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## Mixing Them Up: Group Work with NESB Students

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### Abstract

*This paper describes the implementation of a Problem-Based Learning assessment in a postgraduate ICT fundamentals subject. With an entirely international student cohort drawn from 14 countries, many students had never participated in group work. To facilitate student adjustment into the Australian educational environment, and develop understanding of the role and importance of group work, students were educated in group work theory prior to engaging in the group work process. The experiences of both teaching staff and students identified a number of positive outcomes resulting from this approach.*

### Keywords

Group work, IS Curriculum, IS Education, Problem-Based Learning.

### INTRODUCTION

It is important that university education not only provides technical skills for students but also develops the general skills required when a graduate is employed. The use of group work in university education is one such skill that is classified under the general skill development. Group work is one of the “Interpersonal Skills” required by the Australian Computer Society (ACS) under section 5.8. The ability to participate effectively in group work demonstrates that students have a broad range of skills relevant to working in the ‘real world’. This study employs reflective practice techniques to review the development of strategies and assessment procedures to evaluate group work within a university post-graduate subject. The subject this is referred to in this research is designed to teach the fundamentals of modern Information and Communication Technologies (ICT). In the first session of 2009 (when the research was conducted), this subject consisted entirely of international students whose first language was not English, i.e. they came from a non-English Speaking Background (NESB). As well as investigating the role and use of group work in the teaching of ICT, the issues associated with teaching a NESB cohort of students (Handa and Fallon 2006) will also be considered. This subject is a 6 credit point subject (equivalent to 1/4 of a full time load in a single session), and is designed to be completed by post-graduate students in their first session of an ICT course.

The initial goal of this study is to analyse a range of methods for effective group work within an academic environment and examine their suitability for use with post-graduate students from NESBs. Finally, there is an evaluation of the effectiveness of these methods to support student learning. This evaluation was completed by involving students in a Problem-Based Learning (PBL) task. This task required the students to create an ICT solution for a fictitious company.

### A UNIVERSITY GRADUATE

According to the university, both employers and the community at large have expectations of the qualities that should be held by a university graduate. These qualities describe what individuals should be able to do on completion of a university degree. While graduates from each degree have domain-specific skills and knowledge that is assumed, the university has identified five qualities that *every* graduate should develop during their degree. These university-wide qualities are that graduates should be: Informed; Independent Learners; Problem Solvers; Effective Communicators; and Responsible (UOW 2009a).

#### Informed

An informed student is one who has a sound knowledge of the discipline/profession and understands its current local and international issues. They are also able to apply this knowledge. They understand how an area of study developed and how it relates to other areas.

### **Independent learners**

An independent learner is one who is engaged with new ideas and ways of thinking and can critically analyse issues associated with what they have learnt from being informed. They seek to extend their knowledge through ongoing research and personal reflection. They are able to find and evaluate information, using a variety of information sources and technologies. In addition, they know how to acknowledge the work and ideas of others through correct referencing.

### **Problem solvers**

A student that is a problem solver is able to take on new challenges and opportunities. They are able to apply creative, logical and critical thinking skills, when appropriate. A problem solver is able to make and implement decisions that they deem to be fitting in a particular situation. They are flexible, thorough, innovative and aim for high standards.

### **Effective communicators**

An effective communicator is someone who is able to articulate ideas and convey them effectively using various forms of media (both orally and written). They are able to work collaboratively and engage with people in different settings. Also, they are able to understand how culture can shape communication.

### **Responsible**

A responsible student is one who understands how the decisions that they make can affect others and who can make ethically informed choices. They appreciate and respect the diversity of the university and the wider community. They act with integrity as part of local, national, global and professional communities.

The majority of students undertaking the subject reviewed in this paper come from cultures where the role of education is primarily focused on creating an informed student. However, in an Australian university, when studying an ICT degree, it is not enough just to:

- (i) know a programming language or how to use it
- (ii) know the parts of a network and how to manage it
- (iii) know how a database works and how to create one

Australian graduates should also be able to demonstrate their ability to apply this learning to diverse situations, thinking through new and challenging problems to develop original solutions.

