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# Achieving Deep Learning with Student Teamwork: An Exploratory Investigation

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## Abstract

*There is strong evidence to suggest that student-to-student interaction, both formal and spontaneous, can enrich learning outcomes. It has also been established that employers value students who have problem solving skills and who can work effectively with others. The purpose of this project was to provide some insight into group projects and to improve the quality of student learning in student problem solving projects. Specifically, this project addressed two research questions concerned with group problem-based learning; first, understanding the barriers to deep student learning and, second, how deep student learning can be improved with this technique.*

*This research project involved two fundamental, non-mutually exclusive research approaches, namely, phenomenography and action research. Brainstorming and focus group techniques were used to collect data and the findings indicate that, in order for group* ***synergy*** *to be achieved, initial group* ***establishment*** *and accepted group* ***disciplines*** *must be carefully undertaken.*

**Key words***: Team work, Problem-Based Learning, Phenomenography, Action Research, Focus Groups, Student Learning, Deep Learning*

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## Introduction

There is strong evidence to suggest that student-to-student interaction both formal and spontaneous can enrich learning outcomes (Biggs 2001). It has also been established that employers value students who have problem solving skills and who can work effectively with others (Entwistle 1997).

The group student project that is concerned with problem solving and functioning knowledge is a rich learning context where 'teachers teach less but learners learn more' (Biggs 2001:95). Whilst group projects espouse many of the virtues of psychological learning theory (Hartley 1998), evidence suggests that group work projects are fraught with problems and may be counter-productive with regard to learning outcomes for some students (Laurillard 1993, Kates 2002).

In Business programs in Australian Universities, for pedagogical and practical reasons, student group problem solving projects are increasing in popularity. Indeed, in marketing education in particular, it has been suggested that group-work is well suited as a 'testing ground' for the development of deeper understanding of marketing theory and concepts (Graeff 1997, Murphy 1998). Whilst some students may prefer project work to lectures and tutorials, others find group work less than satisfying and seek ways to minimise such intimate learning experiences; indeed some students decide to choose courses that exclude this form of activity and assessment. Given the supposed educational value of group problem solving activities, there is much that we do not know about the dynamics of these processes and in particular students' experiences, 'lifeworlds' and conceptualisations (Ashworth and Lucas 2000). The purpose of this project is to provide some insight into group projects and to improve the quality of student learning in student problem solving projects.

## Rational

How students learn in groups has important implications for many stakeholders, such as the students themselves, universities, the government, academics and employers. **Students** are often asked to work in groups for pedagogical and resource reasons, thus an understanding for students of how to approach this task effectively is desired to achieve sound learning and good grades. In particular, the growing population of returning adults find the interactive learning experiences most valuable in their academic foray (Colbeck, Campbell and Bjorklund 2000). Whilst students may claim to dislike group-work, they do recognise that how well they work together in this way ultimately determines the quality of the project in a given course (Sergi 2002, p. 105). **Universities and the government** are interested in exploring ways in which learning outcomes can be achieved with greater efficiency and effectiveness. Swinburne University of Technology's (SUT) Careers and Employment Unit, for example, publishes an 'Employer Expectations of Graduates' paper itemising the characteristics that employers are seeking from graduates. The list includes 'connectedness' which suggests that graduates must be 'team players' and have an ability to work with others (SUT 2007, p. 1). The 'list of skills' required by graduates also includes: a willingness to learn, teamwork skills, the ability to define and solve problems, and a willingness to accept directions (SUT 2007). The benefits, therefore, of a sound teamwork experience in a tertiary setting, coupled with problem-solving skills, are apparent for business graduates.

Some a**cademic** educators who have conducted research in the area of 'peer group learning experiences' for elementary and high school students have advocated that higher education students collaborate as they learn (Colbeck, Campbell and Bjorklund 2000, p. 60). **Employers** rely more and more on teams to improve productivity (Colbeck, Campbell and Bjorklund 2000) and have consequently called for students to be equipped with 'communication, problem solving and team-building' skills to facilitate this process (Richardson 2002, p. 5).

Group-work has long been used in Business courses to meet the needs of all stakeholders. However, there is growing concern about the level of learning achieved amongst students undertaking group-work. Students will often claim to have 'carried' other group members on projects[1], for example, or not achieved a comprehensive understanding of the topic under scrutiny.

Group work processes and learning are unchartered territory for many educators at the tertiary level. This research project provides the opportunity, motivation and guidance to explore these complex phenomena in more depth than would be possible under normal academic teaching circumstances. The project involves the collection and analysis of much 'wordy' data, 'an attractive nuisance' according to Denzin (1989); attractive because it is so rich, and a nuisance because it is so voluminous.

