooperation among group members in relation to the work and the reverse also applied: social exclusion impaired effective participation in the group.

9.6 Dublin groups and work: *Assembling knowledge*

In Chapter 7, I showed how Adelaide students understood the purpose and value of the group in PBL. The work of groups comprised assembling knowledge products and its value in PBL was to enable more knowledge to be assembled, often with less individual work. Adelaide students were outcome-focussed and concerned with maximising output in an efficient way. In this discussion of Dublin groups and work in each stage of PBL (refer Table 4.3), I present Dublin students’ understandings of (i) the group purpose and activity, (ii) the group advantage and (iii) the group disadvantage for investigating a PBL problem. I compare the purpose and benefit of Dublin and Adelaide groups.

9.6.1 Group purpose and activity

Adelaide students constructed the group’s work in each PBL stage as collecting and adding information to make a knowledge product. The initial scenario discussion involved pooling group members’ existing knowledge about the scenario (refer Section 7.2.1); independent research involved collecting and compiling textual information into knowledge about the group learning issue (refer Section 7.3.1); the final group session (mixed group) involved an exchange of knowledge in the form of each group’s learning issue summary (refer Section 7.4.1).

Dublin students also emphasised the role of knowledge in stage 1. When I asked about what made a good session, **Brendan** provided an immediate two-word response: “Background knowledge”. **Maeve** also described a good first session: “For example, today

we were brainstorming, we had a basic knowledge of it, some people knew more than others and that was grand, so we could chat about it and brainstorm and share our knowledge”. **Deidre** had a similar idea of what made a good first session: “Whenever we talk (slight pause) most of the problems we’ve had so far we all have sort of a background knowledge of, so everyone tends to put their ideas in”.

As in Adelaide, stage 1 knowledge-assembly in Dublin was a group effort; knowledge could be assembled additively. **Brigid** explained a good first session: “... if people knew stuff, background stuff, then everyone was kind of adding in their bits and pieces, they’re all kind of joining it all together”. By adding everyone’s information the group established a baseline of knowledge from which to start research, since students initially had different amounts of knowledge. **Aileen** said “For the brainstorming, I think it’s just so that everybody gets kind of the right basics, because, basically, people have different information”.

Like their Adelaide counterparts, Dublin students thought that knowledge levels determined members’ ability to contribute to the discussion. In the Irish context, students’ school backgrounds were a major influence⁷. **Brigid** explained to me that “Some people haven’t done Chemistry and we started one on acids and bases yesterday, you just wouldn’t be able to *involve* yourself in the conversation at all, you know, the group conversation”. Commenting on the contrast between group members’ educational backgrounds, **Kevin** said “Some people know infinitely more than some others and it makes it very difficult for people who don’t know, to contribute equally, especially the A-level students, they have got *so* much more than we do”. **Kerry** made a similar observation, “I think the people who don’t have one of the science subjects find it very difficult”. **Brendan** took an extreme view of the knowledge discrepancy between A-levels and Leaving Certificate students; he told me that the students without A-Levels “... can’t participate at all, basically, in the brainstorming”.

Therefore, Dublin students evaluated their contribution (as a mark out of ten) according to how much information they gave; as in Adelaide, other forms of contributing, such as asking questions, were not described as valuable.

⁷ Students from the Republic of Ireland completed the secondary school Leaving Certificate, comprising 6-8 final year subject choices and students from the UK did A-levels, which involved three final subject choices, usually studied more extensively.

Brigid: If you sat there and said nothing, or you just didn't know enough about the topic you'd give yourself a five, or - not really said nothing, it could be like, 'What do you mean?' but you haven't really contributed.

Vicki: And so, you know, what do you judge your grade on when you come up with it?

Hugh: (Pause) How much of a contribution I make to the discussion. Whether anything I said is on that board, that we just discussed. If there's a few things that obviously make bit more sense, then definitely get few more points for that, but if you sat there (small laugh) and not really said a lot, which has happened to me, because especially when you're approaching the subject and because the first thing, I don't know anything about and so I can't contribute to it if I don't know much about it, do you know?

Only one student offered a different view about valuing contributions. During our interview, **Aileen** was reflecting on the way that assessment occurred; she observed that people gained marks for 'quantity' rather than 'quality' (my words) of contribution, which she implied was unfair. However, **Aileen's** focus was still on contributions of information.

Aileen: Just on the marking, like, that, people can just say a lot and then they get good marks whereas people who don't say that much but say the right thing don't get as much marks just because they don't say as much or what they say is more, contributes more to the actual discussion point of view, if you know what I mean.

Vicki: Yeah, maybe more relevant.

Aileen: Relevant, exactly yeah.

Vicki: So it's the sort of - a quality and quantity -

Aileen: Exactly, yep.

In stage 2, Adelaide students constructed research as the work of gathering information from texts (refer Section 7.3.2). Dublin students also spoke of their research as information-gathering. **Maeve** described a "brainstorming" session where no one in the group knew anything; it involved cataloguing the information to be found: "Every time anyone asked a question, presuming someone else could give information, 'oh, we all have to go away and research that'"⁸. **Aileen** described research as learning to "look up stuff". Students told me that a good problem usually contained questions that clearly indicated the information to be obtained. For example, when I asked what made a good problem, **Fiona** said "The one that has precise questions, because [at school] we are so used to doing question-answer, question-answer and I am used to it". I asked **Fiona** to clarify "precise" and she replied, "a little bit specific, so we kind of have a direction and all of us have the same notes". **Kerry** described how she did research:

⁸ Dublin students had information-gathering in mind during stage 1: my observation notes from PBL sessions contained many comments made during the stage 1 session about finding information, such as, "we'll have to look that up"; "we'll find x when we look up y"; "should we look up z?".

Kerry: My general rule would be a decent college book probably is all we need to know. I kind of figure everything we need to know is in there and then maybe further information on one or two points, then you go to a different book and you might get information there just to top it off⁹.

Students were engaged in locating and copying or highlighting information from texts. **Kerry** said “I would usually get a college book, read it then go through it again and underline bits, or write them out”. The principle aim of research, in **Liam’s** words was “... taking out the key points, those that are going to be examined and everyone making sure that they have researched those points so that everyone sees that A, B, C and D are to have notes on them”. **Brendan** said he stopped researching “... if I have covered everything, basically”.

In stage 3, students brought their knowledge assembled during research to class. Parallels can be drawn between sites in spite of the variations in the format of group-work in PBL. In stage 2 each Adelaide group had compiled individual member contributions of information into a complete knowledge product that was the group summary (refer Section 7.3.1). In stage 3, Adelaide students exchanged knowledge products by presenting their summaries to each other (refer Section 7.4.1). Dublin students were not asked to work as a group outside the classroom and each student researched all learning goals. However, the processes of adding individual contributions of information together and exchanging knowledge by telling each other things still occurred.

Stage 3 knowledge-building comprised students exchanging information by telling each other what they had found during their research. **Kerry** referred to this session as “... the coming together in exchange of information session”. **Maeve** described it as “... when we are sharing our information”. The group was engaged in assembling knowledge by adding members’ contributions.

Liam: Some days it’s [pause] the days it’s most effective is when there’s silence in the room, I know that sounds contradictory but when people are actually taking it in turns to constructively develop the point and the problem and say if someone says ‘*Did anyone get anything for X?*’ and you - say there’s a momentary silence of two or three seconds - and someone says, ‘*Well I got...*’ and then they read it out and the secretary takes it down. People are just kind of looking at their notes for again a momentary silence of 5 or 6 seconds and then the chairperson might say ‘*Did anybody get anything for this*’ and somebody else might say ‘*Oh, I got this*’ and it’s really organized and you get through the problem⁹.

⁹ Assembling knowledge by sequential reporting was something that I had noted during my observation of both groups, as this extract from my reflective field notes illustrates:

The group relied on everyone sharing knowledge by adding their contribution of information.

Deidre: I was sitting - there was Patrick opposite me the other day and Caitlin was beside me and they didn't say anything. I see people - kind of like, you say something then they say something and you kind of build and there's no-one around you helping you build and it's like, 'don't you know it as well?'

In Adelaide and Dublin, the group purpose was to produce a combined outcome of knowledge about all the learning issues/goals for the problem. Adelaide groups worked on this between classes for one learning issue through individual efforts and then as mixed groups for all learning issues, while Dublin groups worked as groups on all learning issues in class only.

9.6.2 Group advantage

The advantage of the group for Adelaide students was quantitative. Since knowledge was assembled additively, a group could access more information and enable more knowledge to be built. In stage 1, group numbers and diversity meant that a more complete picture of the scenario problem could be built. In stage 2, a group could access more and varied resources to gather information. And in stage 3, the combination of small group efforts made a bigger fund of knowledge available. Dublin students also attributed a quantitative benefit to group-work.

In stage 1, group numbers and diversity were advantages that meant more and varied information could be offered in the first session. **Kerry** said that "all the different backgrounds and different amounts of knowledge about different things, PBL is great like that because no-one knows it all". Some students regarded the variety of school backgrounds an advantage for this reason. **Maeve** said, "If we'd all done only Leaving Cert chemistry then we'd all contribute the same things, whereas they can contribute what they've learnt in A-levels and we can give them what we've learnt in Leaving Cert". **Kevin** said "Bringing your ideas together and all that and listening to other people, you get

Observation notes, Dublin Week 1

So, from initial observations, I think that

- students are focussed on text-book organisation of knowledge [...] then they gather lots of information from texts and come back and report it

Support for this:

- gathering and transmitting knowledge from elsewhere: in the report phase of the problem the most common expression I've heard is 'I got ...' or 'I found ...' and then students read what they found, there's a strong emphasis on finding definitions and facts. The chair often asks 'what did everyone get?', 'did anybody get anything else?'

different points of view and different ways of raising things”. Therefore, as in Adelaide, a group could see more of the problem than an individual could.

Deidre: I like seeing things from different people’s perspectives, they would pick up things I missed. I’d say you come away with something that’s better and you couldn’t do yourself. Some things you can do independently, like it’s just easier independently. Things like PBL, the group could get a lot more out of the problem than a person, everyone will see different things, some people will be more thorough, some people get the less obvious points or other things some people miss.

The quantitative value of the group continued in stages 2 and 3. As **Brendan** said, “Nine heads are better than one, nine heads can do a lot more reading and a lot more research”. By combining their research as a group, students could be sure that no information had been missed. **Kerry** explained “You know everyone else has looked over the same stuff you have and the only thing you didn’t look up they said”.

9.6.3 Group disadvantage

In spite of its quantitative advantage, the group presented process issues at both schools. Adelaide students were outcome-focussed and concerned with efficiency; since processes were the means to this end, delays or tangents were undesirable. In stage 1 this included wasting time dealing with uncertainties of knowledge (refer Section 7.2.4); in stage 2 it meant wasting time finding or compiling information as a group (refer Section 7.3.4); in stage 3 it meant wasting time listening to poor presentations, which stemmed from inadequate preparation of summaries and presenters due to the organisation of group-work in stage 2 (refer Section 7.4.3). Working as a group created process issues related to efficient knowledge-assembly in Dublin during the in-class sessions of stage 1 and 3. However, there was no group disadvantage associated with stage 2 because the group was not required to work together.

When I asked **Brigid** to describe a poor first session, she replied “If people didn’t have a very good knowledge or they were very vague on the facts, there was a lot of controversy, saying who’s right, who’s wrong”. In a good session, knowledge assembly was uninterrupted, **Brendan** explained, “... we talk through, a lot of information goes through in a good brainstorming session”; in contrast, he said “There might be some sessions where there is not much information gone through and we might deviate from the point”.

Since Dublin students were outcome-focussed, the stage 1 process of dealing with uncertainty and putative knowledge was not valued. **Maeve** told me her group had a bad

session when “... nobody knew anything before we brainstormed, all the brainstorming was really questions, there was no structure to it”. **Liam** regarded uncertainty very negatively: “I think the brainstorming is *totally* pointless because no-one knows anything about it, it just rests on the one or maybe two people, the rest of the people don’t have a clue, it’s just a waste of an hour”. **Kerry** concluded of stage 1,

Kerry: I would make it a strict rule you only report knowledge you know to be fact, none of this confusing other people with saying the wrong thing, because people say ‘*I’m not sure if this is true*’ and then you’re, ‘*Where did you get that from?*’¹⁰

Knowledge-assembly delays during stage 3 included people reading notes or internet print-outs instead of presenting concise information. **Kevin** was frustrated when “A couple of the girls have a big spiel [...] they’ll read off notes they don’t really understand and read out stuff that’s too complicated”. **Deidre** also told me she wished people would not read out word for word their Google searches because it wasted time; she said “... it would just speed up things so much, because the people who read the paragraphs it *totally* eats away at time”. Time could be wasted in stage 3 on familiar information, it was more valuable to discuss new information. **Kerry**, who had studied biology extensively at school, said “I just find biology almost boring and want to get on to the next problem, for me it’s just like going over and over again”, on the other hand, she said, “I’m sure other people are the same with physics and might find physics deathly boring, depending on their knowledge”.

9.6.4 Groups and work: *Summary*

Dublin students constructed the work of the group in class sessions as assembling knowledge, first as information from group members, then as information from texts, into a knowledge product about learning goals related to each PBL problem. Individual students worked alone between classes to source information that could be contributed to the group effort at knowledge-building. The group value was quantitative because members could contribute different information and a group could access more information during research. Dublin students were outcome-focussed and time was also important. The discussion process in each session was a means to generating the knowledge-product;

¹⁰ This was the basis for the stage 1 session becoming shorter over the term, before **Kerry** made the comment above, she explained:

Kerry: Like I’m glad that it’s shorter than our report stage, because we usually finish about five past and you take a ten minute break and we usually only average about 20 minutes for that (whispers sort of conspiratorially).

Vicki: I have noticed that, the time difference.

Kerry: I’m really glad! I mean reporting all the information we’ve learned is a longer than trotting out a few little bits of things we half remembered from, you know, third year science or whatever.

discussing information that was possibly incorrect or irrelevant or too familiar was a waste of time.

9.7 Dublin groups and learning: *Transmitting knowledge*

In Chapter 8, I illustrated how Adelaide students spoke of content learning in PBL as knowledge gains through transfer of information (facts and meanings) between students or from text to student. Learning in a group occurred when students told each other things and explained things to each other. In stage 1, students gained information from group colleagues if there was a knowledge difference that enabled transfer of knowledge (refer Section 8.2). In stage 2, students gained information from texts (refer Section 8.3). In stage 3, students ideally gained knowledge from other groups via the information in their group texts (refer Section 8.4). For Adelaide students, the group role was to fill gaps in each other's knowledge and most learning happened when students did research alone in stage 2. Dublin students expressed similar views of learning in PBL. However, they did not speak of learning group skills, as described for Adelaide students in Section 8.5. (In retrospect, I could have asked specifically about this aspect of their groups.)

In Dublin, PBL was a series of activities in which knowledge was assembled through work, which then increased personal knowledge, which could be shared with the group. **Brigid's** description of PBL was "I knew it was, like, discuss something, just go find out about it and come back - it's just basically understanding how to look up stuff, understanding what to listen to". Group members played a supplementary role and could provide knowledge for those without it. **Fiona** noted this as one of the positive features of the session, "You can share and when you don't understand something you just ask and the others in the group they will actually explain". **Hugh**, who hadn't studied for several years, found it especially helpful.

Hugh: And obviously people that know about the subject before you approach - when you first approach the question, you know, you're not approaching it on your own, you're with people that actually know what the terms are, what the question might actually be looking for you know, as well.

This provided enough knowledge for those without subject back grounds to go on to stage 2. **Aileen** said, "If somebody doesn't know about the topic and somebody else does, then everybody will be able to have a basic understanding".

Deidre: And then people in our group, people become more like teachers, they can help each other understand when we're brainstorming. I mean, you can, see Bridie hasn't done Biology so we had to explain to her about cells and fair enough, she can look them up herself, but we'd always try and help her out.

A large amount of learning occurred for Dublin students in stage 2; however, students did not identify it as the main source of their learning. Research was considered valuable for learning: **Aileen** said, “I think researching it yourself *is* good, it does go into your head more than just, here’s notes, learn it”. Students evaluated their learning quantitatively: I asked each student how they decided if they were “happy with what they had done for their learning goal” and students’ responses addressed whether they had located enough information to report and learn. **Brendan** said he stopped researching “if I have covered everything, basically”; **Fiona’s** response was similar: “answer all the questions in the learning goals”; **Brigid** replied, “Honestly? When you get tired of it and can’t find anything else”. **Deidre** said it was important to get feedback to “make sure we’re doing the right amount of research”.

The purpose of stage 3 in Dublin was that students would become teachers and tell each other what they had learned during their research. **Brendan** told me “I’m actually *teaching* other people what I’ve learned”. This process involved giving each other information. **Kerry** called stage 3 “... reporting all the information we’ve learned”. **Fiona** told me that she disliked chairing, she explained, “I prefer to provide the information than ask the questions”.

9.8 The value of the group: *If you don’t pick up on something*

Although the Adelaide groups had an immediate quantitative advantage for PBL work and learning, their overall value was realised in the context of the whole curriculum and students’ lives. The group helped students to cope with all the demands on their time. Its value in learning was not central; its value was instrumental in that it reduced PBL workload and enabled students to focus their efforts on summative assessment and individually accountable work (refer Section 8.6). In Dublin, the overall value of the group differed to Adelaide and I attribute this to the variation in assessment between schools.

Dublin students also raised the issue of time and workload. Like their Adelaide counterparts, they found PBL and research time-consuming. **Hugh** told me that between classes he was “... looking, looking, looking and I’m writing, writing, writing” but then he changed to “... printing off stuff and kind of highlighting” in order to save time on researching; this was because “... the workload was massive and most of the time something else needs to be done”. One of the problems was the time it took to identify necessary information, as **Fiona** put it, it was a process of sorting: “... this is relevant, this is irrelevant”. **Aileen** explained “There is so much information and it’s kind of hard to sort

through and it also takes a lot of time to sort through it". Students also had other demands on their time outside dental school.

Maeve: I'm like "Mmmmm", thinking I have my PBL to do for tomorrow and I have got my physics to read, like it's not peer pressure, yet, like when everyone's leaving and you're one out of six maybe staying behind, it's tougher on you and you have to be really strong and have willpower and you really want to do it and not to go with the crowd and it's tough and like everyone is going up and having a good time.

However, unlike the Adelaide students, Dublin students did not have the option of subdividing the work among group members. I asked all interviewees if they ever worked with group-mates or other BDS students when working on PBL between classes. All students said they worked alone, generally because it was faster and they got more done. They only contacted another student if they could not find resources or to pass on a good resource. Some said they might ask another student for help if they could not understand something, but generally this was left to the final session, when students reported to each other.

Another pressure was the system of self-assessment after each session. This meant students needed to be able to contribute (i.e. offer knowledge - refer Section 9.6.1). Students also knew that there was an exam at the end of the term that directly tested their knowledge from the PBL cases and notes. As a result, students worked hard to do their PBL research.

Brigid: You're kept on your toes. Like a lecture, you could go and look it up and research and stuff, whereas this you have to do every week. So it's making you go do it.

Vicki: What is it that keeps you on your toes? Why do you have to go and do it?

Brigid: Because if you're sitting in a group and you don't have a clue what's going on like, you just feel (slight pause) not stupid, but just like 'well I have nothing to contribute', what's everyone else thinking?

Deidre: In PBL you have actually find yourself focussing a lot more because you do your work and you need to talk about it and you're going to be assessed on your contribution to that group. You know that your notes are going to have to be used for the exam, so it makes you work a lot harder than it does just going to a lecture.

