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Abstract

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Keywords

Group functioning, Peer assessment, Problem solving, Team skill training

Improving Group Functioning in Solving Realistic Problems

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Abstract

Group work in educational settings has several advantages, but it is also associated with some difficulties, most commonly concerns about group functioning. The aim of this study was to improve group functioning in solving realistic problems, using a combination of: 1) team skill training prior to group work; 2) peer and self-assessment to evaluate contribution to group work; and 3) lecturer-designed versus student-designed problems. The results showed positive effects on group functioning. After initial team skill training, peer assessments and moderation of marks based on those assessments stimulated the so-called free loaders to improve their contributions to group work, which is a result that has been demonstrated in only a few studies. In addition, students showed some preference for designing their own problems and they thought the learning outcomes were higher than from lecturer-designed problems.

Key Words: group functioning; peer assessment; problem solving; team skill training

Introduction

Group work in educational contexts and fair assessment of individuals working within a group has been a concern of many practitioners and teachers (Matthews, 1994; Sisson & Newton, 2007; Smith et al., 2005; Ventigmiglia, 1994). When designing group projects, some of the main challenges are to enhance learning among group members and to have the fairest scheme for judging the contribution of members towards a common goal. The assessment of contributions may also affect group functioning (Schönrock-Adema et al., 2007). Although various measures for improving group functioning have been suggested in the literature, few of these have been tested and evaluated in educational contexts. Having a better understanding of the impact of these measures may help teachers in maximising group learning and functioning, thereby improving the capacity of graduates to work in groups in the workplace.

Cooperative learning in a group setting requires students to work together towards a common goal, which benefits every member of the group. According to Crosby (1997), effective group learning has three characteristics: 1) active participation of all team members for successful learning; 2) having a guided, purposeful task; and 3) reflection as part of the learning process. However, difficulties are often identified in small group learning environments, including a preference of some group members for individual over group learning, lack of adequate resources such as venues or facilitators, and resistance to new approaches to learning by some learners (Jones, 2007).

Working collaboratively in a group should enhance, rather than obstruct, learning (Prichard et al., 2006). However, conflicts may arise leading to impediments in learning. According to Jehn and Mannix (2001), conflicts occur in three areas, namely, *relationships* among group members, differences in opinion about the *task* and the

process of achieving the task. Despite assumptions that “team skills” intrinsically develop as students engage in group work, studies show this is not necessarily the case (Hertz-Lazarowitz, 1989b) and training can enhance collaborative learning (Prichard et al., 2006).

Oakley et al. (2004) provided a comprehensive guide to turning groups into effective teams through design and management of teams for enhancing group membership. Useful information is also provided with regard to dealing with difficulties associated with group functioning, especially *free loaders* referred to as “Hitchhikers” and “Couch Potatoes”. One suggestion for improving team performance is peer rating that is used to adjust team grades based on individual contributions to group assignments (Oakley et al., 2004).

Ideally, group work assessment should assess both the product (e.g., report) and the process of group work (James et al., 2002). Self- and/or peer assessment is one approach for assessing the group process to produce a mark for a group, an individual, or peer assessment factor to modify all or part of a group mark (Blease, 2006). While self-assessment can encourage students to reflect critically about their own contribution to group work, there are opposing views with regard to its effectiveness in assessing performance (see Eva and Regehr, 2008). One study suggested that self-assessment in combination with other methods of assessment (e.g., student rating) could be more effective and provide more useful feedback, in this case for clinical teachers (Stalmeijer et al., 2009).

In discussing the assessment of group work, Willmot and Crawford (2004) indicate:

There is a common difficulty when assessing team projects: how to determine the appropriate mark for each individual. Failure to address this very real problem can not only cause resentment among students but is also quite unacceptable from the Quality Assurance viewpoint. (p. 1)

Here Willmot and Crawford identify two recurring tensions in the literature on assessment of group work. The first is fairness to students and the second, which they refer to as related to quality assurance, is about determining or verifying whether standards set by the lecturer are met by all of the students.