## Review of the Literature

Effective student learning requires much more than sitting in large lectures and reading course material (Säljö 1975). Students approach learning in 'two qualitatively different ways'. First, the *deep approach,* where they seek comprehension, connection and conceptualisation through higher-level cognitive activity. Deep learning occurs when students immerse themselves in the subject matter, allowing time to critically reflect on their learning. The deep approaches to learning are therefore associated with an understanding of the subject matter, viewing phenomena in new and different ways, applying the concepts, and achieving some change as a person (Kates 2002, Marton, Dall'Alba, Beaty 1993). Deep approach students seek personal meaning from their studies and passing exams and assessment becomes incidental to their quest for comprehension. (Laurillard 1993). Indeed, and paradoxically, some students achieve 'expertlike' status as learners (Kates 2002). The second approach to learning, the *surface approach*, involves minimal cognitive activity, the learning of facts without incorporating them into relational schema or theoretical frameworks; and a superficial treatment of the material under study with little emphasis on meaning (Prosser and Trigwell 2001, Entwistle 1997). Students who adopt a surface approach often fail to grasp the essence of the subject material, fail to relate new concepts to existing knowledge and are unable to contextualise the concepts in real life examples (Kates 2002).

### Problem Based Learning

Problem based learning (PBL) has been promoted as a solution to surface learning (Bain 1994), where PBL is defined as 'engaging students in thinking about the subject matter in ways designed to improve their understanding of it' (Laurillard 1993, p. 126). Indeed, the problem-solving approach is a frequent tool in teaching and learning approaches, appearing as a regular activity on most courses in medicine, dentistry and science, and also in some social science courses (Laurillard 1993, p. 126). The problem solving activity, however, needs to take a divergent rather than convergent route if the learning is to be generative, in other words practice can make perfect but what is sought is practice with growing understanding; students need to build a cathedral, not square a stone (Bain 1994).

Educators have been provided with a framework of four conditions to assist student learning in PBL. Instructors should:

1. Provide instruction about interpersonal skills.
2. Encourage positive inter-dependence among students.
3. Make individual goal achievement dependent upon attainment of group goals.
4. Encourage students to reflect on the group process.

(Colbeck, Campbell and Bjorklund 2000, p. 61)

[1] That is, social loafing issues(Comer 1995), such as free-riding and suckers, explained in more detail later.

If these conditions are applied and fostered successfully the rewards will be evident. Students will collaborate and support each other's learning, hold all members accountable for the group performance, share leadership, and monitor their group progress (Colbeck, Campbell and Bjorklund 2000). If the appropriate guidance is lacking then PBL in group-work can result in a poor experience for all students and poor performance. Further, without guidance, students will not hold other group members accountable, will have little commitment to other group members' learning, will resort to working alone, will only recognise a leader appointed by the educator, and will fail to assess the quality of the group's progress (Colbeck, Campbell and Bjorklund 2000).

'The most important single factor influencing learning, according to Ausubel, is what the learner already knows' (cited in Novak 1998). PBL is concerned with the application of knowledge to new situations, the application of 'programmed knowledge' (Revans 1982), thus testing and reinforcing the students' real understanding of what they have learned (Laurillard 1993). Cognitive psychology emphasises the importance of prior knowledge for effective learning and behavioural psychology theory informs us that learning is better when the learner is active and when the student is allowed to practice and apply what he/she has learned (Hartley 1998). Social psychology tells us the socially constructed knowledge and learning in a social setting, with discussion and interaction, is valuable for students as is a real life view of the world (Hartley 1998).

**Problem Based Learning and Group Work**

It has been estimated that managers spend 60-90% of their time at work in group activities (Blanchard, Carew and Parisi-Carew 1996, p. 34), often serving on 3 teams simultaneously, with some managers being involved on 12 teams concurrently (Chapman and Van Auken 2001, p. 117). Indeed, businesses are seeking graduates who can work and learn effectively in teams (Gardner and Korth 1998) as they will be asked to do so very early in their careers (Chapman and Van Auken 2001). Thus, it is a fact of life for both business students and their instructors that the former must learn to work effectively in groups, whilst the latter must teach them how.

It has been documented that organisations use team work to improve quality, speed, innovation and customer satisfaction (Gardner and Korth 1998), whilst the benefits of using group work in university teaching and learning abound. Group work provides:

- preparation for a team-oriented business culture and real-world experience,
- an understanding of the complexities and challenges of group work, and the development of teamwork skills,
- better communication skills,
- an opportunity to learn to work with others, their peers,
- an opportunity to learn from each other,
- an understanding of the division of labor,
- experience of group project management,
- multiple perspectives being brought to bear on a problem,
- achievement of higher-calibre solutions,
- the translation of conceptual material into practice,
- enhanced student interest and motivation, and
- the opportunity to explore an aspect of a project more deeply.