## **THE SUBJECT**

### **Subject Description**

The following paragraph is the subject description that is given to the students when choosing this subject in their studies: *“This subject aims to develop academic skills relevant to postgraduate studies and postgraduate writing in Information Technology and Information Systems. Students will develop an understanding of disciplinary expectations and requirements and the development of skills in critical listening, reading and analysis of text and data, the development of academic argument and the communication of text, data and analysis in written and spoken form. Students will also develop skills in locating, evaluating, and effectively using information appropriately in postgraduate studies. Topics covered include; Critical reading in software engineering, network management, multimedia and content management, Analysis and evaluation of problems and solutions in Information Systems and Information Technology”* (UOW 2009b)

From this description it is clear that the subject has two broad purposes designed for the student cohort of NESB students in their first session at an Australian university. Initially the goal is about improving general academic skills, following this it is about applying these skills within an ICT context.

### **Subject Objectives**

The following are the objectives that a student will be able to achieve on successful completion of the subject:

*“On successful completion [of the subject], students will be able to:*

- (i) Describe the current major business applications & critically assess their suitability for specific business environments.
- (ii) Describe current software development methods & tools & critically assess their suitability for specific development environments.
- (iii) Describe recent developments in networking & telecommunications & critically assess their suitability for various personal, business & organisational settings.
- (iv) Describe recent developments in computer operating systems, computers, & other computerised devices & critically assess their suitability for a variety of uses.
- (v) Critically evaluate the impact of ICT on individuals, businesses & on society.
- (vi) Identify & use a variety of writing styles commonly used in PG studies in IT & IS.
- (vii) Access information & sources efficiently.
- (viii) Critically evaluate whether generalisations are warranted & demonstrate the ability to assess the plausibility of conceptual arguments.” (UOW 2009b)

This paper is concerned with students’ ability to critically assess the suitability of technologies as an overall ICT solution for a fictitious company (objectives i, iii and iv). Students were required to write a business case (objective vi) using information about products and services available on the Internet (objective vii).

### Students

There were 138 students enrolled in this subject during first session 2009. Figure 1 shows a graph of students’ country of origin.

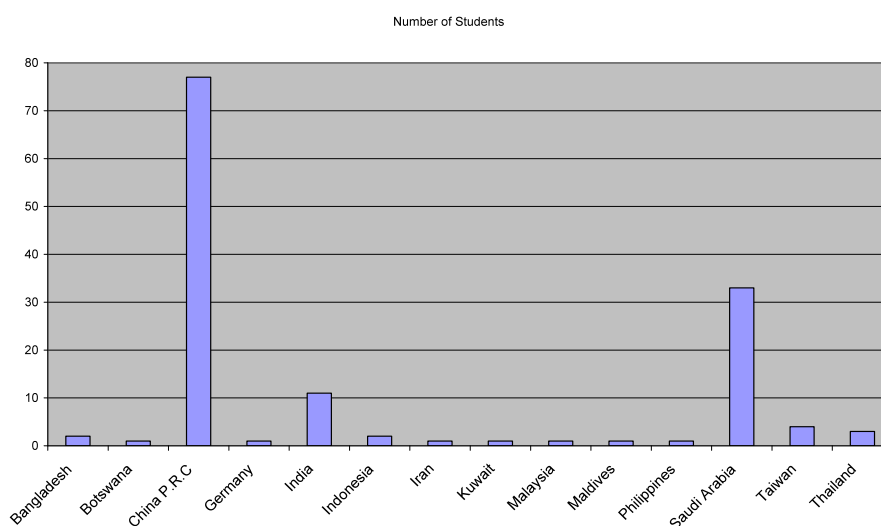


Figure 1: Students’ country of origin

As can be seen from Figure 1, the students that undertook this subject came from varied nations (14) and cultures. Chinese students made up 55.4% of the student cohort, followed by Saudi Arabian students (23.74%) and Indian students (7.91%). With students having such diverse backgrounds, a heterogeneous class and multicultural groups were a major focus (Kelly 2008). The varied nationalities and cultures within the student cohort meant it was also important to consider the different types of backgrounds with associated range of learning experiences held by the students (Tran 2008; Wright and Lander 2003).