A further difference between Adelaide and Dublin was that there were no other class activities covering the PBL content: all knowledge had to be gained from the group sessions and personal research. This meant that students relied on the group for complete and accurate coverage of each topic, so the role of filling gaps was more important in Dublin than in Adelaide. **Hugh** said a plus for PBL was, "If you miss something totally, like, that you should have seen, then somebody else brings it to the group then you can

obviously take that away”. **Fiona** also found this reassuring, “If there’s something that you haven’t been, like you have looked for the information but you haven’t got it, you can take it from a friend in the group”. The discussions also helped some students judge their learning. As **Kerry** explained, “It’s good to know that you’re learning things that everyone else in the group is, that comforts me”. **Liam** was also reassured by the public displays of learning.

Liam: Yeah, exactly, you can benchmark yourself and you know if you’re not pulling your weight because you’ll see others dishing out notes that you didn’t get and you’ll think “*God, I should have researched that*”, or you know if you’ve got something and a concept and you’re explaining it and you know I really put in the work and you can be happy with yourself.

So the value of the group in learning was to provide direct support to students learning efforts as they acquired knowledge that was to be examined.

The exception to this reliance on the group for learning was **Brendan**, who was an A-level student from the UK and who was the main knowledge person in **Purple**. He felt that he did more teaching than learning. This judgment was based on his idea that learning in PBL meant taking in information. When I asked **Brendan** if he learned from his group, he replied, “Um, the odd facts, yes”.

However, there was another factor at work that potentially undermined group cohesion. The requirement for students to self-assess their performance in PBL, combined with their understanding that valuable contributions meant giving information, introduced an unspoken element of competition as students attempted to have their say. Only two students commented on this and they differed over whether this was positive or negative.

Kerry: You know that everyone else has looked over the same stuff you have and the only thing you didn’t look up they said, because they want to get their however many points at the end of the class. So, you know, people are going to put forward information and it is a bit like trying to get one over on you. Not in a bad way, just like trying to maximise your own performance.

Maeve: Someone will say all your information - because a lot of people have the same information because we go to the same sites and get the same stuff, but then if one person says what I want to say then it wipes it out and I am just sitting there and therefore I don’t have anything to say then I am going to get marked lower.

Although there was potential for competition, judging from students’ accounts of their reliance on each other and their willingness to help each other by sharing and

explaining information, the competitive aspect of the group was minor at the time I conducted my study.¹¹

9.9 PBL groups in Dublin: *Summary and conclusion*

In this chapter I have shown that meanings and practices of PBL groups among first-year dental students at the Dublin Dental School and Hospital were similar to those of first-year dental students at the Adelaide Dental School. Students gave similar descriptions and explanations of group structure, dynamics and function, the work of the group and its role in learning.

In each school, group structure evolved according to the combination of personalities and skills each member brought in to the group. Roles were effectively pre-determined by members' personalities or attributes and so groups were not sites in which people took up new roles or developed new skills. Who could say and do what in any group was determined by the particular combination of students in that group, how they perceived themselves and each other and the relationships between them.

In both schools, group direction was in the hands of a minority of vocal group members and the quieter students were excluded from equal participation. Some group members were excluded from some roles, such as leadership and some aspects of function, such as decision-making. This was the case regardless of whether the group was to decide its own approach to leadership (Adelaide) or to nominate a chair (Dublin). This meant that group function was not even and equitable and group direction and progress were not team decisions.

The quality of interpersonal relationships and the resultant group climate also shaped group function in both schools. The Dublin finding about dynamics is significant because I did not explicitly address this aspect of groups during my Dublin study. In my Dublin interviews, I did not ask students directly about group relationships or climate because at that stage my focus was more work-oriented, such as how groups were undertaking PBL and who did what in a group. However, when I asked students their thoughts on PBL, or how their group worked, they frequently responded by referring to group relationships.

¹¹ I learned that competition was a negative feature of senior years PBL groups in Dublin. Several second-year students with whom I had an informal conversation told me of students who were so competitive that they read up on the case before the stage 1 PBL session in order to be able gain an assessment advantage over their group colleagues. **Hugh** mentioned this in his interview and said that he had heard about the "PBL monsters" from a 2nd year student, however he said had not seen evidence of it yet in **Purple**, since everyone was helpful.

In both sites, students expected or desired that their group would form a social unit with a positive rapport between members and so have a comfortable group atmosphere. If this did not eventuate, members felt disinclined or even excluded from joining group discussions. The group climate shaped members' willingness to engage with or support each other on the work of the group and so influenced students' perceptions of how cooperative their group was.

Students in Adelaide and Dublin constructed the work of the group to be assembling knowledge through processes of collecting and collating information and learning as taking in information. Students constructed learning as a transfer of information and learning in a PBL group meant obtaining knowledge from others. The group supplied facts and explanations for students and so supplemented individual learning. Since Dublin students were assessed on their PBL content knowledge and there were no support lectures, they relied more on the group to support their learning than did the Adelaide students.

Knowledge was a commodity that students could collect and collate as information. Hence, the purpose of a PBL group was constructed by students in both schools as knowledge-assembly and the resultant value of the group was quantitative, in that information/knowledge could be added and more knowledge could be built by a group. Of most value was new information or knowledge, preferably sourced from texts rather than colleagues. Key concerns that shaped what students and groups did were time and workload; students were concerned with efficiency and maximising the amount of information generated.

The PBL process was seconded as a means to an end. Group discussion was oriented toward generating information and students preferred it when the content of discussion was clear and unequivocal. Aspects of discussion, such as explaining or justifying one's point of view, or dealing with uncertainty, were not regarded as learning experiences (for outcome or process). Other aspects of PBL, such as researching, were considered to be individual activities and not suited to group-work. Students' rationale for this point of view was that it was more efficient to work alone on this type of activity and again, this was grounded in their concern with time.

I consider the implications of these results in the following Chapter 10, where I synthesise elements of students' accounts into a student version of the ideal group and compare this to other research findings and the theoretical ideal group from Chapter 3.

Chapter 10. The interpreted curriculum: *The students' ideal group*

10.1 Introduction

My research purpose was to illuminate how dental students in two different schools conceptualised, implemented and explained their PBL groups. I wanted to know how students' constructions of PBL groups could be understood in terms of the nature, purpose and value of a PBL group for students. In Chapter 10, I review the key features of and provide a theoretical explanation for, the nature, purpose and value of the Adelaide and Dublin PBL groups.

In this chapter, I revisit the notion of the ideal PBL group. Based on the results presented in Chapters 5 to 9, I distil a picture of what an ideal group was like for students. I discuss this as the *students' ideal group* and consider how my results might inform other research findings about PBL groups that I discussed in Chapter 3. I also consider how the students' ideal group and a *theoretical ideal group* compare. My discussion of the theoretical ideal group refers to the model that I synthesised from the accounts of PBL implementers and theorists and which I summarised in the conclusion to Chapter 3. Through this discussion I signal some implementation issues that arise from this aspect of the interpreted PBL curriculum.

My discussion of the students' ideal group addresses themes that show how PBL groups met the students' needs in the context of being first-year dental students. I have grouped these features as four main themes, which encompass group dynamics and work/learning; however, there is some overlap between these themes as they were closely related aspects of the students' groups.

In Section 10.2, I discuss the nature, purpose and value of the students' ideal group climate and the relationships that enabled this climate. Section 10.3 deals with the nature, purpose and value of the work bonds and obligations between group members. A discussion follows of how members participated in their group in Section 10.4, where I discuss who did or could do what and for what reasons. Then, in Section 10.5, I present an account of learning and collaboration in a student PBL group with regard to the purpose and value of the group. To link my account of the students' ideal group to the relevant sections of Chapters 5 to 9, I refer to the chapter section number and group (if relevant) in

brackets (e.g. Section 5.4.1 Blue) and I also include some representative quotes as single words or short phrases to illustrate core features.

Through this discussion, I show that the relationship between the students' ideal and the theoretical ideal PBL group is complex. In some areas the two models had similar features, although the underlying reasons for their form varied. In other respects the student and the theoretical ideals were quite different. To conclude the chapter, in Section 10.6, I consider the conceptual basis of and provide a theoretical explanation for, the students' ideal group and its difference to a theoretical ideal group.

10.2 Group climate

In the students' ideal group, the academic dimension of the group was dependent on the social dimension. Students wanted their groups to have a supportive social climate and interpersonal relationships. This enabled individuals to feel comfortable about interacting academically with their colleagues.

10.2.1 Group climate: *Supporting and helping*

For students in Adelaide and Dublin, an ideal PBL group had a comfortable and supportive climate. Students' accounts showed that such a climate enabled open and equitable input in group discussions (Section 6.2.1 Blue, Section 6.4.1 Yellow, Section 9.5.1 Green, Section 9.5.2 Purple). At an individual level this was valuable because it meant that members felt able to speak out freely and share their opinions, thus contributing to the discussion. For example, this was expressed as "say their part" (Section 6.2.1 Blue) and "we can all talk" (Section 9.5.1 Green). At the whole group level, students spoke positively of a group culture in which people listened to and supported each other. To describe behaviours that fostered the ideal atmosphere, students used terms that referred to positive interpersonal behaviours, such as "no put downs", "support and encourage" (Section 6.2.1 Blue), "no disagreements (Section 6.4.1 Yellow), "sharing" (Section 9.5.1 Green) and "no one thinks little of anyone" (Section 9.5.2 Purple). A further desirable criterion was for the group to be an "enjoyable", "happy" or "fun" place (Section 6.2.1 Blue, Section 6.4.1 Yellow, Section 9.5.1 Green, Section 9.5.2 Purple).

Students at both sites also valued a cooperative group. This aspect of group climate was both attitudinal and behavioural, and students described it in terms of helpfulness among group members and being willing to do things for each other (Section 6.2.1 Blue, Section 6.4.1 Yellow, Section 9.5.1 Green, Section 9.5.2 Purple). Cooperation was also

associated with consensus, described as “no disagreements” or being willing to “compromise” over decisions (e.g. Section 6.2.1 Blue, Section 6.4.1 Yellow). Cooperation in Dublin also meant being “helpful” in PBL discussions, usually taking time to stop and “explain” to students who didn’t understand (Section 9.5.1 Green, Section 9.5.2 Purple), especially to those members who did not have the relevant subject background (Section 9.5.2 Purple). Cooperation in Adelaide was also evident in students’ accounts of between-class independent group-work: people were willing to “share the workload” and “volunteer” when needed (Section 7.3.2).

The ideal climate was also illustrated when students spoke of its absence. For example, some students told how they “weren’t comfortable” at the start when their group was new, feeling too “intimidated” or “embarrassed” to speak out. Students’ descriptions and explanations of a non-ideal climate were also illustrative: “disagreement”, “tension”, “not fun”, “not enjoyable” (Section 6.2.1 Blue, Section 6.3.1 Red). In this type of climate, students said they would refrain from contributing (Section 6.2.1 Blue, Section 6.3.1 Red, Section 9.5.1 Green).

Other researchers have reported that students value a similar group climate and there has been some indication that social rapport might be desirable. The emotional climate of the group (support, cooperation and acceptance) was identified by first-year medical students as an important aspect of a successful group session, together with participation and power and leadership (Tipping, Freeman & Rachlis 1995). In another study, second-year medical students identified mutual support, respect and encouragement as important aspects of group climate (Willis *et al.* 2002). First-year medical students also identified cooperation and a safe environment free from fear of feeling “stupid” as important (Virtanen *et al.* 1999, p.272). When junior medical students were asked to describe the “essential characteristics” of PBL, the examples they gave in relation to dynamics included: “group getting on” and “good group dynamics” (Maudsley, Williams & Taylor 2008, p.439). In the same study, students identified poor group dynamics as a problem or negative aspect of PBL, but indicated that it was not common (Maudsley, Williams & Taylor 2008), which was similar to my finding.

In contrast to this research with junior students, a desire for a “safe” environment was also expressed by mature PBL students who were academics and doctoral and masters students; however, this was driven by the need to form an effective learning team (Cockrell, Caplow & Donaldson 2000, p.355) and not primarily for personal reasons.

The students' ideal and the theoretical ideal groups have similar climates but quite different rationales. The theoretical ideal climate matches the students' ideal in a number of respects: it is a supportive, safe atmosphere free of judgement that allows open expression. For example, Barrows and Tamblyn (1980, p.73) said that no one would be "censured, criticized or marked down for making naïve or 'dumb' statements". Adelaide and Dublin students also wanted to feel safe in their PBL group. However, a distinct difference was that for the students it was to ensure their personal and hence, academic comfort, whereas from a theoretical perspective it was to enable the PBL process and problem investigation to be implemented to maximum effect. A further difference was the notion in the Adelaide-Dublin ideal of an enjoyable climate and fun in learning, which was not part of the theoretical conception of the ideal group climate.

10.2.2 Group climate: *Social bonding*

For the students in this study, the ideal group climate resulted from positive interpersonal relationships among members. The social dimension of the group was of paramount importance for students, as shown by its prominence in students' accounts of their groups. A common positive descriptor was "friendly" (Section 6.2.1 Blue, Section 6.4.1 Yellow, Section 9.5.1 Green, Section 9.5.2 Purple) while those who did not have positive experiences of their group spoke of personality differences and social discomfort (Section 6.2.1 Blue, Section 6.3.1 Red, Section 6.4.1 Yellow, Section 9.5.1 Green). If students were unable to establish friendships, this disrupted the group climate, sometimes just for those involved (Section 6.2.1 Blue, Section 6.4.1 Yellow, Section 9.5.1 Green) and sometimes for the whole group (Section 6.3.1 Red). Although this was not common in my participant group, the impact was strong; it negatively shaped the group experience for the students involved and led to their feeling excluded.

Students attributed the quality of the relationships to the mix of individual personalities in the group. A good climate resulted from a good "combination of people" and characteristics, which meant everyone could "get on well" (Section 6.2.1 Blue, Section 6.4.1 Yellow, Section 9.5.1 Green, Section 9.5.2 Purple), while a poor climate was due to a "personality clash" (Section 6.2.1 Blue), or social differences and distance (Section 6.3.1 Red), or social exclusion due to cultural differences (Section 6.4.1 Yellow).

Interpersonal relationships have not been extensively reported on in the research literature. One study reported a similar finding to mine: that although personality clashes were not common they did have a serious impact when they occurred (Hendry, Ryan &

Harris 2003). First- and second-year medical students rated “personality clash” eighth most frequent in a list of twelve group problems; however, when asked to rate its impact on learning, they judged it to be the fifth most severe (following three aspects of poor PBL process and one aspect of poor dynamics due to dominant students) (Hendry, Ryan & Harris 2003). When de Grave, Dolmans and van der Vleuten (2001) identified critical incidents in PBL groups by conducting student focus groups with second, third and fourth years, a category of student-identified incident was “difficult personalities”. The need for positive relationships was implied by one of the “dysfunctional” group scenarios discussed by Hitchcock and Anderson (1997), in which a group “scapegoated” one student (this was a student who was treated poorly by the group because of her prior reputation as a bad group member). Second-year medical students believed that good relationships were a part of effective groups, one area identified for assessment was “group dynamics, relationships and interactions” (Willis *et al.* 2002 p498); however the nature of relationships was not specified.

The theoretical ideal has little to say about how the ideal group climate is achieved or about group relationships. Only Barrows (1988) has explicitly emphasised the importance of relationships. He made the point that learning to think and behave as novice professionals involved learning to establish professional working relationships.

[Students] must learn to deal with interpersonal dynamics throughout their professional careers as they will inevitably have to work with people with whom they may not naturally get along well (Barrows 1988, p.12).

Barrows’ conception of professional group relationships is comparable to the later sociocultural ideal of the PBL group as a site of professional enculturation, in which the development of professional relationships between group members is implicit. This is markedly different from the understandings that the Adelaide-Dublin students had of group relationships, for them the issue of getting along was more a personal than a professional matter.

The distinct difference between the students’ and theoretical ideals is particularly illustrated by the case of one group in my study. On the surface, Red group in Adelaide was more like the conceptual ideal suggested by Barrows and sociocultural theory. After an initial period of acknowledged dysfunction that most members attributed to interpersonal differences, the group negotiated a set of work-only relationships that substituted for the lack of social harmony (Section 6.3.2 Red). Red had moved toward the theoretical concept of the group as professional; the obstacle of lack of friendships was

overcome because the group negotiated an alternative basis for working together. The major contributor to this was one member's leadership in calling a crisis meeting to resolve the situation (Section 6.3.2 Red). However, although the meeting improved the group's work-oriented "cohesion" (refer Section 10.3) and members' participation (refer Section 10.4), the school-leaver members were disappointed about the absent social dimension and having to operate under "purely work-related" conditions (Section 6.3.2 Red). Since members were not friends, students considered their group was deficient to some extent. The exception to this was an older, more experienced member, who regarded the group purely as a work-group. He considered that it became "functional" and did not express any concern at the lack of a social dimension (Section 6.3.2 Red).

There is other research to suggest that students may not easily separate the social dimension of the PBL group from the professional or work dimension (Papinczak, Young & Groves 2007). The focus of this work was peer assessment in PBL and yet, their results showed how friendship might shape the dynamics and process in PBL groups. One of the negative aspects of peer assessment for students was that it could influence or be influenced by friendships; students were reluctant to mark friends and they were wary of the effect on friendships of their marks e.g. "hard to criticise friends"; "relationships between students can colour opinions"; "no one wants to criticise others in PBL" (Papinczak, Young & Groves 2007, pp.179-180).

My study has demonstrated that the social and emotional dimension of the group was of paramount importance for junior undergraduate students, most of whom were new to PBL and tertiary study. The fact that students were undergoing a number of significant transitions might provide an explanation why social bonding was so important in the PBL group. As I noted in my conclusion to Chapter 6, there was a tension between the role of the group as a social and personal setting and its role as an educational and professional setting. In both schools, students referred to the need to get to know others and to making friends as an important part of settling in to college or university life (Sections 6.3.1 & 8.7 Adelaide, Section 9.8 Dublin).

This conclusion is supported by a study reporting that the small PBL group provided an important social and emotional developmental context for undergraduate medical students (McLean *et al.* 2006). Students identified a number of such benefits and outcomes associated with a group; these included supporting their "adaptation to a new and unfamiliar academic environment"; "integration and socialization"; and "individual

personal development” (McLean *et al.* 2006, pp.94)¹. In fact, for Adelaide students too, developing interpersonal and intrapersonal “group skills” was a major outcome from being in a PBL group that students valued highly (Section 8.6.1).

10.3 Team spirit

In the previous section, I was concerned with how the group made the individual feel. I showed that a comfortable social climate was necessary for individual members’ academic ease. However, the social dimension of the Adelaide and Dublin groups was also important for how groups developed and worked together as teams. In this section, I show that in the students’ ideal group, a sense of team spirit or solidarity was associated with individual members’ having a sense of belonging to their group, which was facilitated by good social relationships. Team spirit also involved duty toward the group or one’s group colleagues, expressed as a sense of commitment and responsibility, which was also influenced by social relationships.