(Chapman and Van Auken 2001, p. 118; Comer 1995, p. 647; Beatty, Haas and Sciglimpaglia 1996, p. 17; Bacon, Stewart and Stewart-Belle 1998, p.63)

Or, as Katzenbach (1997) suggested, a better appreciation of the 4Cs: communication, collaboration, cooperation, and compromise.

Given the extensive use of team-work in businesses, the advantages appear to outweigh the disadvantages, however possible problems do exist and these are worth noting in a paper such as this where parallels may be drawn between the two settings:

- team members have poor communication skills,
- personality clashes occur,
- members focus on the outcome and ignore the process,
- when obstacles are faced, members tend to give up, and
- social loafing occurs with free-riding.

(Batra, Walvoord and Krishnan 1997, p. 26)

There are some similarities when considering possible problems associated with group work in the university setting, for example:

- students lack the skills and attitudes necessary for effective teamwork, including handling conflict,
- product quality is poor,
- individual innovation is stifled,
- students may not pace or structure their work to meet deadlines,
- a few members do most of the work and gain most of the learning, others find it hard to participate fully,
- the groups may not get frequent feedback, and
- social loafing issues such as free-riding and the sucker effect exist.

(Batra, Walvoord and Krishnan 1997, p. 26; Chapman and Van Auken 2001, p. 118; Bacon et al. 1998, p. 63)

Student experience in group work will affect their future choices. For example, a bad experience might mean that students will avoid classes that have a group work component (Chapman and Van Auken 2001). Common student complaints about group work include a fear that individual grades will be compromised, there is unequal sharing of effort and that the process is time-consuming (Chapman and Van Auken 2001; Batra et al. 1997). Thus, it is vital for instructors to assist students to learn how to learn in groups.

One of the major drawbacks for both students and instructors utilising a group work approach is the issue of social loafing. *Social loafing* was conceptualised by Latané, Williams and Harking in 1979 as 'the decline in member effort that often occurs in groups' (Comer 1995, p. 647). Two types of social loafing are *free-riding* and the *sucker effect*. The former has its roots in economic theory and is where a group member 'derives benefits from membership in a large group that are disproportionately larger than his or her contributions to the group' (Comer 1995, p. 649). The latter is where a competent group member feels that a free-rider is taking advantage and thus reduces his or her own effort (Bacon et al. 1998, p. 65). As teams and groups increase in size, individual effort drops off dramatically and free-riding is also more common (Bacon et al. 1998).

Comer (1995) suggests that social loafing occurs for a number of reasons. Group members may perceive that their contribution is insignificant and will not be evaluated, they cannot influence the task outcome, or it is an unmotivating task, and also that others in the group are social loafers.

This issue of social loafing has been described as a 'serious problem' (Beatty et al. 1996, p. 18) in academe, as the impact on student learning and future attitudes towards group work can be compromised. Group high performers may become resentful of low performers, especially if low performers receive comparable grades. Indeed, group performances are inherently difficult to grade (Beatty et al. 1996). Comer (1995, pp. 663-4) offers four ways to negate the effects of social loafing:

1. Ensure individual group members have specific skills.
2. Limit group size.
3. Address problems quickly.
4. Give groups greater discretion over planning and executing their work.

Thoughtful research in this area provides some useful recommendations for improving student learning in group situations:

- have group work in your courses but not too much, a balance is needed with individual work,
- discuss the benefits of group work and provide an awareness amongst students of the prevalence of group work in the workplace,
- reduce the work and grade inequities by using peer evaluation[2],
- get students to discuss their own group experiences,
- take a process orientation,
- try to avoid the simple random assignment of teams, and
- small teams work best – two is optimal.

(Chapman and Van Auken 2001, pp. 125-6; Bacon et al. 1998, p. 69; Gardner and Korth 1998, p. 31)

In practice, we have observed some student unease with the PBL and group-based learning model and anecdotal evidence suggests that the problems can be crudely categorised into three factors, namely control, commitment and trust. Hence our research questions formulated from the above literature search, and within the overall project question, are:

1. **What are the barriers to deep student learning in group PBL?**
2. **How can deep student learning be improved with group PBL?**

In summary, the growing use of PBL, the demands of industry, commerce and government and the cogent arguments of education scholars, make this a pressing topic; one that will enhance our professional practice and that of others and lead to some conceptual development in the area. Whilst deep learning is a vast area for scholarship, and focuses on the concept of lifelong learning, this research project restricts itself to making a contribution in the specific area of using groupwork as a learning tool to assist in deep learning, the context being problem-based learning.

## Methodology

*Research Approach*

The research project was undertaken in three stages and involved two fundamental, non mutually exclusive research approaches, namely, phenomenography and action research.