### Assessment

The major assessment in the subject required students to work in groups of 4-5 members to design an innovative, contemporary ICT solution (including both hardware and software) for a fictitious small company in the service industry. Students were given a portfolio of information upon which to base their solution including: a company website, organisational structure, basic financial data, and current technologies used. The deliverables of this assignment were: a written business case providing a detailed description of the recommendation solution and the benefits of this solution to the company; and a presentation to sell their solution to company management.

Upon completion of the group work component, each student was required to undertake a written reflection discussing whether they believed their proposed ICT solution would meet the needs of the client; considering the group process; and an assessment of their personal contribution to the group and the solution.

Ensuring that students become involved and immersed in the major group assessment for the subject is of utmost importance for student development. The cohort of the course in the relevant session consisted entirely of international students, with over half in their first session of studies in an Australian university. Most students had never previously worked in a group work situation; the goal of the chosen approach was to encourage effective group work skills. To demonstrate the importance of these skills within the Australian ICT industry, a selection of job advertisements that demonstrated the importance of being an effective team/group player in the workforce were presented to students at the start of the course (see Figure 2a).

**Job Advertisements**

**Senior Web Developer**  
Enterprises level opportunity  
team setting  
Exceptional working conditions  
Career

**SQL Server Administrator**  
Inner city location  
Training and development  
Supportive team

**Service Design and Development**  
Strategic Role, Complex and Interesting Projects  
Focus on Service Design & Delivery  
Great Teams and Career Progression

**Exercise**

- Write down:
  - your greatest strength in studying
  - your greatest weakness in studying
- Now, amongst the 3-6 people sitting around you, find someone whose:
  - weakness matches your strength
  - strength matches your weakness
- You have just discovered someone that working with would benefit both of you.

Figure 2: Slides from lecture (a. Job Advertisements, b. Student Exercise)

Figure 2b presents an example of a general class exercise that involved students reflecting on their personal experiences and having a small group discussion. The body of the lecture was presented on effective group and team work (time was given for students to reflect and ask any questions).

Before the tutorial associated with this lecture, students were encouraged to complete the following tasks:

- Personal goal-setting activity, based on Figure 2b. Students were also required to consider how they could personally improve their areas of weakness throughout the group work assignment;
- Read the chapter in the text on group work to further develop an understanding of the key principles and theories underpinning group work; and
- Read and consider the questions that are posted on the eLearning site. These were designed to ensure that students understood the key points in the reading and to encourage initial application of their understanding to their group work practices.

During the tutorial, discussion focused on: the reasons for group work; how to create an effective group work environment; and the importance of having effective meetings with an agenda and records of what was discussed. To facilitate central recording of relevant information, a private eLearning discussion forum was created for each group. The discussion forum was created by the subject coordinator. Only group members and the subject coordinator had access to the discussion forum. Conducting the first official group meeting with an agenda was the final activity of the initial group work tutorial. Johnson (2008) discusses the difficulties that NESB students have in studying higher degrees in English. One major factor that was indicated in their research was that students had difficulty with managing group work. For this reason students were introduced to group work in a procedural manner. By engaging in these activities, students developed a strong basis for the major group work assessment within a structured environment.

Both published research and anecdotal evidence has identified many difficulties associated with group work. Pauli et al. (2008) identified that negative experiences in group work situations can be summarised into the following factors:

- Motivational/logistical group problems
  - Lack of group commitment
  - Task disorganisation

- Interactional group problems
  - Storming
  - Group fractionation

The purpose of the group work lecture and associated tutorials was to explain to students both the advantages and disadvantages of group work so they had the skills to manage the task throughout session effectively. Also, providing an open discussion about negative group work experiences allowed students the opportunity to raise their concerns early in the process. This meant that practical solutions to potential problems could be openly discussed, while teaching students that they were responsible for independently negotiating internal group issues as they arose.

