Strategies to Engage Engineering Students in Group Project Work

Les Dawes, Queensland University of Technology, Australia. l.dawes@qut.edu.au
Bouchra Senadji, Queensland University of Technology, Australia. b.senadji@qut.edu.au

Abstract *- Project focused group work is significant in developing social and personal skills as well as extending the ability to identify, formulate and solve engineering problems. As a result of increasing undergraduate class sizes, along with the requirement for many students to work part-time, group projects, peer and collaborative learning are seen as a fundamental part of engineering education. Group formation, connection to learning objectives and fairness of assessment has been widely reported as major issues that leave students dissatisfied with group project based units. Several strategies were trialled including a study of formation of groups by different methods across two engineering disciplines over the past 2 years. Other strategies involved a more structured approach to assessment practices of civil and electrical engineering disciplines design units. A confidential online teamwork management tool was used to collect and collate student self and peer assessment ratings and used for both formative feedback as well as assessment purposes. Student satisfaction and overall academic results in these subjects have improved since the introduction of these interventions. Both student and staff feedback highlight this approach as enhancing student engagement and satisfaction, improved student understanding of group roles, reducing number of dysfunctional groups whilst requiring less commitment of academic resources.*

Index Terms *- group work, group formation, social loafing, student engagement*

INTRODUCTION

Engineering graduates of today are expected to develop the ability to transfer basic knowledge to real-life engineering situations; ability to work in multi-disciplinary teams; ability to adapt to change and solve problems in unfamiliar circumstances; ability to think critically and creatively: and a commitment to continuous life-long learning and self improvement [1],[2]. As a result, a new era is emerging in engineering education driven by the recognition that university graduates need to be better prepared for today's rapidly changing professional work environment. It is essential to create authentic engineering design experiences for engineering students that simulate the demands of real professional practice. This has led to engineering educators adopting group based, project based and problem based strategies that give students the opportunity to develop these skills by embedding them across the university curriculum. These strategies are delivered through activities that also help develop other graduate attributes such as ability to identify, formulate, and solve engineering problems and the ability to communicate effectively.

Over the past decade, many Australian engineering schools have been innovative and responsive to students' needs, while meeting the requirements of industry and the professional accreditation bodies. Many accreditation processes (Engineers Australia, ABET, Washington Accord) assess programs against the delivery of graduate attributes, the educational environment, assessment and the quality systems used to ensure program delivery. The graduate attributes are also elaborated in the accreditation system as professional competencies that may be used for program design. The real test of the professional competencies for most graduates will be their fit to employers' requirements, and the rate at which they can progress through work-place experience to gain the required competencies for practice as independent professionals and gain full Chartered status. Despite progress made by institutions worldwide, it remains a challenge to integrate these professional outcomes in engineering programs in a manner that prepares students for the professional complexities of their careers. This is due to traditional thinking about engineering curricula, and in a sense holding onto past messages [3]. Felder and Brent point out that equipping students with necessary skills (graduate attributes) is much harder than determining whether or not they have these skills [4].

The use of teams/groups to promote student learning in engineering education has become more prevalent as a result of increased class sizes along with flexibility to cater for different learning styles. It encourages active learning and assessment can be easily varied. Many team activities in engineering are of the cooperative project based type where students work together in small groups to achieve common goals [5], [6]. Finelli et al 2001 found that it was essential to integrate five elements of; positive interdependence, interaction, individual accountability, interpersonal skills and group processing into any activity [7]. Teams learn differently in early versus later stages of development [8]. Light in a study at Harvard found student learning teams to be highly effective, specifically those students who study outside of class in small groups, even just once a week [9]. An important aspect of active collaborative group learning is that the team

building process needs to be informed by good practice from the teaching team. Teaching staff should construct teams with care and ensure that each team incorporates the individual skills to undertake and complete the project successfully.