Cannon and Newble (2000) point out, however, that group work can have different learning objectives. They proposed two options for marking, depending on the learning objectives of group work: 1) giving the same mark to all members of the group if the objective is to learn that group effectiveness is the outcome of the contribution of all; and 2) asking students to determine their marks depending on their contributions and strengthening the approach by conducting interviews with students. According to Matthews (1994), “peer evaluation provides valuable information in the assessment process but is not the sole means of differentiation between individuals” and “must be recognised as part of the process not the total”. Other sources were suggested, such as “the tutors’ (examiners’) knowledge of the individuals in the group and any factual evidence provided by the group or individual members”. However, the former may not be applicable in group work that does not involve tutors.

Among many factors that may influence performance within groups, the type of project or assignment can be important. In a study regarding design learning in an engineering course, the effect of an instructor-guided design project versus an open-ended project on team functioning was analysed (Okudan and Mohammed, 2006). Okudan and Mohammed looked at variables such as task relationship and process conflicts, conflict resolution, collective efficacy, teamwork behaviours, satisfaction with the team, individual growth of team members and team viability. In addition to overall positive response of students on team functioning, the results showed that the open-ended

project led to an increase in spending time together outside of class, more individual growth and increased ability to resolve multiple types of conflicts. However, the authors do not mention the possibility that improved conflict resolution may have been the result of gaining more experience in teams, rather than being a consequence of the open-ended project, or may have been due to a combination of both. In addition, peer assessment does not seem to have been used as a tool for assessing members' contribution. Another outcome of this study was that most group members were happy with their group and indicated that they wanted to continue with the same group. Perhaps one way of detecting groups with difficulties is to dissolve and re-form teams, providing the option for former groups to get back together (Oakley et al., 2004).

Drawing on previous research, in the study reported here, our main goal was to improve group functioning when students solved realistic problems, using a combination of: 1) team skill training prior to group work; 2) peer assessment to evaluate contribution to group work; and 3) lecturer-designed versus student-designed problems. While each of these strategies had been used previously in the research literature, to our knowledge they had not been used in combination within a single study. We hypothesize that team skill training and peer assessment will improve group functioning by encouraging participation and reducing the number of free loaders. Student-designed problems versus lecturer-designed problems may also improve group functioning either directly or indirectly by increasing autonomy and interaction among students.

Methods

The study was conducted in a third year biology course, "Arthropods and Human Health," at the University of Queensland during semester I, 2008. The ages of participants were between 20-30 years old. The course provides an introduction to the biology of medically important groups of arthropods and their role in human and veterinary diseases. Over recent years, the class size has been around 55 students. After running the course in its traditional form in 2004, the number of lectures was reduced and a problem solving component was introduced to engage students in a group activity where they could learn from one another (Moust et al., 2005). This required major changes in the course curriculum and assessments.

The revised course included 25 lectures and 5 practicals that were assessed by final examination and practical reports, respectively. In addition, groups of 4-6 students worked on two problems, with half a semester spent on each problem. Each group worked on problems that were different to the rest of the groups. The problems, which were realistic and mainly open-ended, addressed current topics in Medical Entomology related to human health. For example:

After recent king tides in the area, the residents of a coastal housing development in the Maroochy Shire on the Sunshine Coast have complained to the local council about a surge in mosquito numbers. What are the likely species causing the problem, what are their breeding habits, what health problems do they pose? What major symptoms would individuals suffering from these illnesses report to their doctor? How would the diagnosis be confirmed?

Nine one-hour problem solving sessions were scheduled: one team skill training session and four sessions on each problem for the students to work in groups. The lecturers who provided the problems either briefly showed up at the sessions or facilitated via email. The venue selected for the problem solving sessions was equipped with computers and internet.

Prior to this study, the lecturers who taught into the course provided the problems to students. Each group wrote a report of about 1500 words on each problem and they

presented one of the problems to the class in a 15 minute presentation. The relevant lecturers marked the reports and all members of a group received the same mark. During the previous three years, several difficulties were detected within some groups, including: good students wanting to take control; free loaders taking advantage of others; casual attendance by some members; and conspiring against one member of a group. In other words, the difficulties related to group functioning.

We were interested in investigating how group functioning could be improved in the problem solving sessions, with particular emphasis on promoting the contribution of free loaders. The group work in this study can be described as cooperative learning, since individuals' input contributes to the success of the group (Johnson and Johnson, 1999). In contrast to competitive learning environments, cooperative learning should enhance accountability of students and have positive impacts on group functioning (Springer et al., 1999). The aim of the study was to enhance group functioning during problem solving, using three methods in combination: team skill training prior to group work; peer and self-assessment to evaluate contribution to group work; and lecturer-designed versus student-designed problems.