## PEDAGOGICAL FOUNDATION

The following section of this paper presents the pedagogical foundations that were used in the development and application of the group work task and related skill development. Overall, the pedagogical foundation of this subject is based on the constructivist school of learning, which views learning as an active process where students construct their own meaning (Hoic-Bozic et al. 2009). Cheong (2008) argues that the constructivist approach used with Problem-Based Learning (PBL) improves students' learning experiences, and Lynch et al. (2008) discuss constructivism within ICT projects. Both of these studies provide support for the use of constructivist learning and a PBL approach to the group work project in this subject.

### Problem-Based Learning (PBL)

Currently, one popular method of encouraging students to engage with content beyond using trivial examples is through the use of problem-based learning (PBL). PBL is a method of education where activities are student centred, with students being given open problems that they need to solve (Hoic-Bozic et al. 2009). Developed to address concerns that university education did not prepare students effectively for the workplace (Albion and Gibson 2000), PBL was used as the basis for the design of the major assessment in this subject. Lynch et al. (2007) argue that for ICT education there is a value in students completing what they refer to as “‘near real life’ educational experience” this is similar to PBL. PBL is typically completed in small groups, with each group being given a ‘near real life’ problem to solve (Barrows 1986). Individuals within the group develop and apply the required skills to resolve the problem. Reflection on the experience consolidates learning and integrates it with existing knowledge and skills (Boud 1985). Group work has been found to encourage students to develop knowledge, problem solving skills and deal with real life problems (Hauer and Daniels 2008).

### Collaboration of Students

The major assessment in the subject was completed using group work. The model of group development that was given to students was based on Tuckman's (1965) model (Figure 3). Students were introduced to this in the lectures, with further detail provided in tutorials. They were also required to complete the reading of “Chapter 14: Working in teams” from Lee-Davies' (2007) book.

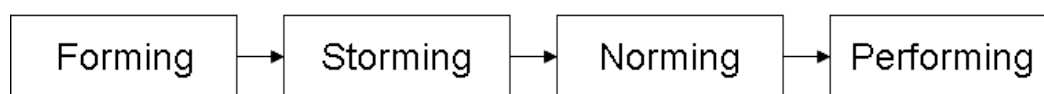


Figure 3: Tuckman's model of group development

Snoko (2007) conducted a study to identify the generic attributes that graduates in the ICT discipline should have. Ranking fourth out of 38 identified attributes was being able to “work as part of a team in a productive and cooperative manner”. The skills developed in group work tasks are therefore considered essential for ICT graduates.

As previously stated, the students who are undertaking this course come from varied cultural backgrounds. Kelly (2008) argued that this can be both an opportunity and a challenge for group work. The different ways of thinking and behaving that each culture (and hence group member) brings to a group situation can be seen as an opportunity, contributing to more creative solutions to a problem. However, challenges often stem from difficulties in communication and coordination (Kelly 2008).

Lubna and Collings (2005) highlighted that students need help with developing the skills associated with group work and resolving conflict in groups. They suggested that this task could be conducted in tutorials. For this reason, the first group meeting was completed in a tutorial. Conducting the first meeting in this setting allowed

the tutor to provide guidance when necessary, and to ensure that relevant information was recorded and all groups were aware of the purpose and expected outcomes of the major project. It also provided an opportunity for students to informally seek advice.

In discussions with students, the role of a leader was identified as essential for an effective group. Dennis et al.'s study (2008) identified that one of the groups that they observed had issues because they were unfocused; this was resolved with the introduction of a group leader. Each group in the subject was required to self-select a leader for the group work task.

Five aspects of cooperative learning were identified by Felder et al. (1998, cited in Pimmel 2003): positive interdependence; individual accountability; face-to-face, promotive interaction; use of interpersonal and teamwork skills; and regular self assessment. From this list it is clear that a collaborative assessment is not a trivial exercise for either students or staff. Careful selection of groups therefore plays a critical role in group success, especially when students come from varied backgrounds.

