

# Problem Based Group Learning in IT in Higher Education: Reflection and Experiences

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## Abstract

This paper describes a number of issues that have arisen using some of the current methods for forming groups for collaborative group projects and how group interactions and group learning support student progress and development. The use of group projects prepares students for the workplace of tomorrow where they will encounter having to collaborate in teams. Firstly, the paper discusses the importance of IT subjects in universities, specifically addressing the importance of computer literacy among students. The paper then draws on the instructors' reflections on field work undertaken when delivering a number of courses and introduces, in a narrative style, some crucial indicators (key factors) which impact on group work within IT education. A number of preliminary suggestions addressing group work learning in the early stages of forming the group will be discussed. Furthermore, some of the students' views (that is, concerns) and specific experiences will be described to highlight the importance of group learning.

**Keywords:** group work, IT education, collaboration, group projects, computer literacy

## Introduction

Students need to develop greater computer literacy skills as they move into the workforce during the 21st century while universities require students to be more reliant on the use of technology to search for and deliver information. Three such courses that used software application packages to provide students with information systems design and analysis skills and to assist them in solving business problems have been reflected upon and explored.

In the University environment, information technology (IT) provides unique opportunities for students' individual learning. These opportunities are translated into knowledge, skills and expertise that students are then able to apply in the work place. However, in order to increase the effectiveness of student learning, future work performance, and enhanced overall opportunities, in-class group work activities are required. IT urges the shift from individual to group learning. Group work activities are sometimes used in classrooms to extend students' learning but they can also be aimed at facilitating an instructor's workload by being left open ended and left for the student's own interpretation. Group work activities play an important role in combining students' IT experiences at university with their professional development in preparing them for their future employment. It is the instructor's role to facilitate this process. The

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development of models from the early stages of group forming can allow interaction between group members and the technology under study (Verma & Parikh, 2001; Lambrecht, 1999).

Swenon (1998) points out that as knowledge is considered to double every seven years, it would no longer be possible for students alone to learn the body of knowledge of a discipline. As IT, in

particular, is constantly changing, it is hard enough for instructors to keep up with the changes, therefore technology demands new ways of teaching so students can access and share this new IT knowledge. This paper reflects on some critical group activities performed by students during three different courses. From these activities and experiences, the instructors argue that the students' pursuit of knowledge and understanding of a subject's foundation is enhanced and complemented by group work activities. It is extensively argued in the literature that peoples' preferences to a particular style of learning vary, an area that it is out of the scope of this paper. However, it is often pointed out that active learning and knowledge sharing by social context are preferable ways of learning in the education field (Bonwell, 1998).

## Reflections from the Instructors' Perspectives

As educators with long work experiences in the use of IT in industry, we have learnt to identify the importance of educational processes to prepare our students to face the normal day-to-day interactions that occur in the workplace. Having recognized the significance of the use of IT in business courses from our educational experiences, the instructors saw an opportunity to conduct an interpretative, qualitative case study of the methods used within these courses when dealing with group work activities.

(Parikh, 2002)  
The current methods used for forming groups for collaborative group projects tend to have the instructor divide the class into groups or allow students who want to work with each other to do so with those left over either forming a new group or attaching themselves to the existing groups. The groups are often left to their own devices with no more intervention from the instructor.

The biggest problem encountered with group work is at the beginning of the semester, when groups have just formed, when members within a group do not know each other. This is the time when most groups either get on with the task at hand, or members fail to say what they really think in fear of upsetting other group members. It is the latter that usually take the longest to start and understand their project, and eventually find they are completing it at the last minute. One of the challenges for the instructors is to be more directly involved in the early stages of student learning to facilitate an effective process for group communication, trust and the sharing of knowledge (Tiessen & Ward 1999).