From the authors' experience, university teachers commonly provide little training in team skills for their students, nor ensure a structure for the ongoing development of those teams. Teachers usually do not closely monitor the progress of those teams and, when team problems inevitably occur, they are often unwilling to intervene in, or even identify, teams that are approaching, or have arrived at, a dysfunctional state. The reasons for this reluctance to be involved in the micro aspects of team development are manifold, but usually include:

- an unwillingness to commit the significant time required to construct and run training sessions and to prepare resources students will need;
- a lack of knowledge about what sort of training and resources would be needed;
- an unwillingness to commit the significant time required to monitor teams and so identify whether they are functioning properly; and
- uncertainty in identifying dysfunctional teams. [10]

At the undergraduate level, effective teams can help students to develop their interpersonal and group skills and prevent them becoming disillusioned and resentful of team related projects. Reference [11] sounded an important warning to universities by saying that these sorts of negative experiences can sour students' attitudes toward all team participation, which may affect their performance in later work teams. Of particular importance is the need for open, fair and accountable assessment of individual and group processes and outcomes, and effective management of interpersonal and group conflict. These issues can generate considerable emotion and, if responded to poorly, can lead to the student group self-destructing or a range of other unproductive outcomes including poor academic results and failure to achieve the technical learning objectives of the unit [12]. Also, team dysfunction is usually not discovered until it is too late for intervention [17]. Team practice can be seen to involve higher order interpersonal and group skills. Not all university students possess these and some may require the assistance of academic staff in order to develop to their potential. So the issue becomes how do we best construct a successful engineering group based design teams?

Students often complain about being forced to work in teams with students who don't pull their weight when their grade is dependent on the team performance [13]. A number of factors have been identified that negatively impact team performance and member satisfaction. These are shown in Table 1:

Phenomena	**References**
Overdependence on dominant leader	Edmondson, Bohmer and Pisano, 2001 [14]
Tendency to conform	
Overcommitment to goals	Staw, 1982 [15]
Tendency to make risky or more conservative	
Social loafing	Blair, 1993 [16]; Jones 1996 [17]
Unresolved conflict	Courtney & Rouse, 2006 [18]

TABLE 1
FACTORS THAT NEGATIVELY IMPACT TEAM PERFORMANCE (adapted from [8])

BACKGROUND AND CONTEXT

In order to determine whether formation of student teams/groups and a more structured approach to assessment practices based around self and peer assessment contributed to better student engagement and satisfaction along with overall academic results, the authors devised a study based around two existing core units in the Bachelor of Engineering degree at the Queensland University of Technology. The purpose of the study was to answer the following questions:

- How effective are team formation processes when there is such a diverse student cohort,
- What are the practical implications and what lessons can be learnt from conducting group design projects by prescribing marks through self and peer assessment, and
- Does student satisfaction equate to overall performance based on engagement with the project and a reduction in dysfunctional groups and staff time.

In 2008 and 2009, a qualitative study was undertaken by the authors focusing on group formation and team success based around both student satisfaction and academic performance. The study was conducted on two core design based engineering undergraduate units, one in second year Civil Engineering (ENB274) titled Design of Sustainable Systems and the other in third year Electrical Engineering (ENB342) titled Signals, Systems and Transforms with particular emphasis on evidence based approach to better understand the student group experience in these units. These real world

design projects have been found to be effective in providing students the chance to synthesis skills learnt in their course into a cohesive problem solving task using relevant contexts. These design based group projects aimed to achieve this integration while enhancing student's appreciation for the environment, society and economies. The main goal of these projects was to empower students to think creatively in pursuing alternative, yet realistic and cost-effective solutions for sustainable development.

The project deliverables of ENB274 include the design of a sustainable residential development conceptual plan including a subdivision layout and infrastructure (road, stormwater drainage and water services) where students work in groups of four (4) each responsible for one of the following areas: Sustainable Transport, Land Planning, Water and Wastewater Management and Environmental Impact Assessment. The group assessment task is worth 50% of total marks and involves presenting a two stage report.

The aim of ENB342 is to provide students with fundamentals of deterministic analogue and discrete-time signals, analysis of linear systems driven by such signals, and digital filter design. The group assessment task is worth 25% of total marks and student groups involve 3 students. Other important learning objectives of these units (ENB274 and ENB342) are to develop fundamental skills needed to participate effectively in multidisciplinary teams, develop communication skills, and for students to be exposed to a wide range of problem solving tools and strategies.

In order to proactively ensure that student teams engage in the design project, develop team skills and do not become dysfunctional, a system was implemented involving an innovative online system titled TeamWorker that helps students and teaching staff manage their group activities and assessment. This system has been developed and implemented across a number of professions and units at Queensland University of Technology (QUT). TeamWorker was created to enhance team teaching and learning processes and outcomes include team creation, administration, development and evaluation [10]. Importantly, TeamWorker can facilitate the early identification of problematic group dynamics thereby enabling early intervention and permits the teacher to create a structured, closely monitored team work experience in which students could engage with and experience the critical characteristics of effective team practice. It does not take the place of the teacher but, rather, supports the teacher and students in existing team projects in a way that helps to maximise students' awareness of how effective teams perform and to minimise the consequences of conflict becoming unhealthy.