Team Skill Training Prior to Group Work

In order to enhance group functioning in the course, most of the first problem solving session was dedicated to team skill training. During this training, the roles and responsibilities of each group member were emphasized. Information was also provided on how to effectively work in a group and what to do if difficulties arose, specifically "Coping with hitchhikers and couch potatoes on teams" from Oakley et al. (2004).

As students were to evaluate each other's contribution to group work, the team skill training gave them a basis for successfully contributing, as well as for evaluating their own and team members' contribution. Therefore, team skill training was provided before group work, rather than between the two problems. Given that team skill training was linked to self- and peer assessment in this way, we did not attempt to separately evaluate its impact, although we asked students to comment on the adequacy of the team skill training (see Group functioning in Results and Discussion).

Peer and Self-assessment to Evaluate Contribution to Group Work

While it is difficult to accurately judge the contribution of each group member in production of a final work, peer and self-assessment can provide a more reliable and systematic way of evaluating members' contribution. In this study, two peer and self-assessments were carried out, after each of the due dates for the reports from group work. Peer and self-assessments were not made available to lecturers prior to marking of reports from group work.

Prior to the group work, students were made aware that peer assessments would be used to moderate marks. After group reports were submitted, the students were asked to rate their peers' and their own contribution to group work based on criteria provided in a peer and self-assessment form (see Appendix A). Students were required to make comments on the form to justify their ratings. Students' marks for group work were moderated based on an average of peer ratings, with each step of down-rating (from B-E) resulting in a loss of 10% of the mark that the group report had received. We used self-assessments to encourage reflection on students' own performance and to aid in resolving conflicts, should they arise. The self-assessments were therefore not considered in calculating averages, to avoid potential bias. If substantial differences between self- and peer assessments were observed, group members would be contacted for individual interviews to explore the reason for the discrepancy. However, a discrepancy of this kind did not occur during this study.

While the purpose of moderation through peer assessments was to mark students according to their contribution to the work of the group, there is a possibility it might

aggravate difficulties associated with dysfunctional groups. In addition, students may cover for each other or the majority in the group may decide to unfairly undermine a member's contribution because of personality clashes, rather than contribution. We found the suggestion by Oakley et al. (2004) to carry out peer assessments during the semester rather than only at the end, an appropriate way to overcome some of the difficulties. This process can be effective if students are given proper feedback on the process and see the effect of peer assessments in marks for group work. Despite some potential difficulties, based on recommendations in the literature noted above, we were interested to investigate whether or not peer assessment could enhance group functioning, in conjunction with our other methods.

Lecturer-designed Versus Student-designed Problems

As part of this study, groups were provided with lecturer-designed problems for the first problem (P1), but were required to design the second problem (P2) themselves. Students were required to design a broad problem relevant to the course in which the topic could not be the same as for their first problem. They were advised to use lecturer-designed problems, presented to them in their first problem, as models in designing their own problems. Although literature is rare on lecturer-designed versus student-designed problems, a study by Okudan and Mohammed (2006) reported positive effects of open-ended student-designed problems on group functioning in an engineering education context.

Evaluating the Methods for Improving Group Functioning

The effectiveness of the methods used for improving group functioning in this study was evaluated in the following ways: 1) student surveys about group functioning; and 2) comparison of ratings from peer and self-assessments on P1 and P2. Each of these forms of evaluation is outlined below.

Student Surveys About Group Functioning

Two surveys about group functioning were carried out after each of the due dates for P1 and P2, using the online management system, Blackboard. The survey questions were predominantly in Likert scale format, with responses ranging from "strongly agree" to "strongly disagree", as shown in Appendix B. From a total of 56 students in the course, 42 students responded to the P1 survey, with 46 responses to the P2 survey. Data were collected anonymously and analysed using Excel. In addition to the Likert questions, students were given the opportunity to make any further comments.

Comparison of Peer Assessments on the Two Problems

Ratings of individual students from peer and self-assessments were compared between P1 and P2. This allowed us to determine whether the contribution of students to group work improved from P1 to P2, especially for those students whose contribution was rated low by peers in P1 and, as a consequence, they lost marks.