After teaching many practical based courses the instructors found student learning was enhanced by the use of group work when solving complex problems. In support, Tiessen and Ward (1999, p632) state that "sharing information and communicating to coordinate activities and to collaborate in building communal knowledge" assists in the learning required to address day-to-day complexities. Students are able to gain valuable skills and knowledge from each other by sharing thoughts and discussing outcomes. It can also lead to higher self esteem, improved marks and a more professional looking final product (Mosca & Howard, 1997).

In order to understand how groups form in the early stages, as well as through the whole semester, the instructors constantly sought students' concerns and reflected on their own perspectives on the issues arising of the forming of the groups. Notes were collated from student feedback and from the instructors' reflection journals. Kuit and Reay (2001) support these methods as appropriate for reflection on teaching outcomes. Some of the emerging themes found by the instructors and supported by Shapiro, Furst, Spreitzer, and von Glinow (2002) were concerned with trust, communication, and a realistic planning schedule.

Unfortunately due to the limitations imposed by the research submission guidelines, the authors cannot present a complete analysis of the data obtained. A summary of the partial evidence is provided below.

## Evidence from the Field

This research is based on an analysis of qualitative data obtained from three courses conducted over a four year period. The instructors kept journals of observations which included issues on group interactions, power structure allocation, collaboration, and ethnicity. The key themes arising were trust, communication, and a realistic planning schedule as mentioned above.

In the courses, groups were either asked to reflect on their group work experience through a group presentation at the end of the semester, or students were able to give their views in a course exit survey.

The practical side of all the courses mentioned allowed students to develop their skills as group decision makers to either create a user friendly decision support tool, or design an oracle based program for a business, while grappling with changes in the project information as it came to hand from the business. The groups were expected to understand the problem the business wanted solved, decide if they needed more information and ask for it (this is sometimes a problem in itself), then work out how they, as a group, were going to tackle producing a decision support tool or program.

### Course 1

During this course students gained skills in information systems design and analysis. The practical activity in this course not only included the design of a program but a systems proposal and requirements specification statement, meaning that the process demanded high team collaboration in the early stages of identification and analysis of candidate solutions. An observation Barker (1993) made in his ethnographic study of an organization's transition to self-managing teams, highlights the need for full collaboration and facilitation when assigning each team a responsibility. The same applies in the educational field. Aiming at evaluating the impact of the instructor's facilitation of group-forming, the same practical activity of the course was conducted in two tutorial groups (that is, A and B) with different approaches. For instance, in designing the initial requirements of the project for group A (and envisaging the use of Oracle), the instructor identified early on the responsibilities of the group work in the stakeholder categories related to the field (that is, systems designer, analyst, programmer). The early allocation of duties to be performed meant that group members formed according to personal preferences and social inclinations. Group B was assigned with a minor variation. For this group the instructor added the request for the delivery of a stakeholder analysis – including the identification of group members. The group achieved this deliverable but students still requested extensions on the project completion. Of more interest was that most group members raised the issue of trust via feedback forms at the conclusion of the course.

In summation, this illustrated how the instructor's interaction with group-members has a relatively high impact on the group forming performance and social-emotional interaction. Some reflections once this course concluded were:

**Proposition 1.** The less timely assistance or monitoring group members have from instructors, the weaker will be their group identity.

**Proposition 2.** The greater the group members' reliance is on class notes and pre-existing work samples, the less visible they will be to each other. There are no longer incentives for group discussions.

**Proposition 3.** The less communicative group members are to each other, the less they will be able to receive timely assistance or monitoring from each other; and

**Proposition 4.** The greater the instructor's reliance is on individual work assignments, the more difficulty group members will have reaching socio-emotional understanding among peers.

## **Course 2**

Students in the second course used application software to assist management in decision making. To help groups form more readily in the early stages of this course, activities were planned around how individuals think and act, and how these characteristics might impact on the group's work. Although it was obvious to the instructor that by introducing these activities they did indeed help the groups to form and participate as a whole much earlier than in previous years, the importance of these activities seemed to be lost on the groups during that time. Many thought the activities were not helpful and felt time would have been better spent in the computer practical sessions learning how to use the application software package instead.

At the end of the semester when the groups reflected during their group presentation on how they performed as individuals and as a group, many of the students had come to realize just how important those early activities were in the group's ability to collaborate. It was important to break down the barriers early, both within the class and within the group. By allowing the students to feel more relaxed within the class setting, many of the groups then met socially outside class to help break down those barriers further. It was these groups that gained the most from the experience of group work and felt they had performed at an even higher standard than if they had not gone through the whole process. At least two of the groups commented that they had developed friendships that would continue even after they finished their university studies.

The instructors also reflected on the number of groups that mentioned trust and respect in their presentation, how well those groups communicated their ideas to each other, and how they decided on an outcome. These groups tended to achieve the most in both a working model and end result. Although all groups mentioned that they communicated well, it was the groups where the members were unable to make group meetings that under-performed. Many groups revealed that they did not follow their planning schedule but in hindsight felt it would have led to a better outcome if they had.

## **Course 3**

The third course dealt with administrative information systems and required Masters level students to solve a business problem from a case study based on at the financial options a manager might have to choose from. The instructor did not need to intervene in the group forming process as social interactions had already occurred within this group. They had undertaken a number of courses together, which meant the trust and communication processes had already taken place. The groups for this project could be either two or three in number and the students were left to form groups of their own choice. Interactions between students and the instructor tended to be more cooperative.

At the end of the course students filled out exit surveys where it was noted that groups with members who had work commitments did not achieve the same outcomes as those without. Groups made up of full-time students were more likely to follow a planning schedule and interacted earlier with the instructor to find extra details to help solve their problem.

## **Emergent Themes**

Some of the positive findings from the three courses are illustrated by the following comments from students:

- “We found getting together for a barbecue early in the semester helped us to communicate better when doing the assignment”;
- “Even though all the members of our group spoke different languages, we decided on using English for all our communication”;

- “Our group got on really well socially. We have formed long lasting friendships and want to meet up with each other again even after we have gone home to our different countries”;
- “Our group trusted and respected each other’s opinions”;
- “We had problems in the forming stage of the group with communication problems and different expectations. We learnt to deal with these conflicts so ended up splitting the tasks and trusting each other to come up with the right solution”;
- “Even though we created a planning schedule at the beginning of the semester, we didn’t follow it at all. We didn’t start the assignment until the second to last week of the semester and now realize that we need to follow a plan in the future so we don’t let this happen again”;
- “We kept to our planning schedule and found we were able to relax a bit at the end. We had a fun time”;
- “We spoke regularly to each other on the phone and often met in town to discuss and plan our assignment”.

## Conclusions

This paper has attempted to describe the importance of the facilitation of group work activities in the IT education field. Three important instructor interventions have been identified:

1. Early facilitation of group work processes;
2. Provide a clear message on the need for social interaction of group members;
3. Provide a relaxed and friendly environment for students.

It is therefore necessary that instructors contribute substantially to the early stages of group formation. A few suggested techniques suggested include encouragement, assertiveness, delivery of a clear message, positive problem solving direction, supportive learning providing a positive and relaxed environment, and an open-door policy.

Ways to support group knowledge acquisition and support, and develop a social learning environment in the classroom are also required. The authors plan to explore means by which a social learning environment can be achieved.

## Future Research: Suggested Teaching Methods

One problem identified while undertaking this research found that the existing literature concentrated more on experiences with the use of IT for online education and on training packages for organisations, but did not address the area of using IT in the classroom to solve complex problems and the benefits this would have for the workers of tomorrow.

Our future research will relate to the ethnicity of group members. Group members with greater national and/or cultural diversity will have more difficulty reaching mutual socio-emotional understanding and this difficulty will simultaneously weaken the group work performance.

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## Biography

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