Participant profile

Total enrolment in ENB274 in 2008 was 141 students consisting of 32 groups, of which TeamWorker including survey responses were recorded from 96% of class and in the same unit in 2009, 179 students in 46 groups were analysed with a response rate of 94%. ENB342 enrolment in Semester 1, 2009 was 111 students in 38 teams. Responses were gained from 76 students in ENB342 resulting in a response rate of 78% for the electrical engineering students. The ENB274 responses includes 13 mixed male, female groups out of 32 in 2008 and 12 mixed male, female teams out of 46 in 2009, whilst in ENB342 responses were received from 5 mixed male, female groups out of 38 groups.

Academic Unit	Group Size	No of Groups	M/F %	Mixed M/F Groups %	% Groups with Leader	Response Rate Tasks TW %
ENB274 - 2008	4	32	88/12	40	21.8	96
ENB274 - 2009	4	46	84/14	26	19.6	94
ENB342 - 2009	3	38	95/5	13	31.6	78

TW –TeamWorker online tool; M – Male; M/F – Mixed male/female groups

TABLE 2
STUDENT GROUP ORGANISATION

It should be noted that all first year engineering students are exposed to the use of TeamWorker across a number of units and Civil engineering students make use of TeamWorker across one design unit every semester throughout their course so would be more familiar with the program and it application than Electrical Engineering students. In both units (ENB274 and ENB342) 10% of the overall assessment required students to complete online tasks throughout semester based around team practices and included self and peer assessment.

METHOD

A group management tool developed at QUT, TeamWorker is used to monitor group progress as well as individual student contributions to their group. Participation is assessed and monitored through semester and is worth 10% of total marks for the unit. Activities within TeamWorker are setup by the unit coordinator across the semester and include establishing group working procedures and group goals, contributing group meeting minutes, reflection on how your

group has performed midway through the project and after the project is finished, peer and self evaluation and assessment deadlines. In addition to these activities a survey was developed and administered through Teamworker to evaluate group performance, engagement and satisfaction. This survey was based around a series of constructs; Working Together (Questions 1, 2, 3 and 4), Task Characteristics (Questions 5, 6 and 10) and Performance Evaluation both individual and group (Questions 2, 7, 8 and 9). The detailed survey questions are appended to this paper.

Teamworker was used to collect individual student data (both qualitative and quantitative) along with management of student team based activities including student self and peer assessment and assistance to facilitate productive team processes and group dynamics.

Team formation

Team formation draws a wide variety of responses from researchers: some supporting completely random teams [19] and others organising groups based on ensuring a mix of skills and experience or personalities [20]. Student teams frequently operate without explicitly assigned roles or established authority and are often classified as "informal". However the quality of informal leadership can vary as it does with formal leadership. Group processes will generate a group leader, but not always the best leader and since leadership may affect performance, the quality of the informal leader can add or detract from team success and learning.

Student feedback over many years identified that there were rarely any consequences for the "social loafer" – the one who does not contribute effectively to the group process and outcomes. Students' widespread dissatisfaction have been illustrated by quotes such as: *"..is it just 'form a group and go and do the work'; there is no structure or mention of how to do it"; "Group work is so unfair"*.

In ENB274 student groups in both 2008 and 2009 were partially social engineered allowing students to pick a partner and then the lecturer joined up 2 pairs into teams of 4 based on previous results in design based units and further criteria. Additional criteria used in group selection included: always making sure that there was never 1 female within a group, making sure that a maximum of two international students or mature age students per group. In ENB342 students were allowed to form groups of their own accord and most identified that they had worked with the same students previously and often were friends.

RESULTS AND DISCUSSION

Table 3 details a comparison of group performance (based on academic performance, team membership and organisation) and engagement (based on participation in TeamWorker) with the design based projects over a two year period.