Results and Discussion

Below we consider the results of this study into improving group functioning in solving realistic problems, using the methods of data collection outlined above. We discuss these results in terms of: group functioning; preference for individual or group assignments; lecturer-designed versus student-designed problems; the effect of peer and self-assessment on contributions to group work; and some additional, supporting evidence from course evaluations.

Group Functioning

As noted above, the first problem solving session in the course was dedicated to team

skill training. The importance and positive impact of team skills training in enhancing group learning have been elaborated in several studies (Oakley et al., 2004; Okudan & Mohammed, 2006; Prichard et al., 2006). Based on feedback obtained from the first survey on group functioning, 92.5% of the students agreed that the team skill training session contained sufficient instructions. When students were asked about possible areas of conflict during group work, the survey responses indicated that conflicts about the task and process declined from P1 to P2, but no difference was found with regard to relationships between group members (see Figures 1-3), such as personality differences and tension (De Dreu & Weingart, 2003). These results also indicate that the peer and self-assessment carried out for P1, which resulted in moderation of marks for a small number of students, did not lead to an increase in personal conflicts or tensions among team members. The survey responses also showed that most students were satisfied with the process of teamwork assessment, including peer assessment (77.5% for P1 and 73.7% for P2).

In the problem solving component of the course, students formed their own groups, which stayed together for both P1 and P2, as most students in this course do not seem to know each other well, particularly given that a number of overseas students join the university in their third year. When students were asked about group membership after P1, only 17.5% indicated they would have changed their group if given a choice, with some increase in the P2 survey (23.7%). These relatively low percentages show that most groups preferred to stay together, which also indicates low levels or no conflicts in most groups. Some supporting comments from students were:

Normally I would rather do assignments by myself, I was just lucky and got a good group of people so it was good to do the group work.

Both problems were extremely fun to complete (in comparison to other assignments and assessments of other courses) and I enjoyed this course immensely.

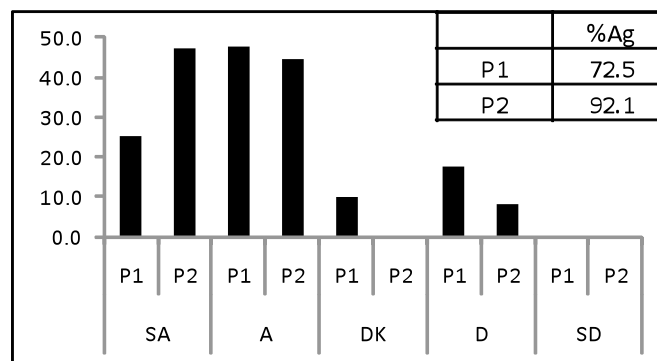


Figure 1: Students' responses on conflicts in *task*: "Within our group, we had no difference in opinion about the *task*". P1) P1 survey; P2) P2 survey. SA, strongly agree; A, agree; DK; don't know; D, disagree; SD, strongly disagree.

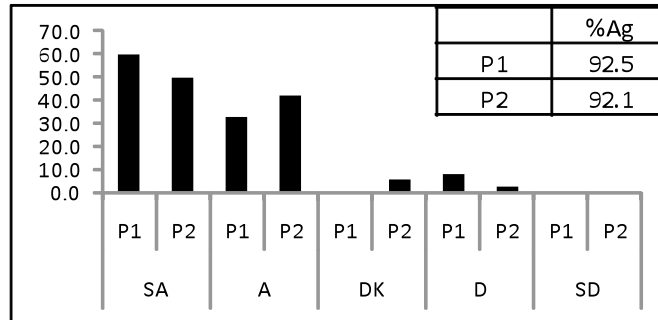


Figure 2: Students' responses on conflicts in *relationships*: "Within our group, I had no conflict in personal relationships with other group members".

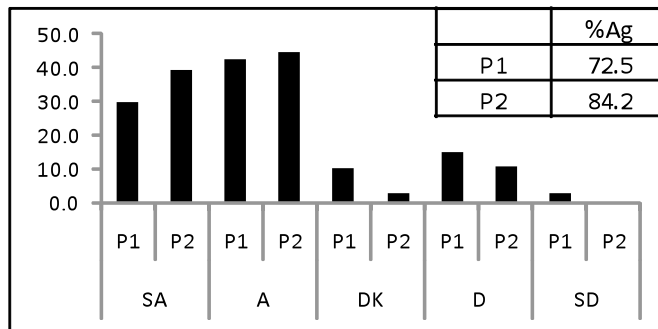


Figure 3: Students' responses on conflicts in *process* of achieving the task: "Within our group, we had no conflict during the process of this assignment".