10.3.1 Team spirit: *Belonging*

In the students’ ideal group, team spirit and belonging were interlinked concepts. Ideally, students wanted to feel a part of their group. Belonging was expressed as happiness or satisfaction with being a member of one’s group: for example, students said that they “liked” their group or were “happy” in that group, or compared their own group favourably against other groups (Section 6.2.2 Blue, 6.3.2 Red, Section 6.4.1 Yellow, Section 9.5.1 Green, Section 9.5.2 Purple). A sense of belonging was expressed by students who related well to their group colleagues, while those who experienced social friction did not speak of belonging or sharing the group spirit. This applied for local students whose friendship underpinned their bonding (Section 6.4.1 Yellow) or for whom interpersonal difficulties led to their sense of being an outsider (Section 6.2.2 Blue, Section 9.5.1 Green). It was also the case for International Students (IS) who bonded socially with group colleagues and had a sense of belonging (Section 6.2.1 Blue) or for those IS who did not integrate socially and so felt excluded from the group (Section 6.3.2 Red, Section 6.4.1 Yellow).

¹ Note that this was in a very particular educational setting. The medical school was in a new university in South Africa that admitted a wide diversity of students; for example the student body spoke diverse languages, had different countries of origin, and widely differing levels of academic standard on entry (McLean *et al.* 2006). Nonetheless, the point of comparison is the role of the small PBL group for students in new and unfamiliar circumstances.

Team spirit did develop in the absence of friendships but it was a substitute for social belonging and did not equate to a full sense of belonging, as it only pertained to the work dimension of the group. This happened in Red group in Adelaide, where team spirit developed independently of friendships. Belonging in Red grew out of the tightly-structured work-team that emerged following the group's attempt to redress the lack of social rapport and group dysfunction (Section 6.3.2). Members of Red spoke with a sense of pride in their group and its success at meeting this challenge: it was noted as a "turning point" in the group's development (Section 6.3.2). Substitute and partial belonging developed for the two socially excluded Adelaide IS. One was a member of Red (Section 6.3.2) and so included in the group's work organisation. The other was a member of Yellow (Section 6.4.2), who was also included by others in the general sense of goodwill that they extended to all group members. However, for the socially excluded Dublin student who lacked a sense of belonging, this situation was not redressed (Section 9.5.1 Green)

The team spirit of each Adelaide group shaped its approach to working on PBL tasks between classes and so members' commitment to each other took various forms. Blue group had a form of limited commitment requiring minimal obligation. Some members referred to it as "laidback" and conferring a sense of "freedom", since "the only commitment was when we had to write the summary" (Section 6.2.2). Yet, this lack of group solidarity was strongly criticised by a social outsider member (Section 6.2.1) who called the group "un-united" (Section 6.2.2). In contrast, commitment in Red (based on the foundation of work relationships described previously in Section 10.2.2) was highly structured and expressed as a sense of collective responsibility for the group's success: the members "all had a part to play" and they worked as a "team"² (Section 6.3.2). Yet again, Yellow team spirit was based on friendship or goodwill and all members spoke of their commitment to each other as being able to "trust" or "rely on" each other to do their share when required (Section 6.4.2).

It is also the case for team spirit and commitment, as it is for group climate, that the surface form in both students' and theoretical ideals are similar but the underlying rationale is different. The theoretical ideal of team spirit comes from collaborative learning theory, such as that applied to PBL by the Maastricht team (refer Section 2.3.4). Team spirit or "cohesion" is described as commitment or bonding between group members for its own

² Note that this was being a "team" in the attitudinal sense, i.e. team spirit; members of Red considered the group to be cohesive, yet they still did the work individually.

sake. Theoretical cohesion means that members are committed to the group and the group's task success. On the other hand, in the students' ideal group, members cohered or had team spirit because they bonded socially with each other and ideally this social bonding underpinned their sense of commitment to each other.

As a result of my study, I suggest that although team spirit and commitment among colleagues were student ideals, they were not always achieved and even within the same group, students had widely different experiences. A similar result was reported by Faidley *et al.* (2000) in their investigation of group processes using the Learning Team Survey (refer Section 3.3.3). In that study, the group with the highest overall satisfaction rating had the highest rating of commitment and accountability and the lowest level of conflict; the opposite held true for the group with the lowest satisfaction rating. Observations of each group suggested that the highly satisfied group had positive interpersonal relationships, while the least satisfied group was dominated by interpersonal tension between two members. Faidley *et al.* (2000 p127) concluded "that it might be the tension created by the conflict between the two dominant male members of the group that contributed to dissatisfaction with the process".

Although it is not possible to specify causal relationships, the results from both my study and Faidley *et al.* (2000) suggest that team spirit and commitment, which were important for effective group function, were underpinned by the personal and social dimension of the group. The value of the Adelaide-Dublin results is to illustrate the importance of social relationships and belonging to the concept of group cohesion for students. In fact, it might be argued that the line between the group social climate and working cohesion is indistinct for students.

Interestingly, some researchers have found that the theoretical concept of 'cohesion' was not salient to students. For example, in the Tipping, Freeman and Rachlis (1995) study of group dynamics, although students identified the group's emotional climate as important (refer Section 10.2.1), they did not refer to "involvement" or "cohesion" as contributors to group success, either before or after a feedback session, for which the authors did not offer an explanation. In that study, involvement included interest, commitment and attentiveness to the group, while cohesion entailed group solidarity and adherence to group norms (Tipping, Freeman & Rachlis 1995). The team from Maastricht applied collaborative learning theory to explore the theoretical concepts of motivation and cohesion in relation to group success (refer Section 3.3.2). To recap, these studies suggested that for students,

motivation was a core contributor to the success of a group and while cohesion contributed, it was less important for group success and student learning (de Grave, Dolmans & van der Vleuten 2001; de Grave, Dolmans & van der Vleuten 2002; Dolmans, Wolfhagen & van der Vleuten 1998).

10.3.2 Team spirit: *Responsibility*

Commitment to the group also entailed a degree of responsibility or obligation among group colleagues. This was expressed as an expectation that members would contribute. For example, since the group task was to gather and assemble knowledge, it was incumbent on individual members to contribute to this goal. Members were tacitly expected to contribute their knowledge and offer their ideas to group discussions (Section 7.2.1 Adelaide, Section 9.6.1 Dublin). Students spoke of this as “contributing”, “involving” oneself, “sharing”, or “putting in”, and a member’s worth was evaluated by the discharge of this responsibility (Section 7.2.1 Adelaide, Section 9.6.1 Dublin). Members were also expected to undertake any individual research and bring this knowledge back to the group for the final session. In Dublin, this responsibility was discharged by oral report; students spoke of “sharing” or “exchanging” their information with each other (Section 9.6.1). In Adelaide, it involved “doing the work”: making a group summary for submission (Section 7.3.1) and then “presenting” their work to other groups (Section 7.4.1).

Accountability for responsibility was both explicit and implicit in each School. For example, it was made visible in Adelaide in the form of student-assigned tasks and group deadlines and emails or SMS reminders from the leader-administrator (Sections 7.3.2 & 7.3.4); in Adelaide and Dublin it was visible as students’ comments recorded on the board (Section 9.6.1). Accountability was also part of an implicit set of group norms or code of ethics that governed member behaviour. In Adelaide and Dublin, students’ disapproving attitudes to the avoiders (group members who had evaded their responsibilities to either contribute to discussions or do the research - Sections 5.6.5 & 9.4.3) attested to the presence of these tacit norms. Students’ forgiving attitudes to people who were “naturally quiet” and so did not speak as much were also grounded in these norms (Section 5.6.1 Adelaide, Section 9.4.1 Dublin). In Dublin the process of self-assessment was also a form of moral accountability, since students had to publicly assess how well they had met their responsibility to contribute (Section 9.6.1). In Adelaide, members’ being accountable was also implied by the fact that the group norms included special sanctions: members could be temporarily excused from their responsibilities if they had other, more pressing

commitments (Section 5.6.5) and in some groups, students could be sequentially ‘rostered off’ from working to reduce the load on different students each week (Section 8.6.1).

However, responsibility did not have the same level of intensity for Adelaide students as for Dublin students because of the way it was uniquely shaped by the assessment and curriculum structure in both schools (refer Section 4.7.6). To recap, in the Adelaide hybrid curriculum the Dental and Health Science I Stream involved PBL problems, class resource sessions, tutorials and laboratory work. In the Dublin hybrid curriculum, the PBL problems were a discrete curriculum component and other course content was associated with lectures and tutorials. Students in both Schools were examined on the PBL problem content. Therefore, in Dublin, PBL group responsibility was a significant obligation, since students had no other recourse for information and so relied on each other to ensure that they had covered and understood each learning goal to the required extent (Section 9.8). In Adelaide, students had an out-of-class duty because the groups were expected to work collaboratively between classes. This responsibility took the form of “doing your bit” or being “hardworking” for the group when required, in the form of doing the work “allocated” and “volunteering” for tasks (Section 7.3.2). However, it was a lighter obligation in Adelaide, as students were able to assign a lower priority to group-work in comparison to individually accountable work (Section 8.6.1). They did not need to rely on the group effort as much, since the nature of the hybrid curriculum meant that they could use “lecture notes” and “the manual” to prepare for exams (Section 8.6.1).

Responsibility and accountability in PBL groups is an under-reported area. The Maastricht results on cohesion and motivation referred to in the previous Section 10.3.2 (de Grave, Dolmans & van der Vleuten 2001, 2002; Dolmans, Wolfhagen & van der Vleuten 1998) suggested that external interdependence (motivation) was more likely to drive students to contribute and to learn than internal interdependence (cohesion). This is similar to my findings: while team spirit was an enabler of commitment and cohesion, ultimately, motivation from assessment and the individual desire to pass drove students to meet their responsibility in Adelaide and Dublin. In their discussion, de Grave, Dolmans and van der Vleuten (2002) noted that all the student-generated examples of lack of motivation were actually factors outside the group and PBL. For example, the lack of motivation item “something else has priority”, which was derived from the student focus groups (de Grave, Dolmans & van der Vleuten 2001), is akin to the way Adelaide students had prioritised their PBL group commitments lower in their workload (Section 8.5.1). This

underscores the importance of studying the group in context, rather than as an isolated phenomenon or just within the bounds of PBL.

10.4 Participation

In the students' ideal group each member took on a role through which they could contribute in their own way to group function and outcomes. The students' ideal group could have a hierarchical structure but it was free from dominance, exclusion and conflict, although in reality, these three elements did occur.

10.4.1 Participation: *Roles*

In the students' ideal group, each member had a chance to participate and so contribute to the group by using their particular skills and abilities, which meant taking on appropriate roles, which emerged naturally in relation to the group's activities (Sections 5.4.4 & 5.5.3 Adelaide, Section 9.4.1 Dublin). Members could contribute to group productivity by using their knowledge in group discussions and research skills between classes. Other members could contribute to group function by using their people skills, which included leading, involving, and lightening the mood through joking. International Students found that they could compensate for not participating in discussions by adopting a researcher role (Sections 5.6.2 & 6.4.2 Adelaide).

There was a tacit understanding among the students in my study that a group needed a good leader to guide and manage the group. This role involved directing the PBL process, guiding content and facilitating the group interactions (Section 5.4.1 Blue, Section 5.4.2 Red, Section 5.4.3 Yellow, Section 9.4.2 Dublin). The majority of students believed that leaders were born or matured and so in an ideal student group the leader would be someone "naturally" suited to the role and who had the necessary skills and attributes (Section 5.4.4 Adelaide, Section 9.4.2 Dublin). In Dublin, this belief shaped students' expectations and evaluations of the group chair, so that if the incumbent was not a natural leader then he or she was a "weak chair" who could not fulfil the duties of the role (Section 9.4.2). The one exception to this belief in natural leadership was a mature-age student in Adelaide who had previous team-leader experience in a professional setting; he viewed leadership as a set of learned skills (Section 5.4.2 Red).

The editor role in Adelaide groups was a specific task-related role that was created by students to meet the group's need to reduce the time and work that each member devoted to the group summary. By having an editor, the burden was lifted from the other

members and by using a volunteer system and by rotating the role through the group, each member took their turn at assuming the burden for the group (Section 7.3.2). Therefore, this task was not only a form of enabling member participation (and facilitating cohesion), it was also a way of distributing workload evenly among group members over the course of the semester (Section 7.3.1).

Little has been reported in the literature about students' roles in PBL groups. Tipping, Freeman and Rachlis (1995, p.1051) included "balance of task and group-building roles" in their ideal group dynamics list, but they did not expand on this topic in the paper. In their study of criteria for assessing group function, Willis *et al.* (2002 p496) listed role sharing as a criterion. Whereas an "outstanding" group "frequently and appropriately" rotated roles, a "poor group" underwent no role changes; however, there was no other mention of roles in this paper. It is interesting to note that although the Adelaide and Dublin students were satisfied with the largely static personality-based role structure of their groups, the student ideal would be classified as "poor" by this criterion. Student-initiated role rotation only occurred in Adelaide with the student-assigned editor role and for scribing (although Yellow eventually had a fixed scribe - Section 5.3) and this was done to meet individual needs and share the workload fairly (I discuss this further in regard to collaboration in Section 10.4.2).

Only one study has described group roles in detail and the findings were similar to my Adelaide-Dublin results. Duek's (2000, p.96) investigation of equity in student groups (refer Section 3.3.3) showed that group members "self-selected" into particular roles and no roles were "explicitly assigned". There was also a strong similarity between the roles that Duek identified from her observations and the roles based on students' reports that I presented in Chapter 5. For example, as roles contributing to group function, she noted the presence of "group leader" (i.e. leader-director), "task organizer" (i.e. leader-administrator) and "reference person" (i.e. researcher). Under process-related behaviours she classified "gatekeeper" (i.e. involver) and, similar to the dominant-quiet dichotomy in Adelaide-Dublin, "aggressing", "hypercontributing", "hypocontributing" and "withdrawing/following". This is further support for my argument that PBL groups were largely personality driven, formed in an ad hoc manner, and tended to remain fairly static.

There is also little in the literature about leadership in PBL groups. Although the ideal criteria listed by Tipping, Freeman and Rachlis (1995) included leadership and its style and effect, they did not address leadership in their discussion, even though it was one

of the three items that students had identified as important for group success. The theoretical ideal is always presented as a flat structure; the equal participation from all students implies an ideal of shared leadership among the students. However, this was not the case in either my study or Duek's (2000). The Adelaide group leaders and Dublin dominant people directed the discussion and decision-making and similarly, Duek (2000, p.92) labelled the "group leaders" in her study as "Discussion dominator/coordinator".

A detailed study of leadership in PBL groups documented leadership and group culture. Palmer and Major (2004) described each of four groups in their study as having a particular culture (which they code-named for popular television shows) that explained the style and impact of leadership. The group culture and leadership were informed by the personality mix and subsequent social relationships in the groups. For example, the "Brady Bunch" group "got along well and supported each other, while the "Survivor" group appeared "wary" and "competitive"; the Brady group had a single leader who was "motherly" and the Survivor group had "hotly contested" leadership (Palmer & Major 2004, pp.122-126). The authors contrasted what they called "collaborative" and "heroic" leadership, with the former being situational and shared and the latter being a personality driven model, and they noted that the heroic model was used by some of their students (Palmer & Major 2004, p.129).

The Adelaide-Dublin student notion of fitness for leadership, which was also not part of the theoretical ideal, has been noted elsewhere. Both Duek (2000) and Benbow and McMahon (2001) described interviews with students (four in all) who had taken control of their PBL groups in the belief they were best suited to this task. The "hypercontributor" in Duek's (2000, p.97) interview also explained that he was a "natural leader". As with my Adelaide study, where the leader-directors were non-School leavers and had previous tertiary or workplace experience (Blue Section 5.4.1, Red Section 5.4.2), the leaders in the Duek (2000) and Benbow and McMahon (2001) reports were also older and more experienced than their group-mates. Like my Adelaide participants, they all expressed a sense of obligation to their group to take the reins and, as in Adelaide, some of their attempts to lead met with resistance and resulted in power struggles and conflict (Duek 2000; Benbow & McMahon 2001).

In contrast to the students' single, natural leader model, instances of distributed and learned leadership, closer to the theoretical ideal, have been documented with more senior and experienced students. Cockrell, Caplow and Donaldson (2000, p.355) investigated

students' perceptions of their group as a site for collaborative learning. In groups comprised of experienced academics, all at doctoral or masters level, leadership was not the prerogative of one person, but was taken on by any group member in response to circumstances - the authors referred to it as "situational leadership". In contrast, one group had a dominant member who had assumed leadership and this was regarded as "dysfunctional" by the rest of the group (Cockrell, Caplow & Donaldson 2000, p.355). Another study of PBL among professional, adult students showed that students reported improving their leadership skills and styles through their PBL group (Fenwick 2002).

However, despite their espoused 'heroic' outlook on leadership, the students in my study may have been using situational leadership without this being commented on. The only example of situational leadership that I identified was not described as leadership by the students. However, the act of proposing to take it in turns to be the group editor was an example of unacknowledged leadership by the students responsible.

10.4.2 Participation: *Power and decision-making*

The students' ideal group was free from dominance and exclusion, although participation was not necessarily even. This ideal was based on beliefs about human nature and a particular understanding of dominance. Students used 'dominance' with a dual meaning; generally this was implicit, but two students in Dublin explicitly distinguished the two meanings (Section 9.4.2). Dominance used neutrally was an oppositional descriptor that distinguished the basic types of people in a group i.e. outspoken or not outspoken, which set up the dominant/quiet opposition. Students understood that a natural part of any group structure was a basic dichotomy of "dominant" or "vocal/active" and "quiet" or "passive/follower" members and that this shaped group function, meaning that some people naturally spoke more than others in group discussions (Section 5.6 Adelaide, Section 9.4.1 Dublin). These dominant people were also more "active" in leadership and decision-making; it was generally accepted that a quiet or passive person could not lead effectively (e.g. Dublin students described how a "weak chair" was usurped by the "dominant" students) (Section 5.4 Adelaide, Section 9.4.2 Dublin). As a result of these understandings, students accepted a certain degree of unevenness in participation and decision-making as natural. Attempts to redress this were aimed at individuals and increasing their participation, such as periodically asking the quiet people if they wanted to say anything or if they agreed with decisions (Sections 5.5.1 & 6.4.1 Adelaide).

However, there was a fine line between the ideal and the actual patterns of power and decision-making in Adelaide and Dublin. Students also used ‘dominance’ in a negative sense: it referred to overbearing behaviour, not letting others speak and imposing one’s opinions and ideas, which led to feelings of intimidation and resentment among other members (Sections 6.3.1 & 9.4.2). Students said that this type of person could take over the discussion and prevent others contributing, which was not an acceptable part of an ideal group (Sections 5.4.4 & 6.3.1 Adelaide, Section 9.4.2 Dublin). I believe that the difference between leadership and overbearing dominance was due to how personality and leadership style were perceived. If people were likeable and were not seen as overbearing, and if there was no conflict caused by their leadership, then their actions were acceptable (Section 5.4 Adelaide, Section 9.4.2 Dublin), which has been reported elsewhere (Benbow & McMahon 2001). This would suggest that PBL groups are at risk of being high-jacked by likeable, dominant personalities.

The issue of an uneven power balance was compounded when students assumed that the quiet people were naturally quiet and that quietness was a solely individual phenomenon rather than a socially constructed aspect of the group. Due to this misattribution, PBL groups became sites of unintentional exclusion. In both Adelaide and Dublin, there were quiet students who wanted to join in but experienced difficulty doing so due to cultural and social differences between group members, which in turn constructed a particular group dynamic in which not all could freely participate. This was exacerbated in Dublin by students’ expectations that the chair was responsible for good group dynamics, which meant that other students did not assume any role in facilitating participation (Section 9.4.2).

Exclusion was reported by three International and two local interviewees in Adelaide (Section 5.6) and two Dublin interviewees (Section 9.4.2), and all but one local Adelaide student who preferred to remain silent (Section 6.4.1 Yellow) reported being dissatisfied with this situation. Each of my Adelaide International interviewees spoke of compensatory participation strategies: participating silently, observing locals to learn how to “think that way” and contributing to research by “finding information” (Section 5.6). The excluded local students expressed frustration and resentment at their situation (Section 5.6 Adelaide, Section 9.4.2 Dublin). In one Adelaide group in particular, there was a hidden power imbalance: the group was cooperative and cohesive, yet it was led by a vocal sub-group and the remaining members, including an International Student interviewee, were excluded

from full participation in the social and work dimension of the group (Section 6.4.1 Yellow).

Although dominance is antithetical to the theoretical ideal, it is common in the research literature. It has been identified by students as a disadvantage of PBL (Maudsley, Williams & Taylor 2008), a problem that disrupted group dynamics (Benbow & McMahon 2001; de Grave, Dolmans & van der Vleuten 2001, 2002; Duek 2000; Hendry, Ryan & Harris 2003; Houlden *et al.* 2001; Papinczak, Young & Groves 2007) and an impediment to learning (de Grave, Dolmans and van der Vleuten 2002; Hendry, Ryan and Harris 2003). As with my study, the students who were dominated felt intimidated, inadequate and withdrew (Duek 2000; Hendry, Ryan & Harris 2003). The same groups of authors reported that quietness was a common, but not detrimental, feature of PBL groups.

The explanations for dominance (and quietness) proposed in the literature are more wide-ranging than the personality explanation provided by the Adelaide-Dublin students. However, although they extend beyond personality, many of these have also located the problem with the individual. For example, explanations of dominance have included personality, learning style or approach and students' being accustomed to competitive participation or being unable to participate equitably (Hendry, Ryan & Harris 2003). Quietness has been explained as due to personality, learning style or approach, lack of confidence, or lack of preparation (Dolmans & van der Vleuten 2001; Hendry, Ryan & Harris 2003). Some studies (refer Sections 3.3.2.2 & 3.3.2.3) have shown that students believed their tutor was wholly responsible for ensuring even participation and managing dominant members (Papinczak, Young & Groves 2007), while others found that students thought the tutor only partly responsible (de Grave, Dolmans & van der Vleuten 2002)³. It has also been noted that students do not appear able to manage dominant group members effectively (de Grave, Dolmans & van der Vleuten 2001; Hendry, Ryan & Harris 2003).

In contrast to the negative impact of dominance, the literature suggests that students did not consider quietness to be a group problem in the sense that it prevented learning (de Grave, Dolmans & van der Vleuten 2002; Hendry, Ryan & Harris 2003), even though in one study it was ranked by tutors and students among the three most common problems (Hendry, Ryan & Harris 2003) and non-participation has been observed frequently in groups (Faidley *et al.* 2000; Tipping, Freeman & Rachlis 1995; Wilkerson, Hafler & Liu

³ In contrast to these students' expectations, Barrows advised that the "tutor must not take on a parental or fully responsible role" for group dynamics (1988, p.12).

1991). De Grave, Dolmans and van der Vleuten (2002, p.207) suggested that perhaps students overlooked non-participation or considered that the quiet students were “a lost cause”. In contrast, the participants in my study were very aware of non-participants and did not abandon them, but regarded them as “quiet but valuable” group members (Section 5.6.1). However, this did not redress the issue of their exclusion from full participation in group activities.

A sociocultural explanation for quietness (and by implication, dominance) in cross-cultural PBL groups has been provided by Remedios, Clarke and Hawthorne (2008a, 2008b), who investigated the experiences of Asian, Confucian heritage students in a Western PBL setting and found that silence and exclusion were not confined to the International Students, (refer Section 3.3.3). Through four case studies of physiotherapy students, two International and two local, who were “silent participants” in PBL, they documented the complex interaction of cultural and social factors that constructed silence and exclusion (Remedios, Clarke & Hawthorne 2008b).

There were a number of similarities in the social construction of silence for both international and local students in the Remedios, Clarke and Hawthorne (2008b) study and in mine. The Asian International physiotherapy students also experienced cultural dislocation; both found the PBL environment and the rapid, colloquial conversational practices of local students new and challenging. One International physiotherapy student also faced extra challenges with discussing in English, which required him to take more thinking and composing time and of which his local colleagues were unaware. The same student was socially isolated, especially when his group-mates engaged in humour (Remedios, Clarke & Hawthorne 2008b). The local, silent students were both familiar with the language and culture of Australian schooling but uncomfortable with the expectation to speak in PBL. One explained that she was intimidated by her tutor and group colleagues, while the other was fearful of saying something wrong and appearing foolish in front of his peers (Remedios, Clarke & Hawthorne 2008b). The authors concluded that the “choice to be silent is not necessarily linked inevitably to a passive position” (Remedios, Clarke & Hawthorne 2008b, p.212).

These results from my study and others show that dominance and quietness are not simply a matter of a dysfunctional individual or a student’s personality, but that they are enabled by the group environment and group members’ interactions and attitudes to each other. They also show that silence and exclusion are not solely issues of International

students in cross-cultural Western PBL groups but can include local linguistically and culturally adapted students. Dominance and silence are socially constructed phenomena which result from the interaction of many factors. This has implications for how the PBL process itself unfolds. For example, in their study of collaborative knowledge building and reasoning, Glenn, Kosschman and Conlee (1999) noted that the way the group engaged in discursive practice made certain events possible, such as a student being able to propose his or her own explanations for the PBL problem (refer Section 3.3.2.3).

10.4.3 Participation: *Competition and conflict*

In my study, ideal group participation was free of competition and conflict. However, this was not always possible and when conflict did arise, it often simmered below the surface. In both schools there was some degree of competition for talk-time and control in group discussions, which was either accepted (refer Section 10.4.2) or associated with conflict or dissatisfaction. These episodes were reported as conflicts for leadership in Adelaide (Sections 5.4.1 & 5.4.2) and in Dublin as the chair role being usurped when dominant members took control of the discussion (Section 9.4.2.2). The issue of the quiet students who were socially silenced and could not speak out about their situation was also a form of suppressed conflict (refer Section 10.4.2). However, conflict was not easily managed in real student groups.

In the theoretical ideal group such power struggles would be dealt with immediately and directly. Regular reflection and evaluation would be part of the ideal PBL approach and fundamental to improving group process. This would include members being able to provide honest and constructive criticism of their own and their colleagues' performances (Barrows & Tamblyn 1980; Dolmans *et al.* 2005).

However, in my study, the majority of conflict situations remained unacknowledged between antagonists or hidden as frustration or resentment (Sections 6.2.1 & 6.3.1 Adelaide, Section 9.4.2.2 Dublin). Students did not feel able to address competition or conflict directly with the offending people and so left the issue unsaid (Section 9.4.2.2 Dublin), or in some cases attempted private resolution of their situation (Sections 6.2.1 & 6.3.1 Adelaide)⁴. Group evaluation was a part of the PBL process in both schools. In Adelaide, each PBL case ended with a group evaluation and in Dublin, each session ended

⁴ Although Red group publicly resolved the lack of cohesion, the actual leadership conflict between two members was not directly addressed. One of the students involved told me how she managed privately by discussing it with her sister (refer Section 6.3.2).

with student self-assessment, which included group process-related criteria. However, this was not mentioned by students in either School in relation to improving group dynamics.

Silent anger and repressed conflict about power have been noted by other investigators. In these studies, students did not criticise their groups publicly during the group evaluation process, but when they had a private means of doing so, a number of them negatively evaluated their groups. For example, students used the Learning Team Survey (Faidley *et al.* 2000, p.129), the interviews with the researcher (Duek 2000) and interviews with tutors (Benbow & McMahon 2001) as channels to express dissatisfaction with a group power imbalance that they had not vented in face-to-face situations. In Section 10.4.2, I noted that students felt poorly equipped to deal with dominant students and expected the tutor to have some role in managing it and this may well apply to other episodes of conflict. These factors combined could provide an explanation for why power imbalances persist in PBL groups.

10.5 Work and learning

The students' ideal PBL group was an efficient knowledge-gathering team that worked collaboratively to assemble knowledge. Its role was to augment the learning of individual members. However, the value of the group was not solely related to PBL, its overall value was constructed within the wider context of the curriculum and students' lives.

10.5.1 Work and learning: *Assembling and transmitting knowledge*

The purpose of the students' ideal group was shaped by their constructions of work and learning in PBL as separate activities requiring different group or individual efforts, which I explained in Chapters 7, 8 and 9. To review, learning meant increasing personal knowledge, whereas doing PBL as a group equated to the work of assembling knowledge; therefore, learning in a PBL group comprised transmitting knowledge between students.

PBL group-work was constructed as a linear series of group information-gathering activities (stages 1, 2 and 3) and so the PBL process became a means to an end. For students, PBL sessions comprised a group effort oriented toward maximising the knowledge return (i.e. the product or outcome of PBL). This meant "pooling" everyone's knowledge during the problem analysis in stage 1 (Section 7.2.1 Adelaide, Section 9.6.1 Dublin), individually "gathering information" from texts in stage 2 (Section 7.3.1 Adelaide, Section 9.6.1 Dublin) and then "compiling" or "adding" together everyone's

researched information in the final stage (Sections 7.3.1 & 7.4.1 Adelaide, Section 9.6.1 Dublin). The advantage of a group meant that more information could be accessed and so more knowledge could be assembled. Through the group students could obtain a more complete account of the problem in stage 1 and of the learning issues/goals in stage 2 and 3 (Sections 7.2.3, 7.3.3 & 7.4.2 Adelaide, Section 9.6.2 Dublin).

Students understood learning to mean taking in information; it was a one-way transfer of information (facts or meanings), which had been collected from texts (i.e. authoritative sources of knowledge). Therefore, a PBL group learning discussion meant that individual members were increasing their personal knowledge and understanding by exchanging information and giving each other explanations; the final session in particular involved students presenting their information to each other (Sections 8.2.1 8.3.1 & 8.4.1 Adelaide, Section 9.7 Dublin). For students, a successful or ideal group session was a goal-directed discussion free from any confusion or conflict. Preferably, all group members had some information that they could contribute toward the end product, (Section 7.2.1 Adelaide, Section 9.6.1 Dublin) and towards each other's learning (Section 8.2.1 & 8.4.1 Adelaide, Section 9.7 & 9.8 Dublin) otherwise they would be unable to contribute effectively to the group discussion (Section 7.2.1 Adelaide, Section 9.6.1 Dublin).

In this context, group learning for students was ideally an uninterrupted process of taking in *new* knowledge and it was impeded by uncertainty and lack of knowledge. A problem scenario discussion in stage 1 was not ideal when people said things they were not sure of or when people had different ideas about things because this caused "confusion" and "wasted time" (Section 7.2.4 Adelaide, Section 9.6.3 Dublin). Students suggested that a group session was of little learning value when group members had "no knowledge" to give each other. This was an issue in the initial PBL session (stage 1) due to students' lack of prior knowledge and in the final session (stage 3) it was due to students' inadequate preparation, which resulted in students reading material that they did not fully understand (Sections 8.2.1 & 8.4.1 Adelaide, Section 9.6.1 Dublin). This explained why some students considered the initial session as something to be rushed through to get to the learning issues/goals (Section 8.2.1 Adelaide, Section 9.6.3 Dublin).

In contrast to the students' ideal of knowledge-assembly and transmission, in the theoretical ideal of a PBL group, learning is more than knowledge acquisition and the PBL process is both a means of learning and a form of learning; it is not subordinate to content. Throughout Chapter 2, I showed that in the McMaster original and in more recent

sociocultural accounts, process and content learning are intended to be integrated. Students learn to think and reason like clinicians as they develop a body of contextualised knowledge; self-directed learning is part of the process-content integration as group members examine their own and colleagues knowledge to test their certainty. Learning in PBL is theoretically situated in the group, as students actively construct knowledge through group discussion.

However, similar group approaches to PBL to those of the Adelaide and Dublin students have been reported elsewhere, often as unexpected or anomalous results. Groups have been noted to alter the PBL process and abbreviate the systematic approach (refer Sections 3.2.2, 3.3.1 & 3.4). This has included groups taking short-cuts in the steps, discussing superficially or too quickly, preparing inadequately for sessions, giving mini-lectures or reading from notes and distributing case solutions prematurely (Dolmans, van der Vleuten & Wolfhagen 2001; Hendry, Ryan & Harris 2003; Hitchcock & Anderson 1997; Houlden *et al.* 2001; Steele, Medder & Turner 2001). These are the same types of alterations that were labelled in Maastricht discussion papers as “signs of erosion” (Moust, van Berkel & Schmidt 2005) and “ritual behaviour”, forms of group-work problems and dysfunction in PBL (Dolmans *et al.* 2001).

In a study of first-year students’ responses to PBL, students who had reacted negatively to PBL felt ill-equipped to do it because they “didn’t have the foundation knowledge” (Tan 2004, p.176) and for this reason they also judged learning in a group to be inadequate because their colleagues were not able to supply knowledge. Tan (2004, p.181) concluded, “there is a strong need to prepare the mindset of students who are only used to a more didactic mode of learning”.

In fact, an explanation for why groups may undertake PBL differently to the theoretical ideal was provided by Faidley *et al.* (2000) who suggested that students were interpreting PBL in ways that were familiar to them, *viz.*, as traditional classroom behaviour. In their observational study of PBL groups (refer Section 3.3.3), they noted of the most satisfied and cohesive group (refer Section 10.3.1) that students took turns teaching each other by giving lectures about their research topics, “we describe the interactions of this group as ‘student-negotiated’ but we describe the pedagogical mode as ‘lecturelike’” (Faidley *et al.* 2000, p.124). They suggested that students had adapted a traditional teaching-learning mode: “[t]he difference of, course is, that in PBL the

information is relayed from student to student rather than from teacher to student” (Faidley *et al.* 2000, p.124).

This and Tan’s finding about knowledge, may explain one report that students did not verbalise a lot of their thoughts in group discussion, so that discussion represented just the “tip of iceberg” of students’ knowledge development (de Grave, Boshuizen & Schmidt 1996, p.327 - refer Section 3.3.2). Possibly the students, like those in my study, refrained from verbalising or contributing unless they had knowledge and so could produce an answer, in accord with their understanding of appropriate classroom practice.

The theoretical ideal of an effective learning discussion also contrasts markedly with the students’ ideal of knowledge transmission and gap-filling. From a social constructivist perspective, learning happens through the discussion process, not simply as an end result of taking in information. Students are intended to explore their existing knowledge, test its certainty and compare their understandings against those of their colleagues during learning discussions. Learning is particularly theorised to occur in the process of confronting uncertainty or differing understandings (refer Sections 2.3.2, 2.3.3 & 3.3 for constructivist accounts of PBL). PBL proponents particularly warn against students delivering information to each other in the final session, Barrows (1988 p39) stated it ought not “degenerate into a ‘show and tell’ at this stage”. Similarly, Savery and Duffy (1995, p.35) advised, “Note that students do not simply tell each other what they have learned”.

However, research findings about students’ engagement in and attitude towards theoretically ideal learning interactions have also been contrary to what was expected (refer Section 3.3.2). For example, key processes like interaction and elaboration and key components of these such as engaging in debates over knowledge conflicts were less frequent than expected, while the predominant activities were simple question and answer and delivery of information (de Grave, Dolmans & van der Vleuten 2001, 2002; Visschers-Pleijers *et al.* 2004, 2005a; Visschers-Pleijers *et al.* 2006; Yew & Schmidt 2009). Further, students did not consider this to put their learning at risk (de Grave, Dolmans & van der Vleuten 2002; Visschers-Pleijers *et al.* 2005b)⁵. As I noted in Chapter 3 (refer Section 3.3.2), these authors commented particularly on the absence of knowledge conflicts and students’ desire to avoid them (Visschers-Pleijers *et al.* 2005a, 2005b; Yew & Schmidt

⁵ Motivation, principally stimulated by the tutor, was seen to be the main driver of learning, refer 3.3.2b, 10.3.2.

2009). The possible explanation, that students may prefer to avoid conflict because of the uncertainty it causes (Visschers-Pleijers *et al.* 2005a, 2005b), is supported by my findings from both Adelaide and Dublin about confusion and time-wasting.

10.5.2 Work and learning: *Collaboration*

In the students' ideal group, the purpose and value of collaboration was providing support for individual members. Collaborative learning meant adding members' knowledge contributions together. Collaboration as work meant helping each other cope with workloads and it provided either direct or indirect support for students' personal learning efforts toward assessment.

The group provided a collaborative 'gap-filling' service in learning. Group discussion was most valuable when students had problems. It was not necessary to discuss familiar and well-understood information, since this did not lead to learning and so was redundant (Section 8.2.1 Adelaide, Section 9.8 Dublin). As this wasted time, the Adelaide groups collaborated to minimise their contact time with each other between classes (Section 7.3.4) and Dublin students mostly worked alone during the research stage (Section 9.6.3). However, in both Schools, colleagues were helpful when resources could not be found, when information in different texts was inconsistent (e.g. due to different publication dates) and when personal learning efforts did not lead to understanding (Sections 8.2.1, 8.31 & 8.41 Adelaide, Section 9.7 Dublin). Collaboration in learning involved supplying missing information or resources.

Collaboration as work in Adelaide was identified by students as how their groups worked between classes and it was linked to the cooperative aspect of the group climate and to the team spirit. It provided indirect support to students in relation to assessment. When group members were well-disposed toward each other interpersonally, they worked collaboratively. Collaboration was also constructed in the context of meeting members' needs, which meant Adelaide students collaborated on making PBL group-work more efficient. Its form was a collective response to the need to save time and effort on the group's work of making a summary document (Section 7.3.4), thus allowing students more time to focus on other assessed work (Section 8.5.1). Students described how they collaborated during the research stage on a series of information management activities by turn-taking and volunteering in order to share the workload fairly among members (Section 7.3.2). Collaboration ultimately took the form of "working as a group by working individually" (Section 7.3.3).

Collaboration as working together in Dublin equated to cooperating on managing the work and it provided direct support in relation to assessment. In Dublin, collaboration was implicit: group members collaborated by explaining to each other and being helpful (refer Section 10.2.1). Dublin students collaborated by doing their own work and so ensuring that as a group they had enough knowledge about each learning goal, the ultimate aim of this was to assist individual members to prepare adequately for their exams (Section 9.8).

Collaboration is also a component of the theoretical ideal group and like the students' ideal, it relates to work and learning. In the theoretical ideal, students learn to collaborate and also collaborate to learn (refer Sections 2.2.2, 2.3.3 & 2.3.4). The former refers to learning to work together as a team, while the latter refers to collaborative knowledge building and reasoning and self-directed learning (refer Section 2.3.3 for sociocultural explanations of groups). Collaborative work is similar in the students' and theoretical ideals in that it means learning about teamwork and learning to coordinate individual efforts. However, the form of students' collaborative work and learning had a different foundation. It was based on students' construction of the group task of knowledge-assembly as a quantitative exercise of adding separate pieces of information together to make a larger body of knowledge and of collaborative learning as exchanging information and increasing knowledge. In contrast, the theoretical ideal is based on collaborative knowledge construction, where the whole produced by the group is greater than the sum of the parts.

Sociocultural investigations of groups have shown how it was possible to facilitate collaborative knowledge-building through documenting how the tutor works with the group (refer Section 3.3.2). However, no one has reported on students' understanding of collaboration or collaborative learning. Although working cooperatively and collaboratively are common in the research literature that reports on student perceptions of PBL, effective groups and group success (for example, Maudsley, Williams & Taylor 2007; Willis *et al.* 2000; Virtanen *et al.* 1999), the researchers have not asked students what they understand these terms to mean or what their groups do when they collaborate. The results from my study suggest that students and researchers (and by extension tutors and curriculum planners) might have different understandings of the same concepts, such as 'collaboration' and 'learning'. This then has implications for how students construe the purpose and value of PBL groups and how they function.