The approach used for group formation can have a significant influence on group membership, dynamics, and overall cohesion. As Strauss and Alice (2007) identified, three options for group formation are available in an educational environment: allowing students to self-select groups; random assignment of students to groups; and intentional selection of groups based on the coordinator's knowledge of the students. Each option presents unique opportunities and challenges, with difficulties particularly pronounced in situations where group members are drawn from multicultural backgrounds. In this subject, groups were selected by the coordinator. The intention was to establish groups with diverse cultural backgrounds, requiring students to work with people they would not normally communicate or interact with and to develop new skills. Each group was also designed to include students studying different courses, to enhance the variety of personal strengths and perspectives likely to exist in a group.

### **eLearning**

eLearning is the web-based teaching application used by the university. Varied learning techniques and communication media were integrated into the major assessment to encourage greater interaction between group members throughout the duration of the project, rather than limiting communication to only group meetings or to one or two key group members. The ability to take time to formulate answers, which is facilitated by online communication, has also been found to support increased participation by NESB students (Wright and Lander 2003). Initially, instructions were given in a traditional face-to-face lecture situation when explaining the role of group work and meetings. Students were directed to the eLearning application to discover the details of the fictitious company for which they would be developing the ICT solution. Further information and support was provided in tutorials throughout the session. This process of presenting theory, then subsequently introducing students to the practical concepts, has been used successfully in other ICT courses (Al-Ani and Yusop 2004).

Students were given access to a blog style online discussion forum in the eLearning site. The benefits of the support of ICT technologies in group work situations has been previously identified by Baskin et al. (2005), with the integration of such technologies linked to improved student learning outcomes. The experiences of the students in this subject also supported the finding that, at this stage, it is generally believed that the use of ICT technologies in group work situations cannot fully replace existing face-to-face learning techniques, with the social presence a necessary part of the group work process (Baskin et al. 2005; Grillier and Goerke 2006). While there are many possible reasons for this widely held belief, current technologies available through platforms such as eLearning are generally restrictive and their inherent limitations are likely to be a significant factor in their inability to replicate face-to-face interactions. For this subject, eLearning was used only as an additional method of interaction to complement and support traditional face-to-face interactions. The multicultural nature of the groups and the issues (including limited English-language ability and varied learning styles) associated with NESB students were key factors in deciding to use eLearning as only one facet of group work interactions.

### **EVALUATION**

When the group work assessment was first introduced, numerous students contacted the coordinator about the group work to ask if they could be in a group with their friends. This is common in most group work tasks - students tend to be more comfortable working with people they know. In direct contrast to students' arguments that they work best with 'friends', the point of this task was to challenge and extend the experiences of students by requiring them to work with others that they would not usually engage with.

Students were introduced to the justification for group work and associated theories before the groups were formed. Compared to the coordinator's previous experiences with group work in other subjects, and with group work experiences in previous version of this subject, anecdotally it was found that teaching students about group work led to a reduction in the number of issues associated with the groups. With students understanding

Tuckman's (1965) stages of group development, students were able to work through their problems in the 'storming' stage where typically issues in student group work surface resulting in major problems. Violet and Mansfield (2006) discuss student feedback about problems in groups and how some groups never get beyond the 'Storming' stage. Pauli et al. (2008) have also indentified this issue of groups with problems not progressing beyond the 'Storming' stage. In this subject, all groups managed to negotiate the task *as a group*, with very few group-related problems being taken to the subject coordinator. Students' recognition and application of Tuckman's stages of group development were confirmed in the individual student reflections submitted upon completion of the group project. Many students identified that they had faced common challenges at the start of the group work component. However, the students were able to identify that, based on Tuckman's research, they were not alone in their feelings and problems. As a result, they were able to communicate concerns and reflect on their personal role in the situation in order to negotiate a satisfactory outcome for the group as a whole.

The balance of face-to-face contact between group members and the use of supporting technologies was demonstrated to be highly successful in the subject. Student feedback supported research that states that not underestimating the importance of face-to-face contact is critical to successful group outcomes (Baskin et al. 2005; Grillier and Goerke 2006). To ensure that groups maintained face-to-face contact throughout the assessment, groups were allocated time in their tutorial each week to hold a formal meeting, following the guidelines established in Chapter 15 of Lee-Davies (2007). Completion of this reading was one of the three compulsory tasks for each student before groups were established. The regularity of meetings assisted students to maintain focus and ensure accountability. It also provided the tutor with the opportunity to speak with each group and to provide guidance where necessary.

The student reflections providing an evaluation of their project outcome, group process and individual contribution were a highlight of the assessment for the subject coordinator. These reflections clearly demonstrated that students had understood the theories of group work provided to them and actively applied them to their personal experiences in the subject. Many students showed significant thought about the challenges of group work, and identified that understanding the theories had allowed them to make a more valuable and active contribution to their group. This had allowed them to enjoy the process, and minimised the initial stress felt about working in groups with others who they initially believed shared little in common with them. The reflections supported subject coordinator and tutor observations that the multicultural groups functioned effectively after they exited the expected 'storming' phase of group development, and that the problems experienced during this 'storming' phase were effectively negotiated within groups in almost all cases. The initial activity requiring students to identify their strengths and weaknesses also assisted groups in allocating roles and supporting each other. As a result of this activity, students were actively able to identify that group members had different interaction and working styles, and that each was able to make a unique contribution to the group. Overall the reflections were overwhelmingly positive in relation to the group process and students' perceptions of their ability to have positive future group experiences.

## CONCLUSION

This study showed that giving students information about the functioning of groups and the resources to deal with group work situations reduced the negative impact of common issues associated with group work. While many groups still experienced difficulties (during the 'storming' stage), almost all were able to openly communicate about these problems and resolve them within the group. Feedback suggests that students actually used Tuckman's model when discussing concerns, allowing group members to maintain an objective perspective rather than feeling they were being blamed for problems. It is important to note that this conclusion is drawn from an observational perspective of the subject, however it is supported by written reflections completed by students who participated in the process.

This study shows how NESB students can benefit from PBL assessments and gain an understanding of the group work formation process. Students appeared to willingly engage with and apply the information given about group work once they were shown the value of this to their future careers (see Figure 2a). This approach of highlighting the link between group work and current job advertisements appears to be particularly relevant to students from non-Western cultures hoping to obtain work in Australia in the future, and it is suggested that demonstrating a direct relationship between skill development and employability is a significant motivating factor for NESB students.

Students who successfully completed the subject, particularly this group work assessment, were able to achieve the university-wide graduate qualities described earlier in this paper. The PBL approach assisted students' development of *independent learning* and *problem solving* skills. The development of an appropriate solution required students to become *informed* about relevant ICT solutions and to complete a *responsible* selection of such technologies to meet 'real' needs. The group work process, culminating in both a written and verbal report, demonstrated students' ability to *effectively communicate* their ideas with others at an appropriate level. Finally,



working within multicultural groups allowed students to enhance their personal appreciation and respect for diversity (again meeting the quality of becoming *responsible*).

## FURTHER RESEARCH

The findings of this research support previous studies that argued that the provision of detailed instructions about group work improved group experiences. This research has demonstrated that explaining the *theories* of group work (rather than simply providing instructions) allows a deeper understanding by students, with personal reflections enhancing student contributions to group work as well as simply minimising issues between group members. Further research could provide a more structured focus on the student perceptions of group work within the subject. Analysis across different cultures and their interaction styles could also be conducted, with Hofstede's (1984) cultural model used as the basis of this analysis. Hofstede's cultural model is classified into five cultural dimensions of: power distance; uncertainty avoidance; masculinity versus femininity; individualism versus collectivism; and long- versus short-term orientation. These classifications could be used to evaluate group work effectiveness and the learning outcomes of the students within and between different cultural groups. This is likely to be particularly valuable for cohorts of students such as the one in this subject, where students come from varied cultural backgrounds. A comparison of heterogeneous and homogeneous groups (based on (for example) culture, language, or learning style) could also be applicable to improving student learning and the management of groups in many learning environments.

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