Unit and Group Characteristics	No of Groups	Failure Rate %	Groups that Completed > 50% TW Tasks	Av Project Grade out of 7	Groups that Identified Social Loafers*
ENB274/2008 All	32	8	93%	5.4	6
ENB274/2008 M	19		74%	4.3	6
ENB274/2008 M/F	13		94%	5.8	0
ENB274/2008 Leader	6		95%	4.7	1
ENB274/2008 No Leader	26		88%	5.6	5
ENB274/2009 All	46	3	89%	5.7	5
ENB274/2009 M	34		89%	4.6	4
ENB274/2009 M/F	12		100%	5.8	1
ENB274/2009 Leader	9		98%	4.9	1
ENB274/2009 No Leader	37		87%	5.8	4
ENB342 – 2009 All	38	11	87%	5.7	8
ENB342/2009 M	33		85%	5.7	6
ENB342/2009 M/F	5		100%	5.2	2
ENB342/2009 Leader	12		83%	5.8	3
ENB342/2009 No Leader	26		88%	5.6	5

M – Male; MF – Mixed male/female groups

* Social Loafers identified through TeamWorker (TW) peer and self assessment

TABLE 3
GROUP CHARACTERISTICS AND PERFORMANCE

In the second year unit ENB274, marks in all group categories achieved for group projects increased marginally from 2008 to 2009. Over both years there was significant difference in academic achievement between the mixed gender

groups (Male average grade of 4.3 out of 7 in 2008 and 4.6 out of 7 in 2009; Mixed group average grade of 5.8 out of 7 in 2008 and the same in 2009). There was also considerable variation based around group organisation (those groups who appointed leaders) with an average project grade of 4.7 out of 7 in 2008 and 4.9 out of 7 in 2009 for groups with assigned leaders. Groups who decided to organise themselves with no formal leadership structure achieved much higher performance with average grades of 5.6 out of 7 in 2008 and 5.8 out of 7 in 2009. This may reflect the level of interest and motivation in successfully completing the project. This result may also reflect enhanced learning by students through iterative and constructive feedback through the course of the project as studio sessions of two hours duration were facilitated by teaching staff over a five week period leading up to the final submission. Groups that attended these sessions obtained considerably higher grades than groups who did not. Those groups that engaged with the group management tool TeamWorker also achieved much higher grades than students who did not participate in the process. This could also be attributed to accessible, considerate teaching staff along with creation of an active learning environment that lends itself to diverse learning styles and students' success in developing teamwork skills.

In the third year unit ENB342 in 2009, group marks achieved for group projects indicated there was little difference in academic achievement between the mixed gender groups (Male average grade of 5.7 out of 7; Mixed group average grade of 5.2 out of 7). There was also minor variation based around group organisation (those groups who appointed leaders) with an average project grade of 5.8 out of 7 for groups with assigned leaders. Groups who decided to organise themselves with no formal leadership structure achieved slightly lower performance with average grades of 5.6 out of 7.

It is interesting to note the difference between the two cohort's academic performance and group organisation with civil engineering student's was significantly influenced by team management structure and team membership (in terms of mixed groups) whereas electrical engineering students were not influenced significantly by management structure. This will be explored further in the next phase of the research where data will be acquired from the 2010 student cohorts and more detail statistics carried out.

Results of student activities within the online management tool Teamworker as well as students' response to the unit through University wide Learning Experience surveys as a whole and in particular group skill over the past three years indicate that the students have become more aware of their own strengths and weaknesses in working in groups. Students also are becoming more adept at identifying the balance in terms of each individuals "team role preference" defined by [21] as the tendency of an individual to behave, contribute and interrelate with others in distinctive ways. Many students found the project challenging yet rewarding and emphasized the importance of communication and team work skills in coming to the most appropriate solution. In the reflective assessment of their group performance (after completing the assessment) students also identified areas in which they needed to improve. Some qualitative evidence from students supports these statements.

"*The task set was challenging and required applying judgement to research into solutions applicable to our specific site."*

"As the project progressed we became more cohesive as a team and learned each other's strengths and weaknesses"

"Some of the things I need to improve on are providing more contribution to discussions. I hold back ideas that maybe useful."

In the authors' experience of running numerous undergraduate group based design activities over many years it is apparent that initially there is a high level of tolerance by many students to social loafers in their groups especially early in their course. However, anger and frustration in those groups build steadily as the weeks pass and can quickly boil to the surface when the workload on the contributing students escalates as a completion deadline looms. By then, unfortunately, it may be too late to rectify the matter. TeamWorker through its team-email facility enables the teacher to easily notify all members in any identified dysfunctional teams and suggest appropriate actions they could take to remove the incipient problems. The teacher can follow up such emails with brief meetings with those teams should the problems continue to show up in the teams' records. In ENB274 the number of dysfunctional teams has reduced from nearly 20% prior to the implementation of TeamWorker (2007) to 11% in 2009. The implementation of both self and peer assessment ratings reduced the number of individual complaints from the students and the social engineering of team formation reduced the number of dysfunctional teams and thus teaching teams time in dealing with these issues. Students identified social loafers in 21% of the groups in ENB342 in 2009. As a result team formation will be reviewed in this unit in 2010.

Reproductive learning strategies such as exams and memorising reflect a lower level view of learning compared with constructive learning approaches afforded through applying contextual knowledge. Reference [22] reported that learning environments that are student-centred, instructor-facilitated and peer-interactive are more beneficial for engineering students, which was the approach facilitated in the design based project reported here. It is interesting to note that students typically rated each other's work to be good (75% median and were slightly above marks awarded by the instructor(s)), but that substantial deviation in the marking existed. The opportunity to review peer reports equips students with the critiquing skills and appreciation for clarity required in competent engineering. Related research states that although students find the task of peer-reviewing a challenging one, they benefit from the learning process [23].

CONCLUSION

Despite university policy exhorting academics to provide meaningful and positive experiences which will develop students' group skills, the increasing financial strictures within universities mean that fewer resources are provided for academics to develop their own capabilities in this area, let alone their students'. Furthermore, the high demands of administration, research, and community service obligations place significant limitations on academics' capacity to develop their skills.

A more structured approach to assessment practices, connection to learning objectives, their fairness and use of the group management tool (TeamWorker) built into an appropriate context based design project across two engineering degree courses have enabled students to develop group skills, undertake critical reflection on tasks and process, better understand group processes including awareness of phases of group development and allow effective management at a personal and group level. Feedback provided by students also identified the need to effectively communicate throughout the project in building trust and managing issues of power and influence to support rather than disadvantage to enhance achievement of outcomes.

Both student (through self and peer assessment) and staff feedback highlight this approach as enhancing student engagement and satisfaction, improved student understanding of team roles, reducing the number of individual complaints from the students, reducing number of dysfunctional teams whilst requiring less commitment of teaching teams time in dealing with these issues.

Findings from different group formation strategies involving group membership and organisation were mixed with results from the civil engineering cohort showing groups who decided to organise themselves with no formal leadership structure achieved much higher performance than groups with appointed leaders whilst the electrical engineering cohort showed minor variation based around group organisation. There was significant difference in academic performance with the mixed gender groups in the civil engineering cohort (2008 and 2009) achieving almost two grades higher than groups with males only. In the electrical engineering cohort there was little difference in academic achievement between the mixed gender and male groups, but as only 13% were mixed groups and only 5% of the cohort were female these results should be used with caution.

REFERENCES

[1] Ribeiro, L. R. D. C. & Mizukami, M. D. G. N., 2005. Student Assessment of a Problem-Based Learning Experiment in Civil Engineering Education, *Journal of Professional Issues in Engineering Education and Practice*, Vol. 131, No. 1: 13-18.

[2] Thoben, K. D. & Schwesig, M., 2002. Meeting Globally Changing Industry Needs in Engineering Education, 2002 ASEE/SEFI/TUB Colloquium, Berlin, Germany.

[3] Rover, D., 2008. Attention Engineering Educators, *Journal of Engineering Education*, 97(4): 531-534.

[4] Felder, R. and Brent, R., 2003. Designing and Teaching courses to satisfy the ABET Engineering criteria, *Journal of Engineering Education*, 92(1): 7-25.

[5] Ledlow, S., White-Taylor, J., and Evans, D.L., 2002. Active/Cooperative learning: a discipline specific resource for engineering education. *Proceedings of ASEE Annual Conference and Exposition*; Session 2793.

[6] Mehta, S., 1998. Cooperative learning strategies for large classes. *Proceedings of ASEE Annual Conference and Exposition*; Session 3220.

[7] Finelli, C.J., Klinger, A., and Budny, D.N., 2001. Strategies for improving the classroom environment. *Journal of Engineering Education*, 90(4): 491-498.

[8] Adams, A.B., Kayes, D.C., and Kolb, D.A., 2004. Experiential learning in teams. Working paper ORBH, Department of Organisational Behaviour, Weatherhead School of Management, SA.