10.6 The students' ideal group

In this section I summarise the students' ideal group and provide an explanation of its conceptual basis. The students' ideal group established good social relationships, which in turn led to a supportive and safe climate for individual members (Section 10.2) and a sense of team spirit and responsibility and commitment among members (Section 10.3). Ideal group function involved each member being able to find a contributory role in the group and no member feeling excluded or dominated or experiencing conflict (Section 10.4). Collaboration and learning in the ideal group were knowledge gathering and transmitting activities that directly and indirectly supported individual members (Section 10.5). From a conceptual perspective, I show that students used a lay functionalist approach, in which internal factors and external factors contributed to their understanding and explanation of PBL groups.

The aim of functionalist group theory⁶ is to explain or predict group success or failure in terms of *inputs* and *outputs* (Poole *et al.* 2004, pp.7-10; refer Table 10.1)⁷. This approach is based on three related assumptions: “groups are goal-oriented”; “group performance varies and can be evaluated”; “internal and external factors influence group performance” (Wittenbaum *et al.* 2004). Group goals can include the group's *task* or may be “social-emotional” and oriented toward meeting the members' needs (Wittenbaum *et al.* 2004, p.19). For the students, their groups were goal-oriented in that they had to be a PBL group (and so do whatever was required by the staff/curriculum); however, groups also had the social-emotional goal of providing social and academic support to group members.

Table 10.1 Parameters of the functionalist approach to groups

Functional Theory Inputs	Functional Theory Outputs
<i>Task</i>	<i>Productivity</i>
<i>Group structure</i>	<i>Efficiency</i>
<i>Group composition</i>	<i>Quality</i>
<i>Group cohesiveness</i>	<i>Leadership effectiveness</i>
<i>Environment</i>	<i>Satisfaction with group outcomes</i>

⁶ Poole *et al.* (2004) identified nine major theoretical perspectives on groups, which originated in diverse disciplines: “the functional, psychodynamic, temporal, social identity, symbolic interpretive, conflict-power-status and social network perspectives” (p6). They note that within the functional approach (as in others) there are various different theoretical stances, however they all share the same set of assumptions on which my discussion of the students' ideal group is based.

⁷ Throughout the discussion of functional theory I use italics to denote functional theory concepts.

To evaluate group performance in functional theory, normative standards are usually adopted on the basis of a “rational model” (Wittenbaum *et al.* 2004, p.19). However, students used both normative and personal standards to evaluate their groups and sometimes these were in tension. Normative standards referred to the group’s performance as a work team in relation to the goal of being a PBL group. This led to students evaluating their group as “good” or “bad” according to some external criterion, such as how they perceived that a PBL group should work. For example, the Adelaide students knew they were “supposed” to work a certain way, such as organising group meetings between classes, but they chose to avoid meeting as much as possible⁸. Personal standards related to the socio-emotional goals of the group and they measured how satisfied individual members were with their group, which was expressed as belonging (Section 10.3.1). However, the group’s performance as a work team could also be measured in personal terms, which sometimes conflicted with normative evaluations. Adelaide students rated their groups in personally relevant terms of efficiency (Section 10.5.2), hence the oxymoronic “solo collaboration”, which was deemed the best way to work despite what ‘ought’ to be done (i.e. work together).

The final assumption of the functional perspective is that group performance is subject to internal and external factors. The internal factors used in functional theory, *group composition*, *structure* and *cohesiveness* (Table 10.1), were embedded in students’ explanations of their groups. Students’ understanding of *group composition* as an explanatory concept was deterministic in that composition, or particular member combinations of personalities and attributes, determined *group structure* (via role uptake) and *group cohesiveness* (via the social relationships in the group). External or *environmental* circumstances that influence groups can include outside threats and time pressure (Wittenbaum *et al.* 2004, p.19). In my study, the students cited demands other than PBL (“other things to do”), assessment, and time pressure as factors that concerned them individually and which shaped groups.

From the students’ lay functionalist perspective, these conditions and factors provided a coherent explanation for their ideal PBL group. Yet, as I have shown in this thesis, the group as a social construction shaped and constrained group membership.

⁸ In relation to selecting groups from which to invite interviewees, I had noted that students thought Red was the “good group”, this was the basis on which they judged Red group (refer Section 4.5.3).

Students understood that ideal *group structure* was determined through each member adopting a role or finding a niche that suited the attributes and skills that they brought in to the group. This enabled the group to function and members to participate appropriately (Section 10.4.1). Students' understanding of group roles was based on a lay form of trait theory. Trait theory applied to groups is usually a means of explaining leadership by recourse to the personality traits of leader and how these confer fitness for leadership (Johnson & Johnson 2006, p.177). The implication of this approach is that leaders are not only born, they will naturally become leaders in a group, as happened in my study (Section 10.4.1). In fact, having leaders who “emerge naturally” (Jaques & Salmon 2007, p.36) has been noted as a common feature of small groups. However, while trait theory of natural leadership has popular appeal and face validity, Johnson and Johnson (2006, p.177) pointed out that there are limitations to its usefulness for planning or predicting good leadership, since the appropriate traits are difficult to identify and may be situationally-dependent.

In contrast to the fixed leader view, such as suggested by trait theory, various situational theories of leadership propose that any group member can provide leadership in a given situation. This position is congruent with theoretical ideals of PBL, however, it is not without issues. For example, Johnson and Johnson (2006) have suggested that it might not be clear when the need for leadership arises or what type of leadership is required under what circumstances.

Students extended their application of trait theory to explain how *group composition* determined overall group structure. In student groups, role uptake occurred through the actions and behaviours of members and so students appeared to “drift” informally into a role (Johnson & Johnson 2006, p.15). This type of emergent group formation, a system of roles and relationships that form and subsequently shape group function, is called the “invisible structure of the group”; it exists alongside the “visible” or deliberately agreed set of roles and tasks that the group might negotiate (Jaques & Salmon 2007, p.31), such as the editor role in Adelaide. The significance of the invisible structure is that it can determine the power structure, or what Jaques and Salmon (2007, p.31) refer to as the “pecking order”, as was evident in the Adelaide and Dublin groups through the active-passive dichotomy. Further, the invisible structure may not be congruent with the visible structure (Jaques & Salmon 2007, p.31), as was evident in Dublin groups when the chair role was

usurped. The invisible structure contributed to the uneven participation patterns in student groups.

The other salient aspect of *group structure* was a set of norms (Section 10.3.2). Norms are structural in that they shape the expectations about member roles and other aspects of what is acceptable or not acceptable in the group (Jaques & Salmon 2007; Johnson & Johnson 2006). Just as the group structure can be invisible, so can norms be tacit or emergent (Johnson & Johnson 2006), which was largely the case in the students' groups. Students did not speak directly of any set of rules, apart from those provided externally and relating to curriculum requirements (e.g. appoint a scribe/secretary) or, in the case of Adelaide, the imposition of deadlines for their group summary preparation. Apart from this, norms about 'doing your bit' and 'being helpful' were tacit in both Schools.

Group composition also explained cohesiveness in the ideal group. *Cohesion* (or team spirit) ideally rested on a foundation of good social relationships that fostered members' belonging and sense of responsibility and commitment to each other (Sections 10.3.1 & 10.3.2). Poole *et al.* (2004, p.7) explained that psychodynamic theory specifically addresses the "affective and emotional" dimension in relation to "member and group growth and development and satisfaction of member and group needs". From this perspective, member belonging is an important positive function for the small group to fulfil (Jaques & Salmon 2007).

The need for belonging and emotional support was clearly illustrated by a study of the independent study groups that medical students in a PBL curriculum formed of their own accord. Hendry, Hyde and Davey (2005, p.672) described these as "supportive, socially cohesive groups" and concluded that trust and friendship were closely linked aspects in these groups. Another study, investigating the progress of medical students, reported that support and integration with peers, staff and the school were key factors and the authors concluded that "a sense of 'belongingness' to the school community" was crucial to successful progression (Treloar *et al.* 2000, p.708). This study addressed differences between local and International Students and also noted that belonging was harder to achieve for the IS due to "social isolation" (Treloar *et al.* 2000, p.710). The form of social isolation in Treloar *et al.* (2000) matches the accounts of exclusion and dominance as socially constructed features of groups in Section 10.4.2.

However, the socio-emotional aspect of the group deserves further scrutiny since it can also have a negative side. The social dimension of any group is considered necessary for providing a sense of “emotional involvement” and enjoyment for members (Knowles & Knowles cited in Johnson & Johnson 2006). Group theorists suggest that the social dimension and the task dimension ought to be in a dynamic equilibrium with each other, according to the group’s needs at a particular time (Jaques & Salmon 2007; Johnson & Johnson 2006). Yet, for the students, the social dimension of the group and friendship and enjoyment were of utmost importance, sometimes at the expense of task dimension success.

Further, the social alliances that form on the basis of members liking or disliking each other can lead to members agreeing or disagreeing with others on the basis of friendships rather than reason (Jaques & Salmon 2007; Johnson & Johnson 2006). This can be a double-edged sword leading to harmony and conflict within a group. In a group that is highly cohesive due to friendships, the resulting “groupthink” means that any constructive conflicts are avoided to preserve harmony (Wittenbaum *et al.* 2004), which is incompatible with the constructivist basis of PBL. This is suggestive of the view of some students in this study, for whom a hallmark of a good group was “no disagreements”. On the other hand, personality clashes were contributors to disagreement and conflict, which could occur between factions in groups.

The other functional theory factors that were relevant to students’ understandings of their ideal groups were the *task* and *environment* (Figure 10.1). The PBL group task of knowledge-assembly was a series of information-handling activities that were performed by the group in the service of individual learning, which was constructed as intake of information (Section 10.5.1). The role of the group in collaborative learning amounted to gap-filling (Section 10.5.2). The PBL group task occurred in the broader context of assessment and other curriculum/life demands, which comprised the *environmental* influence on the group. Working as a group to meet these needs, collaboration provided direct or indirect support for individual students in relation to assessment (Section 10.5.2).

This construction of group-work and collaboration was based on students’ conceptions of learning, which fit the first three conceptions within a suggested hierarchical series of six qualitatively different conceptions (Marton, Dall’Alba & Beaty 1993). Marton, Dall’Alba and Beaty (1993) referred to the simplest conception as “increasing knowledge”, for which they suggested a “consumption metaphor” could

explain the learning process as “picking up, taking in and storing” knowledge. The subsequent conceptions, “memorising and reproducing” and “applying”, continue the consumption metaphor as the stored knowledge is either reproduced or applied when required, for example, in exams or when explaining to others (Marton, Dall’Alba & Beaty 1993).⁹

An epistemological explanation can account for these conceptions of learning. For students, knowledge was an external and concrete commodity that could be collected, added and exchanged or transmitted, which is consistent with the view of Marton, Dall’Alba and Beaty (1993, p.288) “Throughout the first three conceptions, the knowledge that is acquired by learning is seen as something ready-made, given, something that exists “out there”, waiting to be picked up, taken in and stored”.

Knowledge as external or independent of individuals and objectively knowable by scientific endeavour is the cornerstone of an objectivist epistemology (Southerland, Sinatra & Matthews 2001). This is consistent with the first three epistemological positions described by Perry (1970, 1999) in his nine-position scheme of college students’ intellectual development. The three positions share a common view of knowledge as a fixed truth, which exists as right or wrong (“dualist” - position 1) and which is known and decreed by authority (Perry 1970)¹⁰. From this perspective, teachers and texts (not students) are sources of authoritative knowledge (or truth), as was the case for the students in Adelaide and Dublin.

Students’ epistemological beliefs, or “beliefs about knowledge and knowing”, are important because they are relevant to school and lifelong learning and are implicated in the strategies that students choose to learn and how students evaluate and process knowledge (Hofer 2001). A study of medical and psychology students’ study strategies, conceptions of learning, and epistemologies used Perry’s approach; the investigators

⁹ Peter and Morgan were the only students to describe their learning in terms of the more complex conceptions described by Marton, Dall’Alba and Beaty (1993), viz. understanding (as new personal insights), seeing something in a different way and changing as a person. Both spoke of changing as a person by learning to think as a dentist (refer 8.5 *Other views on learning*).

¹⁰ In Perry’s positions 2 and 3, any conception of multiplicity in knowledge is subsumed into the dualist scheme. In position 2 (“multiplicity pre-legitimate”), multiplicity is a teaching strategy so students can “learn to find the answer ourselves” (Perry 1970, p.78), whereas from position 3 (“multiplicity subordinate”), it exists “beyond the limits of the known” (Perry 1970, p.89) and is a “temporary fuzziness (Perry 1970, p.97); the assumption of position 3 is that ongoing discovery of knowledge will yield truth. Perry (1970) suggested that after a transitional stage, students developed into non-dualist or “relativistic” thinkers, who understood all knowledge as relative since it is always constructed from particular perspectives and in particular contexts.

reported that dualistic epistemologies and conceptions of learning as intake were more common among medical than psychology students and more common among junior than senior students in both groups (Lonka & Lindblom-Ylänne 1996). Concerning the imminent adoption of PBL in the medical school, the authors noted that “a dualist epistemology may be especially problematic” (Lonka & Lindblom-Ylänne 1996, p.22).

Other researchers have asked if PBL students have constructivist conceptions of learning, which are consistent with PBL. For example, two studies comparing PBL students and traditional track students showed that PBL students’ survey ratings were more consistent with certain constructivist learning principles, particularly concerning cooperative learning (Loyens, Rikers & Schmidt 2006; Lycke, Grøttum & Strømsø 2006). However, this does not guarantee that students did not endorse group learning from an objectivist or dualist standpoint. In the Lycke, Grøttum and Strømsø (2006) study, both student groups’ ratings of ‘learning as intake’ were equally high as for ‘constructing knowledge’, but this was not commented on by the researchers. In the Hendry, Hyde and Davey (2005, p.674) report on independent study groups, students studied on their own more than half the time and the main learning activities were giving explanations and receiving explanations, cooperative ‘gap-filling’ activities consistent with a view of knowledge as fixed and transferable.

Other investigators outside the field of PBL have reported that a large number of junior university students appear to hold dualistic or simple epistemologies, but that they were amenable to some change during the study period (Katung, Johnstone & Downie 1999; Tolhurst 2007). However, in her commentary on research into the impact of post-secondary education on epistemological development, Hofer (2001) commented that studies suggest that the incremental effect of tertiary education is small and mostly associated with graduate level education.

Epistemological research has implications for how the transition to PBL is understood. It has been noted that students must be supported to adapt to what is for them “a foreign learning style” in which (i) the absence of teachers who transmit knowledge and (ii) working in a small group are often new and unsettling conditions (Conrick 1994, p.237). However, if students coming to PBL for the first time have views of knowledge that are objectivist (Southerland, Sinatra & Matthews 2001), dualist (Perry 1970), or simplistic and certain (Schommer cited in Hofer 2001), then the transition requires them to undertake some radical epistemological revision. Perry (1970, p.49) called this “the labors

of un-learning and re-learning”, which he suggested involved considerable “psychic energy”.

These conceptual and epistemological adaptations, if and when they may happen, can be emotionally challenging for students. As I noted previously in this section, Jaques and Salmon (2007) advised taking account of students’ emotions; they asked

To what extent is it possible, particularly in group discussion, to assist students to growth points in their development, while allowing for the emotional dispositions to which intellectual forms are often wedded? (Jaques & Salmon 2007, p.58).

Savin-Baden’s (2000, pp.56-57) in-depth investigation of how learners interpret and position themselves in relation to PBL has revealed the intensity of this intellectual and emotional work. She described how PBL students encountered “disjunctions” or challenges that had the potential for dramatic and life-changing transformation or “transitions” involving a new learner identity. It is in this transformational context that student preferences for social groups that provide safe learning environments and socio-emotional support may be so important.

10.7 The interpreted curriculum: *Summary and conclusion*

In this chapter, I have shown that the students’ ideal group was a primarily social unit that provided collaborative social and academic support to members. I have shown that there were some surface similarities between the students’ ideal and the theoretical ideal, such as the requirement for a supportive, safe atmosphere and cohesive group, yet there were differences, such as the students’ emphasis on friendships and belonging compared to the theoretical notion of professional relationships and cohesion. In the students’ and the theoretical ideals, member participation was intended to be free of dominance and exclusion, however, the theoretical ideal aimed for even participation whereas the students’ ideal tolerated hierarchical participation. Although in a theoretically ideal group, work and learning and collaboration are integrated (synonymous even), in the students’ ideal group, work and learning were separate. However, both were concentrated around knowledge as an external and transferable commodity, in the form of collaborative efforts at information gathering and transfer.

Drawing on functional group theory, I have argued that students applied a form of functional theory to understand and explain how their groups formed and functioned in terms of group composition, structure and cohesion as well as the group task and environment. The underlying conceptual basis of this explanation was that groups were

determined by members' personality traits and that work and learning were shaped by students' objectivist epistemologies, in which students and knowledge were in a dualistic relationship. In contrast, the theoretical ideal group is based on a model of professional acculturation and a constructivist view of knowledge and learning. Students' constructions and the conceptual basis of their PBL groups raise a number of issues for PBL implementation that are discussed in Chapter 11 Conclusion.

Chapter 11. Conclusion

In this chapter, I summarise how this thesis has contributed to knowledge about PBL groups. First, I provide a brief overview of my response to the research questions. Then, I review how the chapters in the thesis have contributed to these conclusions and consider the limitations and wider significance of this research. I conclude the chapter with suggestions for practice that are based on the results of this thesis.

In this thesis I have provided a social constructionist interpretation of first-year dental students' PBL groups in Adelaide and Dublin. My aim was to understand the meaning of PBL groups for students, so I used a naturalistic, qualitative approach, which included observing and interviewing students, to address the following research questions.

1. What is the nature of a PBL group for students?
2. What is the purpose and value of a PBL group for students?

From this investigation, I have shown that first-year undergraduate dental students in two Schools constructed PBL groups as primarily social units that provided social, emotional and academic support to individual members by doing work and supplementing individual learning. The value of the group depended on the curriculum and assessment structure of each School, but it was oriented toward supporting individual members' learning. I compared models of a student ideal group and a theoretical ideal group, noted the similarities and differences between the two and explained how the similarities in surface features had different underlying rationales. The two main distinctions between the students' ideal group and a theoretical ideal group were (i) the student group formed and functioned on a social basis, while the latter was intended to form and function on a task-oriented basis; and (ii) the student group constructed work and learning as separate tasks involving gathering and transmitting knowledge, while the latter was intended to engage in learning through collaboration. I explained these differences in terms of the different conceptual basis of each. The student ideal group was based on a lay form of functional group theory, while the theoretical ideal had a foundation of sociocultural, constructivist and collaborative learning theory.

This interpretation was based on the assumption that PBL (and hence the PBL group) is a social, cultural and historical construction and so the meaning is shaped by local and situational factors. This assumption formed the over-arching framework of the thesis. It informed the literature review, in which I showed how institutional adaptations and

differing paradigms have led to different conceptions of PBL and the PBL group (Chapter 2) and have afforded different ways of researching PBL and the group (Chapter 3). It also informed my investigation of PBL groups, shaping how the research questions were framed and my choice of methodology (Chapter 4) and how the data were generated, analysed, interpreted and reported (Chapters 4 to 10).

To recapitulate, Chapter 2 traced the variable conceptions of the group since the origins of PBL at McMaster University in 1969. I showed that both the original McMaster conception of the group (which did not have an over-arching theoretical basis) and the more recent sociocultural conception of the group were designed to support PBL outcomes of clinically relevant knowledge and skills and also to foster students' professional and academic development through mentoring and teamwork. In contrast, I considered how implementers at other institutions, following the lead from Maastricht, drew initially on cognitive psychology to frame PBL and the group, which focussed only on the role of group discussion in supporting either individual or shared knowledge development. Then I discussed how collaborative learning theory explained knowledge development and the conditions that support learning, such as group cohesion and motivation.

Chapter 3 explained how research from pragmatic and theoretical perspectives (cognitive psychology, sociocultural and collaborative learning theories) had added to knowledge and also raised further questions about the group. I noted that various investigations had demonstrated: the potential of group discussion to promote knowledge development and conceptual change through elaboration, co-construction and cognitive conflict; the potential of effective tutoring to structure a student-centred learning environment and to scaffold student learning; and the potential for collaborative dynamics to support effective group function and learning. However, PBL researchers also reported results that were inconsistent with theoretical expectations. For example, group discussions sometimes lacked theoretically important components, particularly knowledge conflicts; groups sometimes altered or abbreviated the PBL process to achieve the end-point more quickly; and group dynamics were often disrupted by individual and group behaviours. Investigators have labelled these occurrences as dysfunctional or problematic, but my discussion of these results emphasised the need to understand the meaning of groups, group-work and group-learning for students.

Given this theoretical and research-based conceptual background, I then addressed my research questions about the nature, purpose and value of a PBL group for students.

My interpretation of the key features of PBL groups in Adelaide and Dublin was presented in Chapters 5 to 9, from which I developed a model of a student ideal group for these students, discussed in Chapter 10.

In summary, to answer my first research question about the nature of the PBL group, I showed that for Adelaide and Dublin students the group was predominantly a social unit that subsequently became a work unit, with the social element shaping the work dimension of the group (Chapter 6 and 9). Group function was influenced by the role pattern, especially through the interplay of leaders and quiet members in each group (Chapter 5 and 9). Using a lay form of trait theory to explain groups, students understood that group structure, dynamics and function were the natural result of the particular mix of people, personalities and attributes and relationships that comprised each group (Chapter 5, 6, 9 and 10). Group work and member participation were regulated by the group role structure, socially-generated member cohesion and implicit group norms about responsibility and contributing (Chapter 10). However this also resulted in groups being sites of power imbalances and unintended, socially-constructed domination and exclusion; a consequence of this was unexpressed or private conflict (Chapter 10).

Research question 2 was addressed by showing that the group had a purpose for its individual members and as a group. The group ideally enabled each member to feel comfortable enough to speak up and participate in group discussions; an additional role for the group was for students to interact and have fun in learning (Chapter 6 and 9). As a group, within the scope of PBL its purpose was to do work, which was to gather and assemble information into knowledge (Chapter 7 and 9). The group purpose in collaborative learning was to support or supplement individual learning, since PBL learning was constructed as increasing personal knowledge; students learned *in* a group rather than *as* a group (Chapter 8 and 9). The way work and learning were constructed was underpinned by students' beliefs about learning as intake and knowledge as external and objective, which meant that knowledge could be gathered from texts and transmitted between students (Chapter 10).

The second part of research question 2 about the value of a group was addressed in relation to both PBL and the wider context of the BDS in each School. In the context of PBL, the group had a quantitative advantage in relation to its work: a group could access more resources, find more information, resulting in more knowledge. The different perspectives of group members also meant that more of a problem could be perceived

(Chapter 7 and 9). The overall value of the group in PBL work and learning was shaped by the curriculum context of each School and particularly assessment. Students in both schools prioritised their individual summative assessment needs and this determined value of the group in their learning. As a result, formative PBL group assessment in Adelaide was relegated to a low priority in comparison to other individual summative assessment during Semester. This was possible because students believed that individually they could satisfactorily access the required knowledge for end-of-Semester PBL examinations from other class activities in the Adelaide curriculum (Chapter 8). In Dublin, the group cooperation that supported individual summative assessment in end-of-Term examinations was in tension (and potential conflict) with individual participation for summative assessment in each PBL session (Chapter 9). The overall value of the PBL group for students in both Schools was to provide social, emotional (and hence academic) support for the challenge of transition to Dental School and PBL – to a new environment and a new way of learning (Chapter 10).

In contrast to these findings about student groups, in a theoretical ideal group (as articulated by PBL scholars and theorists), students were situated as novice professionals, whose developing professional or work-based relationships underpinned support, cooperation and team spirit. The theoretical ideal group was committed to the group enterprise of joint knowledge construction and skill development, rather than the simple additive process of knowledge assembly of the student ideal. This group was based in constructivist and collaborative learning theories, which described knowledge as socially constructed through joint effort - in this model collaborative work and learning were integrated (Chapter 2, 3 and 10).

As I explained in Chapter 4, this construction of a rich, integrated account of the meaning of PBL groups for students was made possible by using an in-depth, qualitative investigation based on observing and interviewing. This thesis has layered the insider, or emic, meaning of PBL groups for students, within my researcher, or etic, perspective, of the meaning of PBL groups for students (Chapter 4). The accounts of different or unusual cases, such as the International Students, Red group in Adelaide and one older student, have added to the understanding I constructed of PBL groups for first-year dental students (Chapter 4).

However, as I showed in Chapter 1, 2 and 3, a particular research lens shapes what can and cannot be ‘seen’ by the researcher. Therefore, this study has some limitations and

raises issues for further investigation. For example, the results in this thesis have given a broad picture of PBL groups, however, each chapter topic could have been the subject of a qualitative thesis in its own right. The account in each chapter was necessarily limited in depth to allow for overall breadth in the thesis about the meaning of groups. Likewise, I did not explore culture in depth and did not address gender, so these are areas for further exploration as factors that shape the social construction of PBL groups. My attribution of a dualist epistemology is generalised for the sake of explanation; however, individual students' viewpoints about knowledge and knowing will vary, possibly representing a continuum of pre-relativist understandings. A direction for further in-depth research would be investigating how individual students understand knowledge, knowing and learning. As outlined in Chapter 1, this thesis was only about students' constructions of the group; it is silent on how tutors and curriculum planners contributed to the interpreted curriculum. Further ethnographic research could explore how curriculum planners and tutors interpret PBL groups and how tutors and students construct groups together. This thesis only addressed how first-year students constructed groups and cannot be taken to apply to more senior years, either in the same or other Schools. Further longitudinal research would provide insight into how more experienced students construct PBL groups and whether and how their constructions develop from junior to senior levels.

The results of this thesis raise a number of implications for practice and in the remainder of this chapter I make some suggestions for student development in health professions programs. These suggestions are related to the major findings about how first-year undergraduate dental students had constructed PBL groups and therefore they are aimed at developing how PBL groups form and function among novice students. Specifically, the recommendations address the importance of the social nature of the group for novice students, the socially-constructed imbalances in the group, the way that students constructed knowledge and PBL processes, and the impact of assessment on PBL groups. The goal is to align PBL groups in action more closely to PBL groups in theory.

My first recommendation is that for novice undergraduate students, the social element of the group needs to be nurtured and also balanced with the professional element. Given the significance of the social dimension of students' groups, this would need to be the first aspect of groups to be addressed; I suggest that it begins with the students' initiation to PBL and PBL groups. It would involve extensive team-building and personal development activities as the initial part of the curriculum before groups start PBL

activities, which can then be continued with initial PBL problems that address professional interpersonal relationships and communication. Although curricula are often crowded, this is necessary, since the success of the PBL group as a work unit depends on the roles and relationships established in the group. These activities would explicitly form the foundation for ongoing professional and personal development to prepare students for their eventual work with patients and other health professional in the immediate team and the wider health professional community.

Early initiation activities could capitalise on the issue of fun in learning and its attraction for students. PBL groups would take part in non-threatening but challenging and fun activities designed to break the ice and then raise self-knowledge and awareness of others. Subsequent group activities would aim at team-bonding, developing respect and professionalism, and addressing the idea that friendship is not necessary for an effective work-team; however care and respect are important. Students could discuss the qualities that health professionals need to work effectively with their patients and colleagues. Key learning outcomes would centre on self-knowledge, knowledge of others, and communication skills, which would raise the issue of social and cultural awareness and sensitivity for understanding and communication. An important point would be to engage students' interest by linking this to their professional learning, so that it is not dismissed as extraneous or an add-on to the core health professional program. Through these activities, the PBL group would be presented as a "laboratory of learning about human interaction" (Neufeld & Barrows 1974, p.1044) that students can use to their benefit as preparation for their future practice.

Group activities would address the socially constructed imbalances in groups, which again can be paralleled to knowledge, skills and understanding required by an effective health professional. Cross-cultural awareness activities would be designed to raise awareness of similarities and differences among students (e.g. we all want to feel comfortable and belong but what makes us feel comfortable might vary). It would be important to address the meaning(s) of culture, to avoid constructing culture, ethnicity or difference as the 'other' and to explicitly address cultural stereotypes (e.g. Asian students are quiet). Activities would need to address what I call small-scale culture, such as family and friendship/social groups, as well as larger scale culture, class and ethnicity, which shape who we are and how we behave (e.g. who can speak when and to whom and how, ways of managing conflict). Activities would address cross-cultural interactions as

socially-constructed situations, in which interactions and not individuals produce silence and that any language barriers are a social rather than individual phenomenon. The relevance of this for working with diversity among patients and colleagues would be emphasised.

Specific sessions would be needed to discuss leadership and what leaders do and link this to professional situations. These sessions would raise the idea that although not everyone is a born leader and some people are better leaders than others, it is possible to learn skills that enable each group member to contribute to leadership in the PBL group/professional team. These would be linked to activities enabling students to experience leadership, suggesting that a single-leader model might not always be the most suitable. Similarly, conflict management activities could be designed for PBL groups as preparation for professional practice and working in teams. These too would need to be concrete and experiential, since from my experience at Adelaide, students knew the language of conflict management, but were not able to use productive strategies to cope with difficult situations. PBL exercises would continue to address the notions of group dynamics; the problems could include scenarios of cross-cultural communication or interpersonal conflict.

The establishment of effective PBL groups would also need to address students' understandings of knowledge and learning. If students enter health professions education with dualist, pre-relativist type conceptions of knowledge and learning, this has consequences for how PBL and group-work are constructed. However, as I discussed in Chapter 10, for students to develop in this regard would require difficult intellectual and emotional work, since their fundamental conceptions about how the world is and how they know it are being challenged (regardless of whether students know what an 'epistemology' is). For this reason, PBL student orientation activities (such as those used at Adelaide and Dublin) in which terms like self-directed learning and collaborative learning are introduced and explained are likely to be ineffective, since they do not engineer underlying conceptual changes. I suggest that PBL groups need to take part in experiential activities that address concepts like relative knowledge, constructing knowledge and learning through discussion.

As for the group dynamics activities suggested previously, the knowledge-oriented initiation activities would be introduced before groups undertook any PBL. These activities would need to be very simple exercises designed around the principles that knowledge and understanding depend on perspective, that discussion and sharing different perspectives

can lead to new insights and qualitatively different understanding (as opposed to adding an extra part to existing knowledge and understanding), and that not all views are equal (introducing the idea of opinion vs. evidence).

The idea of learning discussions could be introduced through simple analogy and exercises. These too could be made enjoyable and non-threatening to support group development. For example, each group could be shown an object that appears different from different angles (i.e. one's perspective influences one's understanding). To work out what it is, the students would need to explain what they saw and make links between each other's views. This could be compared to the initial encounter with a PBL problem or a patient and then to each student having researched and read a different book or paper about the PBL problem or patient: students would need to discuss with colleagues what they thought the patient case or resource involved and not just passively add the information.

Other exercises could introduce the notion of multiplicity. The aim would be to address the following issue: two of the students in my study explicitly commented that in a traditional-style lecture all students are taking in the same information, most of the students in this study implicitly applied this logic to reading textbooks and journal articles; this position assumes that each person absorbs the same knowledge and that it is only necessary to discuss faulty knowledge. In contrast, students could watch a short video clip or short film and be asked to summarise briefly what the film was about and its meaning. Subsequent discussion would reveal a multiplicity of viewpoints, probably based on students' prior knowledge and interests (the teaching point is that this is the principle behind movie review programs on television). However, an important issue to address is that not all points of view have equal worth – this raises the issue of evidence. The better movie reviewers draw on specific events from the film to support their comments, just as students need to draw on features of the PBL problem, or their own background knowledge, or their reading to support their comments. Importantly, this would allow the topic of knowledge conflicts (as opposed to interpersonal/social conflicts) to be raised; students could be scaffolded to disagree about ideas without argument and fear of personal offense.

PBL exercises would continue to address the notions of multiplicity and learning discussions. PBL problems could address broad issues about the development of knowledge in the particular health science profession field. The notion of knowledge as socially-constructed and thus open to argument and critique could be raised through very

simple scenarios. These could include historical examples of how treatment has changed as knowledge has developed – or how treatment varies in different cultures. The goal of these activities is to help develop students who are thoughtful and critical constructors of their own knowledge and not passive consumers of others' knowledge.

Finally, I make a recommendation about the issue of assessment and PBL groups to support student learning and collaboration. The issues concern whether to assess PBL activity and if so, whether to assess individuals or groups, on what criteria, and whether assessment ought to be formative or summative. To balance individual and group development, I recommend using a form of summative assessment in which the final individual grade is a composite of an individual score and a whole-group score. To help model and scaffold professional self-assessment, each student and the tutor could share (in private) the responsibility for the individual score, while the whole group and the tutor could share together the responsibility for assessing group function.

To promote student ownership and responsibility for group function, I suggest that student groups and their tutors be scaffolded in discussing and selecting a brief set of assessment criteria relating to the social and task dimensions of the group. These discussions would link to the previously recommended student development activities on forming professional teams. Groups/the class would identify a brief set of social and task related goals appropriate for PBL groups and develop examples of concrete strategies for achieving each goal. The assessment criteria and standards ought to be kept as simple as possible, be clearly demonstrable and where possible be applicable to both individuals and groups. For example, a social group goal may be to develop group relationships based on mutual respect (but not necessarily friendship), a concrete strategy for achieving this would be that all members have the right to speak and be heard. The related assessment criteria and standards might be: “The individual demonstrates respect to colleagues: Listens to others without interrupting”; “The group behaves respectfully: All members have a turn at expressing their opinion”.

Assessment ought to support individual and group development, therefore, formative assessment could be provided once or twice during Semester or Term and a summative score decided at the end of Semester or Term. It would be important to decide the balance of responsibilities between students and tutors for ensuring group function and to negotiate a clear procedure for dealing with any issues that arise.

To summarise these recommendations: they are aimed at helping students to establish PBL groups that function on the model of a professional team, rather than a friendship group, in which respect and task-orientation underpin collaborative group function. They also aim to support students to integrate work and learning, so that collaborative learning through discussion of ideas leads to students learning as a group rather than in a group. Assessment, as a driver of learning, is designed to promote both individual and group development in relation to group and PBL process and outcomes. Importantly, these recommendations take account of the importance of the social element of PBL groups for students and the conceptions of knowledge and learning that students may bring to PBL.

In conclusion, this study contributes to knowledge in health sciences education by adding to understanding about PBL groups and by demonstrating the value of in-depth, qualitative investigation into PBL. While the results of an ethnographic study such as this may not be generalisable, some useful points can be made which can be extrapolated to other sites. A significant outcome has been to show that PBL groups as interpreted curriculum had their own meaning and rationales for students, even though some aspects may have been regarded as ‘dysfunctional’ when interpreted using theoretical criteria. The thesis has illustrated that students operated with explicit and implicit understandings that were counter to the theoretical principles on which PBL curricula and groups were based and designed. This thesis also documented how local contexts and practices shaped PBL groups, conferring particular local purposes and value onto the PBL group. This demonstrated that the PBL group as a social construction shaped and constrained how students could participate in the group and PBL. Based on the findings of this thesis, I conclude that the learning team paradigm with which the novice students understood PBL groups was quite different from the theoretical paradigm that was used to construct the PBL curriculum. Therefore, I suggest that to maximise students’ personal, professional, and academic experience from PBL groups, novice students need to be assisted to develop or even change their concepts of teams, knowledge and learning so that PBL groups can engage in professional, collaborative learning.

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Appendices

Appendix 1. Adelaide observation schedule

Observation schedule

DLP	1.1 Pt 1	1.1 Pt 2	1.1 Rev 1	1.1 Rev 2	1.2 Pt 1	1.2 Pt 2
Week	Wk 1	Wk 1	Wk 1	Wk 1	Wk 2	Wk 3
Date	Mon 1/3	Tues 2/3 9.30 am	Thurs 4/5 9.30 am	Fri 5/3 10 am	Tues 9/3	Tues 16/3
Observe	Red	Red			Blue	
Video	Yellow	Yellow			Black	
Observe + video			Red & Yellow	Red & Yellow		Blue & Black

DLP	1.3 CAL	1.3	1.4	MS Bk	MS Bk	1.4
Week	Wk4	5	6			7
Date						
Observe						
Video						
Observe + video						

DLP	1.5 Pt 1	1.5 Pt 2	1.6 Pt 1	1.6 Pt 2	1.6 Rev
Week	Wk 8	Wk 9	Wk 10	Wk 11	Wk 12
Date	Tues 4/5	Tues 11/5	Tues 18/5	Tues 25/5	Tues 1/6
Observe	Yellow		Black		
Video	Red		Blue		
Observe + video		Red & Yellow		Blue & Black	Blue & Black

Appendix 2. Dublin research schedule

Planned schedule - sent for approval to Dublin Dental School in October 2004

Date	26 Sept	3 Oct	10 Oct	17 Oct	24 Oct	1 Nov	7 Nov	14 Nov	21 Nov	28 Nov	5 Dec	12 Dec
First-year timetable			Wk 1	Wk 2	Wk 3	Wk 4	Wk 5	Wk 6	Wk 7	Wk 8	Wk 9	Wk 10
First-year block			B1	B1	B1	B1	B2	B2,3	B3	B3	B3	Exam
First year plan												
Establish	✓	✓										
Recruit 1 st yr groups			✓									
Observe 1 st yr			✓	✓					✓	✓		
Recruit interviewees							✓					
Conduct interviews								✓	✓	✓		
Prepare initial report										✓	✓	

Amended schedule, October 2005

Date	26 Sept	3 Oct	10 Oct	17 Oct	24 Oct	1 Nov	7 Nov	14 Nov	21 Nov	28 Nov	5 Dec	12 Dec
First-year timetable			Wk 1	Wk 2	Wk 3	Wk 4	Wk 5	Wk 6	Wk 7	Wk 8	Wk 9	Wk 10
First-year block			B1	B1	B1	B1	B2	B2, 3	B3	B3	B3	Exam
First year plan												
Establish	✓	✓										
Recruit 1 st yr groups			✓									
Observe 1 st yr			✓	✓	✓			✓	✓			
Analyse obs			✓	✓	✓							
Recruit interviewees					✓							
Conduct interviews						✓	✓					
Prelim analysis						✓	✓	✓				
Prepare initial report									✓			

Appendix 3. Adelaide student invitation

Dear Dental Student,

I am inviting you to take part in my research project, being undertaken in the University of Adelaide Dental School, called *Students' experiences of group work in problem-based learning*. The project is part of my PhD, which is being supervised by Dr Tracey Winning (Dental School), Dr Annette Braunack-Mayer (Dept of Public Health), Dr Gerry Mullins (Graduate Centre) and Dr Ray Peterson (Medical Education Unit). My project is part of a wider research program in the Dental School that is interested in problem-based learning (PBL).

The purpose of my project is to help improve how PBL is used at the Dental School. I aim to find out what group work in PBL is like for the students who are doing it. The reason I am doing this research is to help us understand what problem-based learning is like from the students' perspective. If we understand students' preferences and needs, then we can develop PBL to help meet students' needs and so improve students' experiences during the BDS. During the project I will gather data about students' experiences of group work in PBL using a range of research methods such as observation and interviews. I will only gather information from students who have consented to take part.

You are invited to take part in the observation sessions, when I will occasionally observe PBL groups during Dental Learning Packages and to complete a survey about group work. Please note that although I am inviting all students in your class to participate, not everyone who agrees to take part will need to do so. I will randomly select the PBL groups to take part from among students who have consented. Details of the project are provided in the attached pages, including what your participation would involve, a description of the research methods, data analysis and how the findings will be reported.

Please note that all participation will be treated with respect and confidentiality, all data will be treated as anonymous and students' identities will not be revealed. Dental School staff and my project supervisors will not know who is participating in the project. Participation in the project will not affect your progress in your course. Please refer to the attached *Information Sheet: Students' experiences of group work in problem-based learning* and *PBL Group Observation and Survey Consent Form: Students' experiences of group work in problem-based learning* for further details. Please refer to the attached *Contacts for Information on projects and Independent Complaints Procedure*, if you wish to seek information or talk with someone external to the project.

If you have any questions or would like more information about the project or the nature of your participation, you are most welcome to contact me without any obligation to participate. My contact details are provided above. Any contact will be treated as confidential.

Yours sincerely,

VICKI SKINNER

Appendix 4. Adelaide project information sheet

The research project *Students' experiences of group work in problem-based learning* is being conducted by Vicki Skinner as part of her PhD research and is funded by an Australian Dental Research Foundation grant and a University of Adelaide Scholarship for postgraduate study. The project is part of an ongoing research program in the Dental School, which is investigating problem-based learning. The purpose of the research program is to contribute to improving problem-based learning in the Dental School.

The purpose of this project is to help improve the way in which group work is used in problem-based learning (PBL) in dental education. The project aims to find out what group work is like from the students' point of view. The main research question is, 'What are dental students' experiences of group work in problem-based learning?' The results will help guide how PBL in dental education and group activities in particular, can be developed to better meet students' needs.

The research involves a study of dental students' group work during PBL. Research methods include direct and video observation and interviews. The data analysis will focus on understanding students' experiences of PBL group work in the Adelaide BDS curriculum. The interpretation of the data will focus on improving the teaching and learning context and especially on enhancing the role of group work in PBL. The results will be reported back to the students and staff of the Dental School via seminars and to the wider educational community via conference presentations and articles in scholarly journals.

Participants will be from the first-year dental student class. First-year students have been selected because first-year is a crucial period, since the majority of students are new to PBL.

The research design involves occasional observation by Vicki of selected first-year PBL groups during Semester 1, 2004 (groups composed only of students who have consented to participate in the study, ie 'participant groups'). Vicki will observe participant groups during sessions for one Dental Learning Package (DLP). Additionally, Vicki will make video recordings of participant groups for one or two sessions during one DLP. Staff who facilitate PBL group work will be asked for feedback about their impressions of group work in PBL. Selected students from the participant groups will be invited to take part in a single interview, approximately 45-60 minutes long, with Vicki, at the start of Semester 2. Interviews will be scheduled at times and places to suit the interview participant. Interview topics will include what dental students, do, think, feel and achieve during and as a result of, group work in the Adelaide BDS. The interview tape will be confidentially typed up as a transcript by a professional transcriber, external to the University, who does not know any participant's identity. Interview participants will be invited to review their own interview transcript and make changes if they choose, before it is analysed and then approve its use for analysis.

In keeping with standard, ethical research protocol, your participation must be fully-informed and voluntary, therefore it is important that you understand the information provided. You are welcome to seek further information from Vicki (see contact details on the attached Invitation to Participate). Your anonymity and privacy must be protected, so only Vicki will have any contact with participants or access to any participant details. All research data will be anonymous and confidential. Audio and video tapes will be destroyed on completion of the project and publication of findings. Printed data will be securely stored without any identifying material in a locked file.

Please note that you are free to participate or decline to participate in this project without any prejudice to yourself, now or in the future. This means there will be no effect on your progress or assessment in the BDS. Your decision to agree or decline to participate and the details of your participation will be confidential and no such information will be available to any Dental School academic staff. You are free to withdraw from participating at any stage of the project, without prejudice. If you withdraw, observation of your group would continue but no data would be used about you.

If you choose to take part in the project this information sheet and the invitation are to be kept by you. Both copies of the consent form are to be signed and one copy kept by you. Thank you for taking the time to read this material.

Vicki Skinner

Appendix 5. Dublin student invitation

10th October, 2005

Dear Dental Student,

I am a visiting researcher from the Dental School at The University of Adelaide, South Australia and I am currently doing research on dental students' experiences of group-work in problem-based learning. I would like to invite you to take part in the study that I'm doing at Dublin Dental School. In brief, I would like to observe some students doing PBL and talk to them about their experiences. The goal of the project is to help us improve problem-based learning and in particular, PBL group-work in dental education.

There is an information sheet on the back of this invitation that explains the project and your participation in more detail. I appreciate that your time is precious. However, I hope that you will consider taking part in this research. You will receive a small thank-you gift in appreciation of your time and contribution. Please note that although I am inviting all students in your class to participate, not everyone who agrees to take part might do so. I will randomly select PBL groups to take part from among those who volunteer.

If you have any questions or would like more information about the project or the nature of your participation, you are most welcome to contact me without any obligation to take part in the research. My contact details are provided over the page on the information sheet. Any contact will be treated as confidential.

Yours sincerely,

Vicki Skinner

Appendix 6. Dublin project information sheet

Project goals: I aim to find out what group-work is like from the point of view of students who take part in PBL and group-work. My main research question is, 'What are dental students' experiences of group work in problem-based learning?' My ultimate goal is to help dental educators improve how group-work is used in problem-based learning (PBL) in dental education.

Project participants: First-year dental students are invited to take part. First-year students have been selected because first-year is an important time of adjustment when most students are new to PBL and university.

Project methods: The research methods include observation of PBL groups, interviews and group discussions with students about their experiences.

Project plan: Student participants will be involved in the following programme of activities (week numbers refer to each year level's respective timetable). All research activities will be carried out by Vicki.

I will observe volunteer first-year PBL groups for several PBL problems in Michaelmas Term, 2005 (weeks 1-3 and possibly weeks 6, 7 or 8). To help with my recall, I will make notes and audio record the sessions. The recordings and notes are only for my use and will not be available to anyone else. They will be erased or discarded after the project is completed.

Some 1st year participants will be invited to take part in an interview with me, approximately 45-60 minutes long (weeks 4 or 5). Interviews will be scheduled at times to suit participants. I will record interviews so they can be typed up and I can analyse them. The recordings are only for my use and will be listened to once by the professional typist and will not be available to anyone else. Student identities and any potentially identifying information will be removed from the data, pseudonyms will be used in place of real names. Recordings and notes will be erased or discarded after the project is completed.

Staff who facilitate PBL will be invited to talk about their perceptions of student experiences of group-work in PBL.

Analysis and reporting: I will focus on whether dental students in Adelaide and Dublin share common features of their experiences of PBL and group-work. Preliminary results will be reported back to the students and staff of the Dental School before I leave Dublin and full results will be reported to the wider educational community via conference presentations and articles in scholarly journals. The ultimate aim will be to identify the relevance of the results for student induction and support activities in Dental Schools.

Ethics approval: The project has been approved by The University of Adelaide Ethics Committee and the Dublin Dental School Dental Studies Committee. Please note that you are free to participate or decline to participate in this project and you are free to withdraw from participating at any stage of the project, without any effect on your progress or assessment in the BDS. If you withdraw, observation of your group would continue but no data would be used about you. All project information will be stored securely during the project and erased or discarded after the project is completed.

Further information and consent to take part: I will be available to answer your questions and collect consent forms in a scheduled session on Tues 11th Oct 2005 (please see your timetable for details). Students who have read this information sheet and would like to take part are invited to sign the consent form and return it to me in this session. You are also welcome to seek further information from me at any time via phone/text, 086 871 0554 or email: vicki.skinner@dental.tcd.ie

Appendix 7. Adelaide first-year PBL packages (excerpt from yearbook)

DENT01AHO Dental and Health Science I Part 1

O-WEEK: Refer to separate Program. **WEEK 1:** Communication and learning

Semester 1A

Week Beginning	Class meeting Tues 2.00pm	Learning Laboratory Wed, 10.00am	Tutorial Fri, 2.00pm
2 8/3	DLP 1.2 Part 1 <i>'What's that you've found'</i> (links to topics in Human Biology semester 1b) Resource Session: Dental morphology	Distribution of plaster teeth and models - Informal session looking at plaster teeth and extracted teeth Students to begin using appropriate dental terminology. Occupational Health & Safety Training.	Meet tutors, discuss format of tutorials and expectations Dental morphology exercises
3 15/3	DLP 1.2 Part 2 Resource Session: Dental morphology	Dental morphology exercise - identification, sorting teeth into classes, sketching different views Dental morphology exercise Wax carving demonstrations	Dental morphology exercises
4 22/3	DLP 1.3 Part 1 <i>'What have I done to my front teeth'</i> (links to topics in DCP I) Resource Session: Oral anatomy, including terminology emphasising normal appearance of teeth and soft tissues and range of variability	Dental morphology exercise Wax carving demonstrations Exercises in: pulp anatomy and tooth identification; CAL resource tutorial: surface features	Dental morphology exercises
5 29/3	DLP 1.3 Part 2 Resource Session: Structure of teeth and supporting tissues	Manual dexterity - restoration of tooth surfaces in wax Exercises in: pulp anatomy and tooth identification; CAL resource tutorial: surface features	Dental morphology exercises Dental and supporting tissues exercises
6 5/4	DLP 1.4 Part 1 <i>'What's happened to Keith's teeth'</i> (links to Genetics in Human Biology stream and topics in DCP I) Resource Session: Dental development - timing and sequence of calcification	TRIAL TEST and review exercises in restorations of tooth surfaces in wax; tooth identification exercises	GOOD FRIDAY No tutorial

MID-SEMESTER BREAK

Semester 1B

Week Beginning	Class meeting Tues 2.00pm	Learning Laboratory Wed, 10.00am	Tutorial Fri, 2.00pm
7 26/4	DLP 1.4 Part 2 Resource Session: Deeper structures related to the oral cavity	Exercises involving: examination of skulls and radiographs, including own radiographs; restorations of tooth surfaces in wax; tooth identification exercises.	Response to Semester 1a feedback; Radiographic anatomy exercises Dental Development: aging exercises based on timing and sequence of tooth crown and roots
8 3/5	DLP 1.5 Part 1 'Why has Ari still got her baby teeth?' Resource Session: Dental development - timing and sequence of tooth emergence	Exercises involving: examination of skulls and radiographs, including own radiographs; restorations of tooth surfaces in wax; tooth identification exercises.	Dental Development: aging exercises based on calcification plus emergence times
9 10/5	DLP 1.5 Part 2 Resource Session: Dental occlusion and functions of the masticatory system	Discussion of dental occlusion and functions of the masticatory system	Tooth identification test Concepts of occlusion exercises
10 18/5	DLP 1.6 Part 1 - 'Peter Pascoe: 13 y' Resource Session: Dental Diseases	Exercises: Dental Development; timing and sequence of tooth emergence; age determination; restorations of tooth surfaces in wax	Dental diseases and preventive dentistry exercises
11 24/5	DLP 1.6 Part 2 Resource Session: Nature and distribution of dental diseases	Dental development; timing and sequence of tooth emergence; age determination; restorations of tooth surfaces in wax	Dental disease and preventive dentistry exercises
12 31/5	DLP 1.6 Review Resource Session Preventive dentistry	Hand in wax restorations to Mr Greg Natt no later than 4.30pm, Friday 4th June, 2009 Staff available for questions	Discuss DHSI objectives, problems and expectations for end-of-semester examination.

Appendix 8. Dublin first-year PBL packages, Michaelmas Term, 2005

NOTE:

Appendix 8 is included in the print copy of the thesis held in the University of Adelaide Library.

Appendix 9. Adelaide student PBL assessment criteria

DHS I/II/III DLP Participation Assessment Criteria

1. Knowledge acquisition, integration and application:

Summarises, analyses, organises and relates new knowledge/experience to previous knowledge/experience, in order to explain important concepts in the context of patients' history, examination and test results, using appropriate terminology.

2. Package investigation and analytical skills:

Logical approach to problem, i.e, cue recognition, identifies and analyses issue(s)/problem(s), identifies and asks for further information or research to understand the problem, proposes and priorities hypotheses and tests ideas.

3. Self-directed learning skills:

Poses questions, identifies learning goals/questions related to the problems, prioritises information, summarises information, applies information back to the DLP to evaluate learning, evaluates accuracy and usefulness of information from a range of resources; respects ownership and accurately acknowledges information sources.

4. Communication skills:

Written/oral methods at appropriate level; data (words or graphics) is relevant and accurate; ideas structured consistently.

5. Group skills:

Commitment to group demonstrated by: punctuality; encourages peer input; cooperates by taking on, assigning and sharing tasks; participates by listening, sharing information, focuses discussion and asks for clarification; monitors time; reviews group's progress; works within group, resolves disagreements; no domineering; respects and values opinions of colleagues and staff.

6. Self-assessment skills:

Good points commented on first followed by areas for improvement with suggestions; identifies achievable goals related to work, not person; comments on all criteria; incorporates feedback; accepts feedback; avoids destructive comments.

Adapted from:

Neufield and Sibley, 1989; Conran et al, 1991; Herman et al, 1992; Little, 1994; Mennin, 1995; Clancy and Ballard, 1995; Ryan and Feletti, cited in Toohey, 1996; Marfording, cited in Nightingale, 1996; Ryan, 1996; Wilkerson, 1996; Herbert and Bravo, 1996; Biggs, 1997

Appendix 10. Dublin student PBL self-assessment criteria

NOTE:

Appendix 10 is included in the print copy of the thesis held in the University of Adelaide Library.

Appendix 11. Adelaide pseudonym letter

Dear Research Participants,

Thank you for agreeing to take part in my research project. As you're aware, all data that I gather is to be anonymous. However, to be able to give the description I write a sense of 'reality' I would like to use names instead of 'student 1', student 2' etc or code numbers. I think the best way to do this is to ask you to choose a pseudonym (given name only) for yourself. Then I can use your 'research name' instead of your real name in my research notes and in discussion with my supervisors and they won't know which students/group we are discussing. When you choose a name I don't mind if it's of the same ethnic origin as your given name or is different, can you just choose a name of the same gender, please? Thanks. When you've chosen one could you let me know by 16th April and I will compile a pseudonym list for everyone and lock it in my file drawer. No one else will see it and please don't tell anyone what name you've chosen.

I'm at vicki.skinner@student.adelaide.edu.au

Thanks.

Vicki

Appendix 12. Observation notes, Week 8, Yellow (excerpt)

Yellow, DLP 1.5 Pt1, 4-5-04

This is the first time I've observed this group since week 1, they were all very friendly and welcoming when I arrived, several students asked me how it was going and I asked them how their study was going. [deleted: more description about getting started]

MY SUMMARY OVERVIEW OF GROUP MEMBERS

Immediate recall of this group.

Amy appointed herself as scribe-leader-facilitator. She volunteered to scribe and her style was that she directed/checked what step they were on, asked if they should move on; asked questions about the content eg what was significant information, how could it be interpreted; wrote up what she thought was appropriate and asked if that was OK. She tended to emphasise things of interest to her and at times self-checked and said things like, 'that's what I think is important, what about you?' to the group. A couple of times students (I recall Cathy was one, drawing attention to this by saying, 'that's what Amy thinks is important' in a joking way. Amy took it well by smiling and sought group input in a point that she thought was important.) Amy mostly spoke (judging by eye contact) to Sylvie and Cathy and Peter. Her eye contact tended not to be for Bruce and only for Neil or Carol in direct response to things they'd said. However if they made comments she acknowledged them and followed up by asking, or more often, commenting or elaborating on what they had said. She spoke in a loud, confident voice and sounded quite comfortable when she suggested what they should do next.

Sylvie and Cathy were both frequent contributors. They were ready to make suggestions about content. Cathy also monitored what Amy was doing re her scribing and the organisation of information on the board. Sylvie from time to time commented on the Steps, checking to see if her understanding of them was correct. Sylvie was a high volume content contributor and appeared confident to speak out. (Note: Did she make suggestions? Did she question process? Did she question content? Cathy's style?)

Peter's contributions were mostly content-focused except for two notable occasions. The context for this DLP is that students have just received back their trial test papers done in week 6 (the last week) of Semester 1a before the break. The only process suggestions that I recall Peter making were about organising information as they would be required to in the exam. He emphasised the point that they could be practising now so they know what they are doing when it comes to exam time. When he mentioned this he spoke in a serious voice with a sense of what I'm interpreting as urgency or need. His first suggestion was at the start when they were discussing how to organise the information on the board. Peter said, interrupting Amy as she had started to read the scenario, 'how about we follow the format we had to use for the practice test so that we can learn to do it on our own.' The other main thing I recall about Peter was that after Amy volunteered to be scribe he said he'd be 'chair' in a joking voice, he said it a couple of times and it sounded a bit put on and I wondered if this was for my benefit (students had just attended a group management workshop run at which group roles were addressed, including chair). I said jokingly to him, is this for my benefit but he didn't really reply. I said to them to just do whatever they'd normally do. At that stage Amy and Sylvie and Cathy and he were making some comments so mine was just one comment in the general noise.

[deleted: descriptions of other members]

OVERVIEW OF GROUP DYNAMIC

The group dynamic seemed to me to be: they did work as a whole group but there was a tendency for the four to dominate. Only the four contributed to process and when they did discuss or negotiate, it appeared to only involve the four. The three were involved in content, but to a lesser degree. As far as the way contributions were offered, it seemed to be that it's up to the individual to make a comment. I didn't see any instances of people asking for any specific person to comment if they hadn't spoken. However, the group do make 'generic' invitations of the 'what does everyone think?' variety.

There were some jokes and fooling around, the instigators of that were mostly the four group. I think Bruce and Neil may have contributed to a couple of light-hearted moments at the end. The social chat was limited, but there were little asides from time to time, again, mostly the four group.

When the session was over they were discussing how to organise a group meeting to plan their learning issue research. The session finished at about 3.45 and they had a resource meeting at 4 pm. So in the 15 minutes they were stretching, relaxing and chatting. The group meeting was set for 9.30 am at the Library the next morning (Wed) and I was invited to come along - I agreed to meet them outside the Library. Someone queried having a meeting so soon, were they going to do their research that night, but it was explained that the meeting was to plan for what they would do for their LI. The reason they decided not to meet that afternoon after the resource session was that they had all been at school since 8.30 am and weren't finishing until 5 and they were too tired to meet then. Although I was tired and didn't record the conversation, my recall is that everyone was involved in setting the meeting and it was a cooperative process.

As they were winding down there was a bit of chit chat going on. It was light-hearted and all were involved and a few laughs were had. I just didn't catch whether it was social or BDS type stuff, but it was friendly.

Appendix 13. Group themes and codes (excerpt from NVivo)

NVivo revision 2.0.161 Licensee: Vicki Skinner

Project: PhD Analysis 05 User: Administrator

Nodes in Set: All Tree Nodes

Created: 14/05/2005 - 2:30:51 PM

- 1 (1) /My group as a group**
- 2 (1 1) /My group as a group/our interactions**
- 3 (1 1 6) /My group as a group/our interactions/fun, jokes, enjoyable
- 4 (1 1 14) /My group as a group/our interactions/conflict, tension
- 5 (1 1 19) /My group as a group/our interactions/ domination
- 6 (1 1 19 2) /My group as a group/our interactions/ domination/ dominant talk a lot
- 7 (1 1 19 3) /My group as a group/our interactions/ domination/ dominant direct or control
- 8 (1 1 19 4) /My group as a group/our interactions/ domination/dominant exclude
- 9 (1 1 20) /My group as a group/our interactions/no conflict, no tension
- 26 (1 5) /My group as a group/our relationship climate**
- 27 (1 5 1) /My group as a group/our relationship climate/friendly, happy, close,
- 28 (1 5 2) /My group as a group/our relationship climate/awkward, not socially close
- 29 (1 5 3) /My group as a group/our relationship climate/encourage, support, prompt
- 30 (1 5 4) /My group as a group/our relationship climate/local and IS, us and them
- 31 (1 5 10) /My group as a group/our relationship climate/work only relationship
- 32 (1 16) /My group as a group/different but good
- 99 (4) /People in my group**
- 100 (4 1) /People in my group/roles**
- 101 (4 1 3) /People in my group/roles/leaders
- 102 (4 1 4) /People in my group/roles/involvers, encouragers
- 103 (4 1 5) /People in my group/roles/jokers
- 104 (4 1 6) /People in my group/roles/followers, members, not leaders
- 105 (4 1 7) /People in my group/roles/researchers
- 106 (4 1 8) /People in my group/roles/facilitators
- 107 (4 1 9) /People in my group/roles/organisers
- 108 (4 1 11) /People in my group/roles/discussion directors
- 109 (4 1 12) /People in my group/roles/scribe, note-taker
- 110 (4 13) /People in my group/types people**
- 111 (4 13 1) /People in my group/types people/active~passive
- 112 (4 13 2) /People in my group/types people/loud~quiet
- 113 (4 13 3) /People in my group/types people/just want to get the work done
- 114 (4 13 4) /People in my group/types people/hardworking people
- 115 (4 13 5) /People in my group/types people/reliable, diligent people
- 116 (4 13 6) /People in my group/types people/personality, type of person
- 117 (4 13 10) /People in my group/types people/quiet but valuable input
- 118 (4 15) /People in my group/structure development**
- 119 (4 15 1) /People in my group/structure development/picked, chosen for role
- 120 (4 15 20) /People in my group/structure development/volunteer
- 121 (4 15 3) /People in my group/structure development/natural, normal, expected roles
- 122 (4 15 4) /People in my group/structure development/emerged as, took on, rose up
- 123 (5) /Feelings re group and people**
- 124 (5 1) /Feelings re group and people/comfortable, enjoy being there
- 125 (5 2) /Feelings re group and people/frustrated, annoyed, upset, angry
- 126 (5 3) /Feelings re group and people/dread, not enjoy being there
- 127 (5 4) /Feelings re group and people/not important, not worthy in group
- 128 (5 5) /Feelings re group and people/uncomfortable, afraid embarrassed
- 129 (5 6) /Feelings re group and people/intimidated

Appendix 14. Focus group themes

Students' Experiences of Group-work in PBL: Analysis Feedback Sheet

Good things about group-work/being in a small PBL group

- **Group and people skills development** eg
 - communication/interaction skills, understanding/managing people
 - collaborating, organising, managing work/tasks
 - appreciating cultural and individual differences eg multiple viewpoints and ways of thinking
- **Get to know your classmates**
 - as colleagues - helps when you work together in clinic
 - socially - get to know people your class a bit better; for some people - make friends
- **Help each other with work/learning**
 - support to manage your workload - share workload eg learning issue research
 - have access to more resources/information than you could manage on your own
 - can help each other understand, explain things
 - interaction in groups more stimulating/fun/interesting than sitting in lectures
- **Group support**
 - If someone has personal or study problems, other group members are understanding, will ease group-workload expectations on that person

Negative things about group-work/being in a small PBL group

- **Time-management difficulties**
 - Finding time for the group to get together or work together was difficult eg
 - people have different schedules
 - people have other commitments outside Dental School
 - it's a long (stressful) day at Dental School -meeting at lunchtime/end of day makes it longer/more stressful
 - Researching and/or writing up the learning issue summary together was time-consuming/waste of time - easier to research individually or in pairs/sub-groups and nominate one person to write up the summary
 - Fitting DLP learning issue group-work in with other things that need to be done
- **Difficulty with PBL**
 - During PBL scenario analysis - frustration/uncertainty/tension eg
 - what steps mean, what questions for each step mean, how to do each step (eg what goes where on the whiteboard)
 - sometimes the group 'stalls' and goes off-track and/or the group experiences some differences of opinion and possibly tension
 - Learning issues
 - sometimes problems with learning issues eg no references, references have conflicting information, learning issue not 'core' to DLP outcomes
 - group summaries - often not useful for exam revision
 - problem over how much depth and breadth to learn - no one tells you
 - Learning issue discussions (mixed groups)
 - not useful if students just stand up and read
 - worthwhile if facilitator highlights important points\

Other things: Please make a note of anything important that I've missed and raise it during the focus group - thanks

Appendix 15. International student focus group themes

Students' Experiences of Group-work in PBL: IS Analysis feedback sheet 2
(We will discuss feedback sheet 1, first, which deals with PBL groups in general)

Asian schooling and the system here: differences and difficulties

- Asian schooling:
 - 'spoon-feed', teacher gives notes, students memorise for exams; don't learn to think critically
 - only examined on what was in that subject, each subject separate
 - group work different if you experienced it: more of a shared task eg researching and presenting information, not discussions
- Here/PBL:
 - problem-solving, discussion, thinking and application of knowledge; more self-directed
 - material is integrated and linked across Streams
 - group work involves more student interaction/discussion

The system here: challenges/opportunities to learn

- New ways of thinking and learning
 - Can watch and listen to local students to see how they think - can use others as role models
 - Can adapt to new ways of learning, problem-solving, learn what is required for PBL
- Improve confidence
 - Learn to speak up in class, take part in group -happens gradually
 - Chance to develop English skills, learn to interact with local students

Experiences of group work

- Local students
 - seem to know a lot, must read a lot, previous experiences here help them understand the system or content of DLPs
 - they're very fast at thinking and speaking in class
 - accents and local language can be difficult at times
 - sometimes can be loud/not listen and so exclude others from social and academic conversations
- International students:
 - Issues about joining group discussions
 - sometimes not confident/comfortable - only feel comfortable speaking up if you're sure of what you're saying - if it's right, relevant etc
 - sometimes find it hard to keep up, need more thinking time about what is being said
 - need more thinking time about what you want to say and how to say it
 - sometimes hard to actually get into the conversation/discussion; sometimes feel as if not heard/not important
 - experience satisfaction/enjoyment when you are able to participate and contribute

Appendix 16. Dublin interview guide

Background: Your previous educational experience and how it compares to what you're doing now:

School leaver or uni?

What subjects?

How does dental school compare to that (school/what you did before)?

What do think of PBL? How does it compare to what you've done before?

How does it compare to other parts of the course? (physics/dental anatomy)

A bit about PBL and group work:

How would you describe the way your group works?

What for you makes a good brain-storming session/reporting session?

How do you decide when you're satisfied/happy with what you've learned for a PBL problem?

Do you ever work with others (in or out of your group) on PBL problems? (What do you do, does it help?)

What have been the good things so far about PBL group-work for you?

Any not so good things?

Thinking about being at dental school and becoming a dentist:

What did you expect to be doing at dental school?

What did/didn't meet your expectations?

Any surprises, unexpected things?

Do you feel like you're on your way to becoming a dentist?

What things in particular contribute to that (you feeling like you're becoming a dentist)?

What things don't contribute to that (you feeling like you're becoming a dentist)?

Any other comments?

Appendix 17. Dublin interview feedback topics

DUBLIN: SUMMARY OF THEMES RELATED TO PBL AND GROUP-WORK

1. PREVIOUS EDUCATIONAL EXPERIENCE

Student backgrounds:

- People have a diverse range of subjects across previous educational systems and from personal choice (re interest or ease of getting improved points) within those systems
- getting into Dental School is high stakes, very competitive; people often repeat to improve points for med or dentistry; grind school exam results focus; mature students entry very competitive

2. SCHOOL/GRIND SCHOOL COMPARED TO COLLEGE

School compared with college: differences and adjustments

- Syllabus type
 - having a set or specific syllabus at school compared with vague or broad syllabus at college
- Spoon-fed or Independence
 - at school you get spoon-fed, teachers give you everything needed, there's more structure, you're told explicitly what you need to know, sometimes study was timetabled by school, it was more exam focussed at school/grind school compared with at college you have more independence, less structure eg lecturers say 'you probably need to know this', 'we'll come back to this later' (ie people aren't sure: how do you interpret these comments?)
- Some students suggested that more understanding of subjects is required at Dental School whereas Leaving Cert could be passed with memorising (even though that wasn't everyone's preference)

Students' backgrounds:

- familiarity with subjects (Chemistry, Physics, Biology) from school makes it an easier experience of Dental School subjects; the new/unfamiliar subjects are a challenge: for example, there is new, complex language/terms to be learned

3. PBL

Overall there seem to be a mix of positives and negatives about PBL, but I've tried to extract some things I think are fairly widely held views and indicate any differences of opinion. It would help a lot if you could indicate what you don't agree with.

1. Positive features of PBL

- Good problems:
 - have a clear direction/focus
 - often contain clear guiding questions
 - you can derive clear learning goals
- Good learning goals:
 - you know what you have to research, the boundaries are clear
- A good brainstorm discussion
 - is to the point, everyone is 'on the same page'
 - people can give lots of information about the problem
 - it gives everyone a clear idea of the basics to start with

- A good report
 - is to the point, information is complete and relevant, problem is covered well
 - people don't read slabs of information or contribute irrelevant information
- PBL can keep you working/on your toes: having to discuss means you must prepare well and focus/concentrate more to get anything out of it, otherwise you just get lost
- Doing your own research can be good for helping you learn and remember, especially if you make your own good notes and put things in your own words

2. Negative features of PBL

Overall, any problem that people experience with PBL seems to be associated with lack of structure in some way

Lack of structure can be perceived in a range of ways, for example,

- Poor problems
 - either vague or too broad, with no clear direction or no guiding questions embedded,
 - makes it difficult to derive good learning goals
- Poor discussion
 - goes off at a tangent, or has no direction, it's frustrating and easy to get confused
 - if nobody knows anything about the problem before researching it, again this can make the discussion vague, confusing, or full of controversy
 - if people reads long paragraphs of information printed from the internet it's boring, can be hard to understand, it may be irrelevant
- Poor learning goals
 - not focused or specific so it's hard to know what to research

3. Other issues

- doing your own research can be challenging because it can be hard to know how much detail is required, how much depth or breadth of a topic should be researched, when to stop - this is an aspect where some people prefer lectures because you know what you should be learning
- some people use a standard college text as a guide to what to cover; some people base their research on their previous Leaving Cert or A-Level syllabus; some people are concerned/unsure about what level of detail is required
- keeping good notes or keeping notes organised from both sessions of PBL plus your own research can be difficult - this is an aspect where some people prefer lectures because you know what should be in your notes
- some people suggested that it would help if more guidance/feedback was given by tutors, eg at the end of problems handing out a sheet that tells you what main points you should have covered

4. GROUP WORK

1. Group dynamics

- Getting to know each other: at first some people were not comfortable because the group didn't know each other, it was a bit awkward to discuss/disagree → later it became easier, people got to know each other, became more comfortable with each other
- Interaction: can be fun, more enjoyable/stimulating than sitting passively/switching off in lectures, makes it easier to focus (but note: this is given the points above re good discussions)

- Uneven dynamics: many people commented on the uneven dynamics in discussion, they said this can be due to a mix of personalities (quieter and more talkative people); this raised some issues
 - some quieter people find it difficult to get into the discussion and have a say; this can be frustrating for them
 - the more talkative people are aware of the difference but I get the impression it seems to be a difficult issue for them eg how to ask quieter people what they think without embarrassing/patronising them
 - most people suggested an important role for the chair was to involve everyone

2. Group composition

- The mix of different backgrounds
 - most people thought it was good/beneficial to have a range of different points of view and perspectives in the group - you get a bigger or broader perspective on a problem
 - some people said it was good for everyone to experience different cultures if groups were mixed
- The mix of different knowledge levels, there were mixed views on this:
 - some people said it was good to have a range of knowledge/experience that you could all put in to the discussion
 - but some people said that it could be difficult/frustrating when the discussion is at too high or too low a level for different people (related especially to the difference in Leaving Cert and A-Level), this contributed to uneven dynamics in the group
- More resource/information gathering
 - An advantage of group work is that you can research the problem better: this includes accessing more references and covering more of the problem
 - This benefits the group because more is brought to the table in discussion
 - This benefits individuals because if you miss something someone else will have it

3. Working together

- People tend to work individually when they do research, they might occasionally ask for help if they don't understand or sometimes share a useful resource.
- Some people find that working together in the group discussion is good, benefits include
 - Being able to help each other and explain to each other
 - Being able to talk to each other using your own language, ie this makes it easier and/or more interesting to understand than some of the complex text book language

4. Role of chair

Qualities or characteristics of a good chair for PBL: two main features, knowledge and people skills

- Knowledge of the problem: so a chair can control the direction of the discussion and keep it on track, for example by asking appropriate questions
- Ability to deal with people: so a chair can control the discussion and improve the dynamics, eg politely stopping people saying wrong/irrelevant things and involving everyone

- Most people believe that different people/personalities are more suited to different roles, ie being chair is not something that suits everyone

5. Role of secretary

People didn't say much about this role, some general points

- It can be enjoyable, for people who like to write/draw on the board
- It can be difficult if everyone talks at you and/or if the chair doesn't assist you or give any guidance
- In general people found that their own experience of being chair/secretary made them more aware of what the role required and how to help the group dynamic

5. MARKS - SELF-ASSESSMENT IN PBL

Grades

- Average: most people appear to aim for 'average/reasonable' grades', reasons include
 - Wanting to achieve an overall good enough grade for PBL participation ie 70%
 - Not marking themselves too high or too low in comparison with others, eg being modest
- Variation of grades an issue with marking is the variation or subjectivity of grading - different people commented on different aspects:
 - Grades across different groups - this could be unfair because they could be quite different for the same amount of work, but people assumed that this hopefully would average out over the year as groups swap around
 - Grades within groups
 - the actual grading differs from the grading criteria in the back of the block book eg getting 5 for saying nothing
 - the discrepancy in grading between quiet and talkative people was not fair
 - some people weren't sure if the tutor wrote down the actual mark the students say

Competition and grades

There were different views on the extent of this but I've attempted to make a general summary

- some people didn't perceive any competitiveness in their group, but some people thought that marking affected the group dynamic to some extent
- the effect of marking varied
 - it encourages you speak up, as people do try to maximise their own performance since you are marked on your contribution
 - it makes some people compete to speak, such as repeating things others have said in order to say something or cutting in across others
- some people suggested that competitiveness for marks also came from the 'Leaving Cert culture', which fosters competition

Appendix 18. Excerpt from interview with Peter

Peter: We shared similar concerns I guess about the PBL- how it was, I don't know, it seemed to be a waste of time. Well mostly that's what I thought most of the time.

Vicki: This is what you thought?

Peter: Yeah, most of the time. I think till a fortnight before I started studying for exams.

Vicki: Up until exams, what changed?

Peter: I started like looking over what we had to learn for the exam and then I thought '*Oh alright well I might as well look back to the PBLs*'. And I went through three of them, not all of them. I didn't have time. And I went through like the procedure and whatever else and actually found that now, if the patient *came* to me, or the situation *arose* I could actually *help* the person. So although it seemed like a waste of time going through the process and going through all the arduous *tasks* and repetition, although that was a little bit still, I think, boring to some extent, it's necessary so that we have like a systematic approach towards like when we go and treat people in the future and that's what I found good. When I actually went through all the PBLs/DLPs again I could actually (pause) I knew the knowledge that I required to be able to help a person. So yeah, that was good.

Vicki: So you're saying that when you were doing your exam study, PBL seemed different to you or what you were doing...

Peter: For the first time it seemed *relevant* and for the first time I actually thought '*Oh okay so that was worth it*'. Whereas up until then I really just put it off (even looking at it) because I thought it was useless. I didn't see *any point* to it. I was getting frustrated with all the time that we were spending on it when I thought it would be more beneficial to do something else. Except for this semester I think it's good because now I know that there is a benefit to it and therefore I know now to take it more seriously. [...]

Vicki: Okay, so if you think about when you were working with the group over that semester and all those DLP's, can you describe what some of the good things were for you?

Peter: Good things. [Long pause - laughs] As I told you, during the semester I didn't really think of many good things. Right towards the end I thought some good things. I guess I'll just talk about towards the end when I was studying for exams, I was reflecting on it. It was good just basically, *instead* of just learning theory and then *trying* or *hoping* that one day when the same situation arises we would be able to match the correct theory to the correct situation, I can actually *see* myself using what I learnt in the same situation *in* the future and actually *knowing* what to do because I've *had* the experience before. With, I think, dentistry and as with many things, the *experience* is the most important thing. You can learn how to paint, someone can *tell* you the technique, but until you *practice* it, you see your own faults and what you have to improve on and stuff like that and so, *if* we have already got some experience, even though it's a piece of paper, our patient, at least it's *some* patient experience. That's one thing. And then the second thing was, the systematic approach, I think, is good. I like, personally, learning things in a very systematic way and so therefore I cover everything I have to without being worried that I've forgotten something or that I could be liable I guess, as a dentist, for some kind of law suit or

whatever else and so by doing the systematic process, I think most things are covered and therefore- and then again, yeah, for the exam as well, it benefited that we went through the steps a few times because then in the exam, it was again just a systematic layout. They gave us basically the same thing for DLPs and we just had to go through the cues and problems and issues and things like that and then they would give us some underlying question at the end.

Vicki: So - just so I understand what you mean by systematic approach, can you just quickly tell me what that is?

Peter: Systematic in a sense that it's step by step. You know (pause) it's very straightforward. It's not that you don't know where to start and where to stop kind of thing, it's just a straight forward layout, step by step and I guess easy to follow (pause) that's pretty much all.

Vicki: What is it that you are doing 'step by step'?

Peter: Sorry, the systematic thing is just like, when you start and get your DLP, you get step one, that's the systematic I'm talking about. Step one is like identifying cues and then what you interpreted from that and then the second thing is problems and issues and then step two causes and consequences and that sort of thing, that's what's systematic. And so I think if we had a patient in the future, that's what we'd probably- we wouldn't actually sit down and write that, but quickly in our head we would think all right, what does this person look like, what's their medical history. Open their mouth, alright look they've got caries, so that's all your cues and then you can start thinking a bit about them and then you can identify what problems they may have and then causes and consequences and then what additional information, so, tests you do. So again, you wouldn't write it down but you just do it, go through it in your head.

Vicki: So, it's a systematic approach to a patient.

Peter: Yes.