In order to provide a 'starting point for the research for researcher and researched' we must have a shared topic which is recognised by both parties (Ashworth and Lucas 2001). Thus, the first stage of the project was exploratory in nature and involved a review of pertinent literature in the learning processes in problem solving group projects. This was followed by the second stage, also exploratory and aimed at finding the key issues (the shared topic) from the unit of study, the students themselves. This stage involved using a brainstorming approach with a group of 44 students, focusing on the phenomenon under investigation, improving deep learning using problem-based learning. The third stage of the research utilised focus group discussions with third year marketing students who had three years' experience of group work. The focus groups were conducted using a variation of the convergent interviewing approach (Dick 1990a). Focus groups were selected for this research project to allow interaction between the students in their groups. The group members were already familiar with each other from the learning setting and the questions posed allowed them to reflect on their shared experiences. Depth interviews would not have allowed this interaction and the data collected was richer for the design.

[2] See Beatty et al. 1996, p. 20 for peer rating criteria.

The phenomenographic method requires an empathetic approach where the researcher enters the students' 'lifeworld' and the experiences and feelings of the students are recorded (Ashworth and Lucas 2001). However we desired to go further than this and, since we were convening a course where group problem solving is part of the curriculum, we had the opportunity to research further as part of our professional practice. Working with students on projects enables us to take an action research (AR) approach. AR is a 'process of experiential learning where knowledge is created through the transformation of experience' (Kolb 1984) and where the AR process involves participation, collaboration, and cycles of planning, acting, observing, and reflecting (Kemmis and McTaggart 1982). Further, AR is emancipatory, where all are equal in the inquiry process, critical, interpretive and action oriented. Clearly, we could not work and record all our discussions and actions with all of our students on this research project since they numbered over forty in total, we needed to take a sample.

Whilst we are cognisant of the caveat issued by Ashworth and Lucas about sampling particular types and their conceptions, we sampled in a way that maximised the 'variety of experience' as far as possible (Ashworth and Lucas 2001). We selected two work groups of third year students (four to each group) based on past group performance and 'personality' (one group was younger, mixed gender and more 'outward going'; the other group which was all male, was older, more introverted and independent). The students were members of a third year Marketing course that tackled practical market research projects for local businesses. Class members were expected to work in self-selected groups to explore and analyse the research process and apply it to provide data that would be used in the solution of a management problem. Assessment entailed the production of a research proposal, a short concepts test, and the production and presentation of a research report; the group practical work accounted for eighty per cent of the final grade.

*Focus Groups and Convergent Interviewing*

Interviews have been likened to a 'kind of conversation' (Robson 1994, p. 228) but, in reality, the conversation is very biased towards the needs of the researcher. The interviewer initiates interviews in order to obtain research-relevant information guided by the research objectives of systematic description, prediction or explanation (Cohen and Manion cited in Robson 1994). Interviews range from totally structured to completely unstructured, from computer assisted telephone interviewing to face-to-face depth interviewing. The choice, however, should be guided ultimately by the specific research in hand and philosophical position adopted.

The pure positivist would prefer totally structured interviews with a large sample of the population in order for the results to be comparable and generalisable. The phenomenologist would argue to the contrary; that smaller numbers of respondents provide greater depth and understanding and a contextual view of the phenomena under consideration.

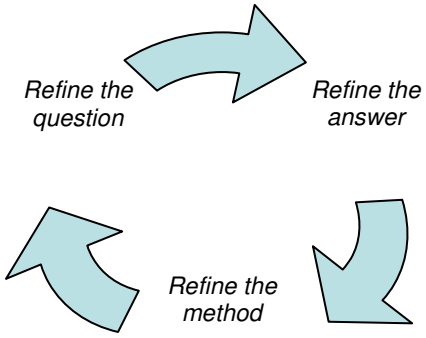
For the purposes of this research focus groups were selected as most appropriate given the nature of the research problem; the flexibility of the structuring is felt to best suit the respondents, allowing more or less detail on individual topics relative to each person, and the level of directness allowed questions that the respondents might otherwise have had difficulty in answering (utilising, for example, projective techniques). Focus groups were felt to be most appropriate for the students as they are the most non-threatening process of gaining rich, qualitative data with these respondents. Thus, face-to-face, semi-structured, focus groups were the most suitable data collection method for this project. Interviews were taped and transcribed verbatim in preparation for data analysis.

An important feature of this research design relates to the utilisation of a form of the *convergent interviewing* technique made popular by Dick (1990a, 1990b). Convergent

interviewing is an action research technique for collecting and interpreting information, providing rigour without numbers (Dick 1990b). Whilst Dick experimented with convergent interviewing on a one-to-one interview basis, the technique has been used here in focus groups to achieve much more insight from the data and to allow flexibility in data collection.