Preference for Individual or Group Assignments

Despite the positive results on group functioning in problem solving in this study, after P1 40% of the students indicated they preferred to do their assignments on their own rather than as a group, which increased to 50% after P2 (see Figure 4). This preference might be due to individual characteristics or features of working in groups, or a combination of both. For example, informal polling in the class indicated that most students did not have prior group work experience. Not being used to working in a team, students may feel more in control when they work as individuals. High achievers may also be concerned about poorer performance of some group members and its influence on the mark they receive. Some students informally expressed concerns such as these to the course coordinator. Jones (2007) also identified the preference of students to work as individuals rather than in groups as one of the problems associated with small group learning and teaching. For the most part, preference for individual versus group assignments relates to features that extend beyond the present study, but they need to be taken into account when weighing the merits of group work.

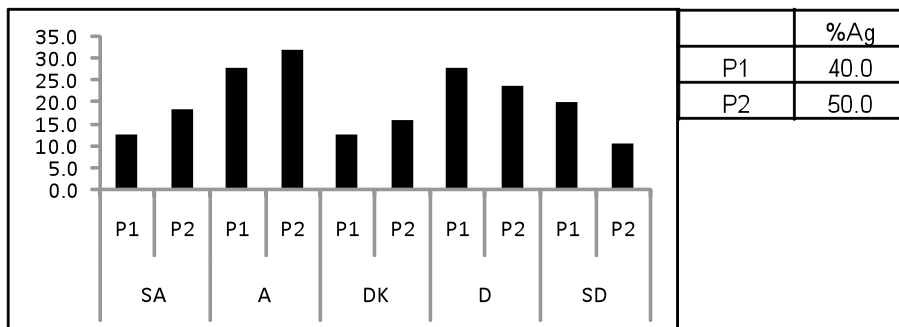


Figure 4: Students' responses on group membership: "I prefer to do the assignments on my own rather than as a group. P1) P1 survey; P2) P2 survey.

Lecturer-designed Versus Student-designed Problems

Another aspect of this study was to explore whether the type of problem (designed by lecturers in P1 versus by students in P2) was related to learning and group functioning. According to the surveys, students were more satisfied with learning outcomes of P2 (94.7%) compared to P1 (85.0%) and thought the problem solving component of the course improved their learning skills, with an increase from 75% in P1 to 81.6% in P2. In addition, when students were asked whether they preferred lecturer-designed problems (as in P1) over student-designed problems (as in P2), 52.5% of students agreed with this statement in the P1 survey, which dropped slightly to 47.4% after P2. Although these differences are quite small, this result is consistent with the higher level of student satisfaction with learning outcomes from P2 and an improvement in group functioning in general. It also shows a similar pattern to a study in which Okudan and Mohammed (2006) explored student perception of team functioning over the course of a semester, as students moved from a guided project to an open-ended project. Their results indicated students' generally positive perceptions of team functioning, including relatively high levels of conflict resolution, collective efficacy, teamwork behaviours and low levels of conflict.

It should be kept in mind that the results from the Okudan and Mohammed study, as well as students' slightly higher preference for student-designed problems after P2 in the present study, have occurred after they have been eased into these more open formats: from a guided to an open-ended project and from lecturer-designed to student-designed problems. Without the scaffolding and modelling provided in the earlier examples, the results may have been less positive. On the other hand, the results of both studies suggest that giving students more autonomy over time, after providing appropriate guidance, can enhance students' engagement and learning (Dall'Alba, 2009).

Autonomy, referring to self-determination, is one of the basic elements of motivation (Reeve et al., 2004), which can have a positive effect on engaging students and on the functioning of groups. When students are given some degree of control over their own learning, this can contribute to motivating and engaging them in learning. In addition, open-ended tasks promote interaction among students, which can increase student achievement as more extensive information processing is required (Springer et al., 1999). The level of autonomy and structure in higher-order thinking and open-ended tasks (e.g., in realistic problem solving) which facilitate cognitive growth may influence group functioning (Springer et al., 1999), although there is lack of agreement on the level of structure that should be provided to learners (Hertz-Lazarowitz, 1989a; Johnson & Johnson, 1985; Nystrand et al., 1991; Smith et al., 1984).