[9] Light, R. J., 2001. Making the most of college: Students speak their minds. Cambridge, MA: Harvard University Press.

[10] Murray, M. & Lonne, R., 2006. An innovative use of the web to build graduate skills. *Teaching in Higher Education* 11(1): 63-77.

[11] Buckenmyer, J.A., 2000. Using teams for class activities: making course/classroom teams work. *Journal of Education for Business*, 76(2): 98-103

[12] Paulus, T. M., Bichelmeyer, B., Malopinsky, L., Pereira, M. & Rastogi, P., 2005. Power distance and group dynamics of an international project team: a case study, *Teaching in Higher Education*, 10(1): 43-55.

[13] Chen, G., Donahue, L. M., & Klimoski, R. J., 2004. Training undergraduates to work in organizational teams. *Academy of Management Learning and Education, 3*(1): 27–40.

[14] Edmondson, A. C., Bohmer, R. M., & Pisano, G. P., 2001. Disrupted routines: Team learning and new technology implementation in hospitals. *Administrative Science Quarterly*, 46: 685–716.

[15] Staw, B.M., 1982. The escalation of commitment to a course of action. Academy of Management Review, 6: 577-587.

[16] Blair, G.M., 1993. Laying the foundations for effective teamwork. *Engineering Science and Education Journal*.

[17] Jones, D., 1996. Team learning approach in education. *Journal of Quality and Participation*, 19(1): 80-87

[18] Courtney, P. & Rouse, A. 2006. The emotional impact of learning in small groups: highlighting the impact on student progression and retention. *Teaching in Higher Education*, 11(1): 79-91

[19] Foyle, H.C., 1995. Interactive learning in the higher education classroom, National Education Association, Washington.

[20] Michaelson, L.K., 1995. Getting started with team based learning. Accessed May 1, 2010. http://teambasedlearning.apsc.ubc.ca/d/GettingStartedwithTBL.pdf

[21] Belbin, R. M., 1993. Team roles at work. Butterworth-Heinemann, Oxford Press.

[22] Lin, C.-C. & Tsai, C.-C., 2009. The Relationships between Students' conceptions of Learning Engineering and Their Preference for Classroom and Laboratory Learning. *Learning Environments*.

[23] Hesterman, D., 2008. "Peer assessment of past exam scripts", *Australasian Journal of Engineering Education*, Vol. 14, No. 2, pp. 57-76.

APPENDIX A: STUDENT SURVEY ENGAGING STUDENT GROUPS

Contructs

Working together WT
Task Characteristics TC
Performance Evaluation PE

Question 1 (written response, 1 paragraph maximum) WT
When you first met as a team for this assignment, what were the strengths and weaknesses you brought to the team?

Question 2 (Answer with a number only) WT, PE
Did all the team members contribute equally hard in getting to the solution? Use a five point agree disagree rating scale where 1 = strongly disagree; 3 = uncertain: 5 = strongly agree

Question 3 (written response, 1 paragraph maximum) WT
Describe how team responsibilities were managed; Was a leader appointed? How did you plan for the task ahead?

Question 4 (Answer with a number only) WT
Does your team have a process for resolving conflict if it arises during the assignment? Use a five point agree disagree rating scale where 1 = strongly disagree; 3 = uncertain: 5 = strongly agree

Question 5 (Answer with a number only) TC
Was the task challenging? Use a five point agree disagree rating scale where 1 = strongly disagree; 3 = uncertain: 5 = strongly agree

Question 6 (Answer with a number only) TC
The task requires the team to meet regularly? Use a five point agree disagree rating scale where 1 = strongly disagree; 3 = uncertain: 5 = strongly agree

Question 7 (Answer with a number only) PE
My performance as an individual directly affects how well the group as a whole performs, Use a five point agree disagree rating scale where 1 = strongly disagree; 3 = uncertain: 5 = strongly agree

Question 8 (Answer with a number only) PE
As the project progressed the team became more cohesive. Use a five point agree disagree rating scale where 1 = strongly disagree; 3 = uncertain: 5 = strongly agree

Question 9 (written response, 1 paragraph maximum) PE
Describe how your team worked together to accomplish the assignment, participated in developing ideas and communicated within the group?

Question 10 (Answer with a number only) TC
Did the main learning from completing the assignment allow you to better understand the theory learned in this unit? Use a five point agree disagree rating scale where 1 = strongly disagree; 3 = uncertain: 5 = strongly agree