At the start of the focus group process, each protocol was almost completely unstructured. As the focus groups proceeded, the questions became more specific. As Dick recommends, the focus groups were conducted by two interviewers working individually but in parallel (Dick 1990a:vii) and the technique was of a cyclic nature allowing the researchers to refine both question and answer (and method) over a series of focus groups (see figure 1):

**Figure 1:**
*Convergent Interviewing Cycle, Applied to Focus Groups*




(Source: developed from Dick 1990a, p. 2)

Thus, in this research study, a focus group was conducted with, initially, a relatively unstructured protocol. The focus group moderator was able to conduct the first group and, during a short break, discuss the emerging findings with the second moderator, allowing time to converge on findings and key issues before recommencing the first focus group. The tape was then transcribed, and a full feedback and analysis session undertaken, before the second group was conducted by the second moderator, using the same structure as for the first group (focus group topic guide can be found at Appendix 1).

One of the strengths of conducting convergent focus groups in this study lies in the fact that the interviewers developed an interpretation of the data that is very tentative early in the procedure. It then gradually converged towards a firmer interpretation (Dick 1990a). Convergence, therefore, occurred both within each focus group and over both focus groups. Low priority information, mentioned only once, is discarded which leads to convergence from group to group as information mentioned more than once becomes the focus of following group interaction. If the two mentions are in agreement, probe questions are devised to test the agreement; if in disagreement, probe questions seek an explanation (Dick 1990a, p. 1-2).

*Data Analysis*
The emphasis in this work was on qualitative data and, thus, the data are words. These words have to be summarized, coded, categorized and interpreted until meaning is generated from them. Eminent scholars have attempted to bring the rigor of quantitative and systematic analysis to the qualitative research process through the use of strict coding paradigms (Miles and Huberman 1985, Strauss 1987). The grounded theory approach of Strauss (1987) guided the analysis of the data in this study, and methods advocated by Strauss and Corbin (1990) were employed in the quest for increased rigor. Thus, the coding paradigm for this research focused on: the causal

*conditions* that gave rise to the categories identified, the *action/interaction* strategies used to manage or respond to the categories, and the *consequences* of the strategies. The focus group interviews were tape-recorded and transcribed.

The criteria first suggested by Lincoln and Guba (1985) to assess qualitative research rigor are *credibility*, *transferability*, *dependability* and *confirmability*. Credibility is achieved by the accurate identification and description of the subject matter that is influenced by the setting, the population and theoretical framework used in the study. Credibility in this study was achieved by interrogating multiple sources of data. Transferability approximates to the generalisability concept of the positivist paradigm and is achieved by analytical generalization and grounding the theory in the data. Transferability is crucially dependent upon credibility, dependability and confirmability and is enhanced by triangulation (Jick 1979). Dependability is concerned with the extent to which emerging theory reflects the changes in the phenomenon being studied. The research method employed in this study accommodated changing data and theory by the employment of flexible and developing data collection and analysis methods. Finally, confirmability addresses two issues. First, are the conclusions reached reasonable in view of the data, and second, to what extent could another researcher in the same context confirm the research? Confirmability was addressed in this study by a careful articulation of the research method, the development and retention of a 'database' (Parkhe 1993) containing tapes, transcripts, documents, and notes for inspection, interrogation and use, and finally the use of data to document emerging theory.

In summary, this research approach was concerned with analytical or conceptual generalisation rather than statistical generation and the rigour of the process was enhanced by adherence to the principles of credibility, transferability, dependability, and confirmability. The value of a small-scale qualitative study such as this lies in the richness of their particularity and the ways in which this can thrown light on previously unrealised issues or dynamics.

## Findings[3]

Recall the research questions for this study were:

1. **What are the barriers to deep student learning in group PBL?**
2. **How can deep student learning be improved with group PBL?**

**Barriers to deep student learning**

The findings of this study confirmed the results obtained in research by Kates (2002) that control, poor conflict management skills and 'freeloading' were real barriers to deep learning in group PBL. But other problems have emerged from this study and these are discussed.

The **control** phenomenon is concerned with the situation where a group member has a need to take control of the planning and execution of the project. This phenomenon has a number of manifestations. In the Kates study, the 'controller' 'hijacked' the assignment but did not perform satisfactorily (2002, p. 17), whilst in our study the 'controller' inhibited group thinking, discussion and action:

*'… in the group, she was an absolute control freak; it was like treading on glass. I was scared to have any input; it was terrible. I wanted to play my part but she wanted to do it her way' (1:32).*

[3] Where direct quotations are made from respondents, the reference is given as 1 or 2 for each group conducted. The figure after the colon in each case is the number of the line in the original transcript for each group. 'Post' is used to indicate a quote after the groups were completed.

Group learning and performance was adversely affected because of the one-dimensional nature of the outcome. But to compound the felony, group members appeared to reject the wisdom of a good student if s/he was perceived as too dominant:

*'He knows his stuff but he's a bit awkward to get on with, a bit domineering. I would go without his input to keep the group working; maybe he knows more but causes conflict' (1:238).*

The student in question was a 'High Distinction' student, so it is likely that group learning was sacrificed for the sake of internal harmony.

This finding is closely related to the second barrier to learning in group work, which is the inability of some students to manage **conflict**. There is a reluctance to confront the stronger and more vociferous members of the group and this trait is demonstrated in the foregoing experiences of respondents.

The third barrier to successful group dynamics was the propensity of some team members to **freeload** on the efforts of the group and group synergy and output is affected (Kates 2002, p. 19). The social loafing issue of free-riding has been well-documented in the literature review and was apparent in this study:

*'I tend to put in more effort than they have' (1:23)*

*'People don't pull their weight' (1:262)*

*'The group was bad because there was an unequal amount of work being done' (1:25)*

Further barriers to group learning were identified in the 'brainstorming' session, focus groups and in the literature. It was felt that groups were not effective because of the time that it took to achieve a result; groups lacked focus, and were often sidetracked. Group members had different expectations and commitments and sometimes there was a lack of trust.

Students have expressed concern that group projects can expose individuals as incompetent or lacking experience in front of their peers and that cultural or gender differences can affect group performance (Brown 1999). Students were concerned that uneven contributions were 'rewarded' with the same grade, and that grades were adversely affected by lazy or less able students. (Note that students equate learning with grade achievement – a case of 'backwash' (Biggs 2001) or a reflection of our assessment procedures (Rowntree 1987)). Better students were actually fearful that their grades would suffer as a result of group work and most groups were uneasy about group conflict and about confronting issues that would generate conflict (see Table 1). Paradoxically, there was much less reticence on the part of students in involving tutors in these conflicts – but in the absence of the offending parties.

**Initial Inertia Precedes Frenetic Activity**

Both groups with whom we were working experienced early difficulties with their research project. Group two was indecisive with respect to project choice as each member explored a number of options. Since the project proposal had to be submitted in week three, we met with the group towards the end of week two to assess progress. We explored the problem and decided that the students would develop key criteria by which they could evaluate the various projects. They did so and quickly and enthusiastically embraced a retail/branding project. The group gained strength and cohesion from this exercise and the initial 'jockeying for position' stage was over. (See findings below on groups and the animal metaphor discussion that took place in week four). Group one experienced a similar exploration stage as they had difficulty in

understanding a complex business that a member had suggested for their project. We concluded that the business problem was too large and complex for a one-semester project and the group were invited to develop criteria for project choice.

**Building More Effective Groups**
In an attempt to encourage students to explore group dynamics and the roles that need to be performed to achieve group objectives we used an animal metaphor. Students in the focus groups were asked to consider themselves an animal and project this behaviour to their contribution to the group.

In group two, the first animal mentioned was:

*'A lion, the king, a leader. But we're all lions, there's no hierarchy here' (2:88)*

*'The hare, a doer, a busy person who pushes us all along and gets things done' (2:95)*

*'… as opposed to the worker bee who does all the real work making sure that it is right – I put in hours at the end, typing and reading and typing and reading to get it done' (2:102)*

In sharp contrast the first group expressed a stronger team orientation:

*'… like a bird, when they are building a nest they go off and get the material and work together' (1:81)*

'A *sheepdog that can go off and work hard and come back be part of a group' (1:73)*

*'I would say dolphins because when you see dolphins they're usually in a group and they're sort of working together, that's what I maybe picture ourselves as a group. We're not sort of greyhounds where you are going after the hare full pace ahead, we're just working as a group and working our way through the project' (1:69)*

The focus groups and subsequent discussions revealed a number of conditions, attributes, attitudes, and processes that lead to **effective** group behaviour and performance.

The above findings were encapsulated in a more detailed and rigorous analytical process as meanings and concepts were developed from the data (Table 1). The coding paradigm developed by Strauss and Corbin (1990) was utilised in this analysis, focusing on the causal conditions which gave rise to the categories identified, the action/interaction strategies used to manage or respond to the categories, and the predicted consequences of the strategies.

**Table 1:**
*Concept Development*

| **Conditioning Factors** | 1. Dissatisfaction |
|---|---|

| | |
|---|---|
| | 2. Fear<br>3. Differing values motivation and work ethics<br>4. Disharmony<br>5. Conflict<br>6. Lack of trust<br>7. Inequity<br>8. Loss of control |
| **Action/Interaction Strategies** | 1. Preparation and enhanced learning<br>2. Enlightenment<br>3. Group selection development and management<br>4. Consensus<br>5. Healthy conflict<br>6. Group selection and development<br>7. Group evaluation<br>8. Synergy |
| **Predicted Consequences** | 1. Confidence<br>2. Group equalisation<br>3. Conflict management<br>4. Self assessing groups<br>5. Enhanced learning<br>6. Enhanced Relationships |

Based on analysis of data collected in this study using the coding paradigm proposed by Strauss and Corbin (1990:99-115).

When discussing student performance and evaluating the course after the final assignment, groups were asked to assess group performance and the reasons for it. Effective work groups had learned from past experiences and tended to choose group members with similar 'objectives, values and work ethics'. They enjoyed 'discovering' other points of view that gave them other perspectives and sounder solutions and found ways to manage this process in a harmonious fashion. There were attempts to assess individual strengths and weaknesses and to exploit these in a technical and human relations sense (but grades still take precedence over learning):

*'Ryan handled the stats and Damien did the graphics – but we were all involved' (1:post)*

And, more tellingly:

*'We found that he was always critical of the ideas tabled but never put anything else in their place. We told him to "put up or shut up" and that worked well and brought greater strength to the group. He took it alright and is better for it' (1:post)*

And, overall:

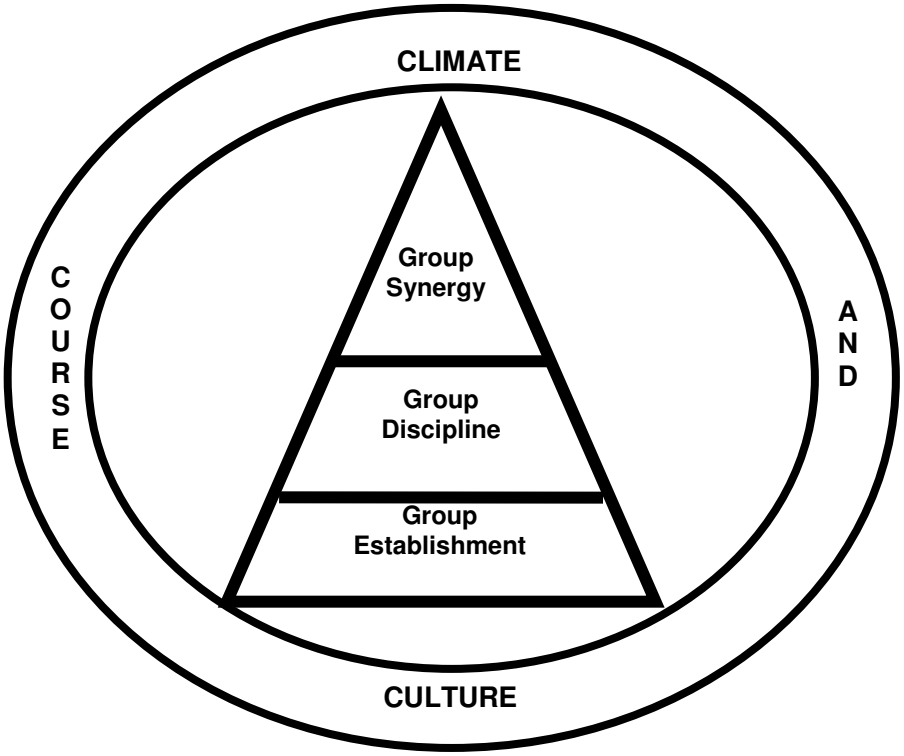
*'This was a brilliant result that we could not have achieved on our own' (1:post)*

A view endorsed in glowing terms by the project sponsor, a tough consumer goods marketer.

## Conclusions

It appears that a number of complex and interrelated factors are at work when problem solving group projects are employed to enhance learning in a higher education context. These factors included course climate and culture, group establishment, group motivation and values, group disciplines and group synergy (Figure 2).

**Figure 2:**
*Effective Group Behaviour*




*Course Climate*
Course climate is outside the control of the students but was found to impact on the behaviour of students when working in groups. For example, work ethic and motivation appear to be enhanced if the unit is viewed as central to student learning That is:

- If the course is a capstone course.
- If the course leader is professional, has high expectations of student performance and knows the students by name.
- If the course is known to stretch students.
- If the outcomes carry extra reward, for example accreditation to a professional body.

*Course Culture*
A Course culture was seen to develop as students decided to perform well in their final third year unit in the subject. They became less competitive and more collaborative as they sought new ideas and strived to improve their degree grade point average. They developed and enjoyed closer working relations as they toiled hard and long to produce an 'excellent' project report that would facilitate the job interview process which would come after the course (as found in Chapman and Van Auken 2001).

*Group Establishment, Motivations and Values*
Students displayed a preference for self-selecting groups rather than have group imposition from teaching staff, thus recommendations from the literature about instructor interference in this process was not achieved (Bacon et al. 1998). The selection process was managed by inviting members to introduce themself indicating work experience, scholastic achievement and course goals. Next, the selection process used a *dry* 'cocktail party' where class members mingled and met each other in a more intimate and less contrived manner. Students preferred and chose, as far as possible, group members with similar motivation, commitment and goals and values; they sought respect, trust and empathy and wished to avoid personality conflicts. Where mis-fits were found to have occurred, students were invited to establish rapport and seek membership of an alternative group.

*Group Discipline*
Past group experience had taught the students the value of a disciplined and planned approach to project management:

*'We have learned time management skills and organisational skills – we go into a group meeting and come away with something; we really make the most of the time that we have got' (1:172)*

One group established a list of tasks that had to be performed, by whom and by when. When they ran into conflict as a result of the supposed 'errant behaviour' of one group member, it was suggested that they use this list to establish criteria by which group members' performance could be judged and the grade distributed if they sought unequal shares (Heathfield 1999). Again, contributing to the literature in this area that suggests peer evaluation should be used but the criteria selected by the instructor (Beatty et al. 1996). This study has found that students must be included in the criteria selection for peer evaluation, promoting ownership of the problem.

Groups expressed the importance of regular meetings, at least once per week and preferably twice and, importantly, time was allowed on the day of their workshop (scheduling at least one group meeting on workshop day minimised early group conflict). Workshop content and processes were renegotiated after week 6 when the groups became heavily involved in data collection and mentor groups were chosen and allocated to assist with questionnaire design. This produced a collaborative, rather than competitive, culture in the classroom.

*Group Synergy*
The groups 'discovered' that the whole was greater than the sum of the parts, for example:

*'I like group work because I like bouncing my ideas off other people – if you just go by what you think it may be bad' (1:115)*

*I've learned that there's not just one way to do things, there's a number of ways. When you're working on your own, there's only your way, whereas working in a group, everybody's got different ideas so the way that I would have approached the problem would have been different' (1:305)*

And consensus prevails:

*We're strong and we all have different ideas and strong personalities but we don't fight – we have a discussion and we convince each other and then you go that way' (2:6)*

Even though the action learning approach caused some frustration, the group made good progress after the discussion referred to below:

*'That discussion with you really helped us to develop our ideas and we got really good stuff out of it – even though at the time it seemed that we were just talking and going nowhere' (1:120)*

Synergy was demonstrated in the enhanced learning and improved relationships as the students worked harmoniously and collectively to construct and present project findings and reports to impressed clients.

In terms of future research, it is now important for interested scholars to take the insights generated here and test them on a larger scale.

**Implications for Teaching Practice**
This research project has provided us with three key insights into improving teaching and learning in group work at the tertiary level.

First, guidance on effective group behaviour must be given in the early weeks of semester. The literature confirms this finding, however we need to go further. It is suggested that the format should incorporate group selection procedures, group dynamics and prescriptive methods for increasing the potential for group synergy. Indeed, our courses have been redesigned to include an early, week 3, session on group dynamics and commitments. By including sessions solely on group work students will realise the importance of the process. MBA students at the University of Tennessee, for example, complete **all** their work in teams and are given formal training to assist. Similarly, Wharton School at the University of Pennsylvania provides a two-semester course on Leadership Skills with group activities in 6-person teams. INSEAD in France opts for a multi-cultural, cross-functional, team-based learning approach (Gardner and Korth 1998). Given the importance of group work to both business and academe, this now needs to occur in the undergraduate market, too.

Second, educators should provide an understanding of how effective groups work; that is, having an informal group leader, setting goals and having commitment to the task (see conclusions).

Finally, peer assessment of group work should be introduced into all courses. However, students need to be involved in setting the criteria for assessment, assessing each other and informing the lecturer of marks. Again, our courses have been redesigned to incorporate this assessment procedure that will empower students and give them insight into evaluating work.

Using group work as a learning tool means that students increase their learning experience, benefit from the strengths (and weaknesses) of others and learn the art of 'give and take'.

**Limitations**
Naturally any research project that purports to be 'exploratory' will have significant limitations, such as the lack of generalisability. However the benefits of an exploratory study are welcomed by many scholars who are examining a new, or under-researched, area of interest. This paper has made a significant contribution to our knowledge in how groupwork can be used as a learning tool in the context of problem-based learning.

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# APPENDIX I
## FOCUS GROUP TOPIC GUIDE

- WHAT'S BEST GROUP YOU'VE WORKED IN?
- WHAT MADE IT 'GOOD'?
  - WHAT GOALS DID THE GROUP SET?
  - WHAT PROCESSES DID YOU USE?
    - YOUR OWN PARTICIPATION? ANIMAL METAPHOR.
    - TO PLAN AND COMPLETE THE PROJECT?
- WHAT WERE THE OUTCOMES?
- ANY PROBLEMS?
- WHAT WOULD BE THE CHARACTERISTICS OF AN 'IDEAL' GROUP? ANIMAL METAPHOR AGAIN.
- HOW HAS GROUP WORK HERE AFFECTED YOUR LIFE OUTSIDE OF UNI?
- HOW IS YOUR GROUP WORK GOING SO FAR THIS SEMESTER? REASONS?

- THANKS!