Effect of Peer and Self-assessment on Contributions to Group Work

Peer and self-assessments after P1 identified three of the 10 groups in which some members made inadequate contributions to group work. As a consequence, these students were marked down on the group report. When the ratings of these students were analysed in P2 peer assessments, it was found that they received a rating equal to the other group members. Peers of those students who were marked down on P1 consistently indicated in their written comments on P2 peer assessments that the students "improved their group efforts from P1". Another comment was:

Receiving marks back from P1 before commencing P2 was rather good as it allowed those group members who did not perform adequately in P1 to have an increased input in P2.

There is an extensive literature pointing to peer assessment as an effective approach for improving team functioning, helping to adjust team grades based on individual performance and developing teamwork skills in students (e.g. Brown, 1995; Kaufman et al., 2000). However, this is one of very few studies that demonstrate improved contributions of group members following a combination of peer assessment and

moderation of marks based on those assessments.

As 77% of students returned their P1 peer and self-assessments in this study, decision making was difficult in groups with few peer assessments. Most of those who made little contribution to their group work failed to return their peer and self-assessment. This was partly overcome in P2 when students were informed that marks for the report would be released only when students had filled in their peer and self-assessment forms, which resulted in 89% participation for P2 peer and self-assessments.

In one group in which only a small number of peer and self-assessments were returned (2 out of 6), the students marked down another group member by two marks. The student who had been marked down by peers contacted the course coordinator about unfair marking. The students involved were interviewed separately, resolving the issue by amending the mark. The student who was marked down was a high achieving student. According to the other group members, this student wanted to control the group and marking down was not based on contribution but, rather, conflict in the process. This indicates certain limitations of peer and self-assessment as a tool to evaluate contribution to group work. However, interviews in the absence of such assessments by group members have also been found to be inconclusive and time consuming, in some cases leading to the introduction of peer assessment (Matthews, 1994).

Some Supporting Evidence from Course Evaluations

While not focused specifically on group functioning, two standard course evaluations that are used across the university provided some additional relevant data. In 2005, after introducing the problem solving component to the course, in response to the question, "Overall how would you rate this course?" the mean rating on a 5-point Likert scale was 4.42. Incidentally, this was an increase over the previous year's rating of 4.18, prior to introducing problem solving. After the changes to improve group functioning in 2008, this mean rating showed some increase to 4.62, with similar numbers of students taking part in the course evaluations in both 2005 and 2008. This score increase should be considered with caution, as there are several factors that can affect course evaluation scores and it is not possible to make a direct link between the changes made to improve group functioning and an increase in overall course evaluation score (McDonald & Mills, 2007). However, in 2008, 92% of students agreed with the statement: "I felt I belonged to a group of students and staff engaged in inquiry and learning in this course". This question was not included in the course evaluation in 2005. Some responses to open-ended questions about positive features of the course relevant to group work from the 2008 course evaluation were:

*Group assignments were fun compared to individual assessments all the time.
Get to choose own topic for second essay.*

There were no negative comments about the course in response to open-ended questions in 2008.

Educational Implications

The aim of this study was to investigate whether group functioning can be enhanced during the solving of realistic problems, using a combination of: 1) team skill training prior to group work; 2) peer and self-assessment to evaluate contribution to group work; and 3) lecturer-designed versus student-designed problems. The results indicate positive effects on group functioning and improved contribution of "free loaders".

Although the effect of team skill training on promoting group functioning should not be underestimated, peer assessments and the consequent action taken to adjust marks for those who did not contribute adequately to group work had most direct impact on

addressing the remaining difficulties associated with group work. According to surveys and peer assessment comments, all students who had inadequate contributions to group work improved their input substantially after being assessed by their peers and losing marks. This is one of very few studies that demonstrate such improved contributions following peer assessment and associated moderation of marks. Some students did not fill out peer and self-assessment forms until their marks for the report were withheld, so this issue will need to be addressed in future.

One of the limitations of this study is that students' prior experience of group work could have been determined in the first survey, rather than through informal polling in the classroom. In addition, a possible limitation in evaluating the effects of team skill training was that the training was carried out prior to group work, rather than between P1 and P2. This latter limitation, however, must be weighed against the potential benefits to students' learning of providing team skill training prior to group work.

Several questions arise from this study for further research, especially with respect to closer exploration of students' experiences with the peer and self-assessment process, as well as its impact on their learning. For example, what challenges did students face when assessing their peers and their own performance? How did they think they could improve in making self- or peer assessments? Informal feedback indicated that some students were a little uneasy about assessing their peers and also about potential bias when being assessed by their peers. However, most of the students were satisfied with the teamwork assessment, including peer assessment. An additional question for further research relates to whether or how students think their group involvement changed as a result of being involved in peer assessment.

Some students expressed a preference for designing their own problems, with learning outcomes considered to be higher than for lecturer-designed problems. However, it was not clear whether the type of problem had direct impact on group functioning, so this is a question for future research. As students considered they learned more from problems they designed themselves compared with lecturer-designed problems, this is also an issue that would benefit from further research.

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Appendix A

Peer and self-assessment of team members' contribution*

Your Name _____ Your Group # _____

Please list the names of all of your group members (including yourself), and rate the extent to which each member participated by fulfilling his/her responsibilities in completing the group assignments. Use the guide below for your ratings:

- A) Outstanding:** Consistently carried more than his/her fair share of the workload.
- B) Very good:** Consistently did what he/she was supposed to do, very well prepared and cooperative.
- C) Satisfactory:** Usually did what he/she was supposed to do, acceptably prepared and cooperative.
- D) Ordinary:** Often did what he/she was supposed to do, minimally prepared and cooperative.
- E) Very poor:** Often failed to show up or complete assignments, rarely prepared.
- F) Unsatisfactory:** Consistently failed to show up or complete assignments, unprepared.
- E) No show:** No participation at all.

These ratings should be based on each member's level of participation and effort and sense of responsibility, not his or her academic ability.

Name of group member	Rating	Comments

*Adapted from Oakley et al. (2004).

Appendix B

Survey Questions

- 1) I found the instructions provided at the first session with regard to group work sufficient.
 - A) Strongly agree
 - B) Agree
 - C) Don't know
 - D) Disagree
 - E) Strongly disagree

answer: _____

- 2) Within our group, we had no difference in opinion about the task.
 - A) Strongly agree
 - B) Agree
 - C) Don't know
 - D) Disagree
 - E) Strongly disagree

answer: _____

- 3) Within our group, I had no conflict in personal relationships with other group members.
 - A) Strongly agree
 - B) Agree
 - C) Don't know
 - D) Disagree
 - E) Strongly disagree

answer: _____

- 4) Within our group, we had no conflict during the process of this assignment.
 - A) Strongly agree
 - B) Agree
 - C) Don't know
 - D) Disagree
 - E) Strongly disagree

answer: _____

- 5) Within our group, I could freely express my opinion.
 - A) Strongly agree
 - B) Agree
 - C) Don't know
 - D) Disagree
 - E) Strongly disagree

answer: _____

6) If I had a choice for P2 assignment, I would have changed my group.

- A) Strongly agree
- B) Agree
- C) Don't know
- D) Disagree
- E) Strongly disagree

answer: _____

7) I prefer to do the assignments on my own rather than as a group.

- A) Strongly agree
- B) Agree
- C) Don't know
- D) Disagree
- E) Strongly disagree

answer: _____

8) I am satisfied with the processes for team work assessment, including peer assessment.

- A) Strongly agree
- B) Agree
- C) Don't know
- D) Disagree
- E) Strongly disagree

answer: _____

9) I am satisfied with the learning outcomes of P1.

- A) Strongly agree
- B) Agree
- C) Don't know
- D) Disagree
- E) Strongly disagree

answer: _____

10) The problem solving component of the course improved my learning skills.

- A) Strongly agree
- B) Agree
- C) Don't know
- D) Disagree
- E) Strongly disagree

answer: _____

11) I prefer lecturer-designed problems (like P1) over student-designed problems (like P2).

- A) Strongly agree
- B) Agree
- C) Don't know
- D) Disagree
- E) Strongly disagree

answer: _____

Any comments: