Students’ Perceptions of Peer Evaluation in Project Work

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Abstract
To capitalise on the benefits of group work and at the same time alleviate the potential negative effect of benefiting from collective effort without contributing equally (also referred to as free-riding) and internal conflict, this project was conducted for the following purposes: design an approach to peer assessment of individual contributions to group work, evaluate student perceptions on the proposed approach, and refine the approach. Under the proposed peer evaluation approach, the final project grade of an individual student is the sum of two components: the group project mark awarded by the lecturer and the contribution of the individual student to the team as assessed by other team members. Fifty-eight full-time computing students taking the module ‘Project Work’ at a post-secondary institution in Hong Kong were involved in this study. Data were collected from a questionnaire survey and a focus group interview. Findings revealed that participants strongly agreed that the proposed peer evaluation method was fair and could motivate them to work harder. This project provides a tested and workable peer evaluation approach for group projects at the post-secondary level, as well as maximises the learning values that group projects can bring to students.

Keywords: peer assessment, group project work, higher education.

1 Introduction
Group project work is a prevailing student-centred learning approach in information and communication technology (ICT) education (Bushell, 2006; Clark et al., 2005; Clear, 2007; Herbert, 2007; Joyce, 2002; Richards, 2009). Given that a project requires collaborative investigation and the production of a series of project artefacts, it can provide opportunities to include tasks and activities more directly related to the business world and professional practice, to apply conceptual skills and theoretical knowledge, to experience and learn about group dynamics, to familiarise with different perspectives and problem-solving approaches, to develop and extend interpersonal and social skills such as collaboration and networking, and to increase student motivation and engagement (e.g., Chen et al., 2009; Riordan et al., 2008; Sobral, 1997; Topping, 2009; Tseng and Tsai, 2007).

Although the potential of group project work as an instructional tool is rarely disputed, its use often brings about problems that limit and even negate its possible benefits. Specifically, the difficulties associated with accurately and fairly assessing individual performance, conflict within groups, and free-riding of individual members are frequently cited as group project-related problems (e.g., Barfield, 2003; Bower and Richards, 2006; Bushell, 2006; Dyrud, 2001; Herbert 2007; Joyce, 2002; Richards, 2009; Tenenberg, 2007; Topping, 2009).

The implementation of peer evaluation in assessing project work, as an alternative approach for entirely instructor-assessed, has gradually received attention from diverse disciplines in the higher education process (Fellenz, 2006; Herbert, 2007; Sung et al., 2005; Topping, 2003). Peer evaluation should be understood as an educational arrangement in which students comment on the quality of the work of their fellow students, for formative or summative purposes (Topping, 2003). It is considered an unbiased assessment approach because group members have been working together for a period of time and they themselves ‘would seem in a natural position to provide reliable, valid evaluations of each other’ (Cederblom & Lounsbury, 1980, p.568). However, student responses to using peer evaluation in project work are varied. Studies revealed that the reported reactions on peer evaluation range from being viewed as ‘fair and equitable’ and ‘qualified endorsements’ to ‘traditional peer assessment is relatively ineffective in addressing free-rider problems’ (Cheng and Warren, 1997; Conway et al., 1993; Falchikov and Goldfinch, 2000; Goldfish and Raeside, 1990; Herbert, 2007; Lejk and Wyvil, 2001; Sadler and Good, 2006).

Despite the potential advantages of peer evaluation, its success is not unconditional. The peer evaluation approach must be designed, organised, and implemented systematically and adequately in order to be accepted by students (Tseng & Tsai, 2007). The literature does not provide adequate data that can help explain this variety in reactions to specific or similar peer evaluation approach, particularly in Hong Kong sub-degree level. To capitalise on the stipulated benefits of group work and to ensure equal marks among students, we plan to implement peer evaluation in a computing subject entitled ‘project work’. Thus, the present study aims to (i) design a fair peer evaluation method that can maximise student learning from a group project, (ii) explore students’ perceptions on the proposed peer evaluation method, and (iii) refine the proposed peer evaluation method to be implemented in the following academic year.

2 Design of the Proposed Peer Evaluation Method
Peer evaluation has been used by educators for a considerable amount of time and for many different purposes. Most of these purposes are served using peer
evaluation on learning outcomes such as reports, presentations, or classroom contributions. However, the focus of this paper is on the use of peer evaluation of individual contributions to group work that concentrates on complex group processes that lecturers cannot easily observe and assess.

There are many different schemes for assessing individual contribution to group work. Goldfinch and Raeside (1990) adopted a two-part approach in group awards. The first part determines the performance of the tasks of the group members, whereas the second part measures the contribution to group dynamics. In the study by Gatfield (1999), the peer evaluation component constitutes 50 percent of the final grade of the students. The 50/50 split is considered a safe margin to provide an incentive for students to take the issues seriously and a safeguard against some students in the group wanting to sabotage an individual (Clark, 2005). The outcomes for implementing peer evaluation were acceptable, and the occurrence of dysfunctional groups became less. Subsequently, Lijk and Wyvill (2001) conducted a study and compared the results derived from using two different approaches to assess peer contributions: holistic and category-based approach. The holistic approach was concluded to produce a wider spread of grades than the category-based approach and therefore was considered a better relative indication of individual contribution to the project. The study also stated that the holistic approach supports the purposes of summative peer evaluation method, whereas the category-based approach is useful for formative assessment.

2.1 Approach to Determine Individual Final Mark

The proposed approach for determining the final mark of a student in the group project was inspired by the works of Goldfinch and Raeside (1990) and Gatfield (1999). The final marks of individual members within the same group are varied and depend on two elements: group project and individual contribution to the group. The group project is worth 50 percent of the total marks and is assessed by the lecturer according to the submitted group report. Members within the group should receive equal marks. Individual contribution is also worth 50 percent of the total marks and is evaluated by other members within the same group. Students who contribute more or less will receive more or less marks in the half portion of the group marks. This method is equivalent to a ‘zero-sum’ game where an increase in marks for one student must be accompanied by a decrease in marks for another. This fixed-pie evaluation system precludes the possibility of grade inflation. The 50/50 split has been used and evidenced a desirable ratio in the study of Gatfield (1999) and Clark (2005) respectively.

2.2 Design of the Proposed Peer Evaluation Form

The proposed peer evaluation form (Table 1) was designed to collect feedback on the contribution and performance of other members of the group throughout the group project process. It consists of two parts, A and B. Part A is used to grade peer performance on the areas of choosing a topic, planning, designing, testing, documentation, report write up, and reliability in meetings and completing tasks. The ratings ranging from A (excellent in both performance and contribution) to F (poor performance and no contribution) provide formative evaluation on the performance of students in each categorised area and do not contribute to the student’s final grade. Descriptions of each rating are also provided for ease and consistency in student marking. These dimensions are consistent with the assessment criteria because each submitted project will be evaluated according to the following project factors:

- Overall design resulting in specifications from which the solution can be developed;
- Design and developing of solution;
- Documentation, including user guide; and
- Design and implementation of all appropriate testing.

Part B is used to measure the overall contribution of an individual member to the project work. Each student is required to allocate a single percentage to all other group members according to their overall contribution to the group work. The holistic approach supports the purpose of summative peer evaluation method and is a better indication of individual contribution (Lijk & Wyvill, 2001). After collecting all the completed peer evaluation forms, the lecturer consolidates the comments in Part A for the compilation of the feedback report on the individual students. The percentages in Part B are used for the calculation of individual marks according to the approach discussed in Section 2.1. Subsequently, individual students will receive a report that contains the final project grade and anonymous descriptive feedbacks provided by their group members.

3 Research method

A cross-sectional field study was conducted. The unit of analysis was individual. As one of the research objectives is to evaluate student perceptions and experiences of using the proposed peer evaluation method, both quantitative and qualitative approaches were used.

3.1 Participants

Fifty-eight students enrolled in the module ‘Project Work’ participated in this study. ‘Project Work’ is a core subject for the programme ‘Foundation Diploma – Computing Stream’ offered by a post-secondary institution in Hong Kong. The aim of this subject is to provide students with practical experience in the application of the subjects studied, such as Programming Concepts, Database Development, Internet Applications, and Information Technology Applications. The subject lasts for one semester (13 weeks) and involves group collaboration in relation to a ‘realistic’ IT project. Students are required to form groups of five to six members and produce a written report. Assessment of the project is based on its design, testing, implementation, documentation, and overall presentation.

The participants formed 10 project groups. They had prior experiences in conducting group projects from either other subjects or secondary schools, but none of them had taken part in peer evaluation prior to this study.
reported issues such as the appropriateness, fairness, and the first six questionnaire items were related to the most issues raised in previous studies on peer evaluation. The approach, the questionnaire items were derived from the explore the perceptions of the proposed peer evaluation statements. As the purpose of the questionnaire is to methods was an end of semester survey comprised of nine and a focus group interview. The main quantitative statements. The range descriptors were from acceptance of using peer evaluation and were linked to a grades and percentage of contribution by completing Parts A & B respectively.

PART A: Feedback on group members’ performance (Give a grade between A-F)

<table>
<thead>
<tr>
<th>Tasks to be assessed</th>
<th>Group Members’ Full Names</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Choosing the topic of the IT project</td>
<td></td>
</tr>
<tr>
<td>2. Design and development of the IT solution</td>
<td></td>
</tr>
<tr>
<td>3. Programming, testing and debugging</td>
<td></td>
</tr>
<tr>
<td>4. Documentation including the user guide</td>
<td></td>
</tr>
<tr>
<td>5. Reliability in completing tasks</td>
<td></td>
</tr>
<tr>
<td>6. Reliability in attending meetings</td>
<td></td>
</tr>
</tbody>
</table>

Grades: A. Excellent - exceptionally active and constructive, excellent ideas and organization skills B. Good - active and constructive C. Fair – cooperative, attended and participated in most meetings D. Marginal - sometimes absent and did not participated E. Unsatisfactory - did not contribute or was unreliable F. Poor - rarely attended meetings, was disruptive for team work

PART B: Allocation of percentage of contribution to all your group members.

<table>
<thead>
<tr>
<th>Group members’ full names (exclude yourself)</th>
<th>Total %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Please allocate the % of contribution (should add up to 100%)</td>
<td>100%</td>
</tr>
</tbody>
</table>

Student’s Name (in full) ___________ Signature ___________
Remarks:
1. The grades and percentage of contribution that you award will not be disclosed to any of the group members.
2. The lecturer holds the final right to override the group’s decision if unfair discrimination is experienced. In this case, equal marks are awarded

Table 1: Proposed Peer Evaluation Form

<table>
<thead>
<tr>
<th>PEER ASSESSMENT FORM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Title</td>
</tr>
<tr>
<td>Names of Group Members</td>
</tr>
<tr>
<td>For each member of your group, but excluding yourself, award grades and percentage of contribution by completing Parts A &amp; B respectively.</td>
</tr>
</tbody>
</table>

Table 2: Questionnaire Statements

‘strongly agree’ to ‘strongly disagree’. The last three survey statements were open-ended questions provided with space for writing down the reason for the answer. The survey questions are summarized in Table 2.

The focus group interview was employed to collect qualitative data because although survey data can identify a problem, they generally fail to probe its causes. Conducting an interview after the survey aimed to clarify the questions asked in the questionnaire and to explore further the opinions, views, and suggestions of the students on the peer evaluation process. Focus group was used instead of individual interview because feedback from multiple students could be obtained in a shorter time and the exchange among interviewees raises ideas and concerns that might not emerge from individual interviews.

3.3 Administration of Data Collection

At the end of the semester when students submitted their group projects, they were requested to participate in the survey in the classroom. At the beginning of the session, students were provided with the peer evaluation form (Table 1). As the students had no prior knowledge and experience on peer evaluation, the lecturer had to explain the content of the evaluation form in detail, particularly the objectives and method of peer evaluation and the nature of the survey. Students were asked to complete the peer evaluation form in confidence, giving them an opportunity to practise and experience the peer evaluation process. Students were then asked to complete a questionnaire (Table 2), which sought their opinions on the proposed peer evaluation method they just experienced. The completion of the questionnaire was voluntary and done anonymously, and the students were assured that whatever answers and comments they provided would not affect their project marks because the survey is to collect students’ views on the proposed peer evaluation approach that to be implemented in the next academic year. All fifty-eight students completed and returned the questionnaires. The entire process took about an hour.

A week later, a student from each project group was selected randomly and invited to participate in a focus group interview. The rationale for the group-mix is that
the participants coming from different teams are unlikely in a position of control over each other. The focus group interview was voluntary, with a total of eight students participating. To provide a quiet, relaxed, and comfortable discussion environment, the interview was conducted in the meeting room, with snacks and drinks provided. The entire process took about one-and-a-half hours and was recorded.

To guarantee that the students would not feel threatened about the consequence of identification, the purpose of the study was explained to them before the interview with the assurance that their feedback was for planning purposes only and would not affect their project marks.

Since the interview was conducted in Cantonese (the native language of the students), the interviewees’ responses were first transcribed in Chinese. The statements were then grouped according to the survey questions. For reporting purpose, only the verbatim quotes which best exemplified the essence of the survey questions were chosen and translated into English.

4 Results

The analysis is divided into two parts. The first part considers the perceptions of the students on the proposed peer evaluation method and addresses study objective 2, whereas the second part is comprised of the analysis of the suggestions for improvement of the proposed method from the students and is related to study objective 3.

4.1 Students’ Perceptions of the Proposed Assessment Method

The responses of the students to the first six statements in terms of the five-point scale ranging from ‘strongly agree’ to ‘strongly disagree’ are summarised in Table 3.

<table>
<thead>
<tr>
<th>Questions</th>
<th>SA</th>
<th>A</th>
<th>N</th>
<th>D</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1: Students should take part in assessing their group members’ contribution.</td>
<td>39%</td>
<td>39%</td>
<td>17%</td>
<td>-</td>
<td>5%</td>
</tr>
<tr>
<td>Q2: I am able to assess fairly my group members’ contribution.</td>
<td>78%</td>
<td>5%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q3: It is fair to take the peer evaluation marks into account when allocating marks to each student.</td>
<td>22%</td>
<td>34%</td>
<td>22%</td>
<td>11%</td>
<td>11%</td>
</tr>
<tr>
<td>Q4: I have understood the project assessment procedure.</td>
<td>33%</td>
<td>44%</td>
<td>18%</td>
<td>-</td>
<td>5%</td>
</tr>
<tr>
<td>Q5: The assessment form is appropriate for assessment.</td>
<td>77%</td>
<td>5%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q6: Peer evaluation should be used earlier.</td>
<td>39%</td>
<td>34%</td>
<td>17%</td>
<td>5%</td>
<td>5%</td>
</tr>
</tbody>
</table>

Table 3: Students’ responses to questions 1-6

4.1.1 Question 1: Should students assess their group members

When asked whether students should take part in assessing the contributions of their group members, the majority of the students (78 percent) agreed or strongly agreed that they should, whereas 17 percent did not have an opinion on this question. Only 5 percent disagreed.

All the students who took part in the focus group interview confirmed that the effort or the contribution of the members should be assessed as they knew the process of work and were thus the best judges of the activities of the group. Some interviewees added that students’ assessing the contribution of their peers to the group work was important because it encouraged the members to share workload and work harder.

‘…I believe students will work harder if they know other members can assess them… we students are realistic and will focus on doing things that can get higher marks…’

‘I support peer evaluation because I, as a leader, am unable to push members to do work… at the end, I do most of the work … I believe that with peer evaluation, all group members will cooperate and work harder… the project work will be of higher quality’.

However, an interviewee expressed concern that peer evaluation would damage the friendship. In view of this, he tended to give other members more or less the same percentage.

‘… although the percentages allocated by peers were kept confidential, the team mate still can work out the mark you give him/her, say, by asking other members… I fear losing my friends, so I will give the same marks to my friends…’

4.1.2 Questions 2, 3, and 6: Fairness and confidence of student assessors

The results for question 2 indicated that 61 percent of the students felt that they were able to assess the contribution of their members fairly; 23 percent did not have a firm opinion on their ability; and 16 percent felt that they were unable to do it fairly.

Students gave similar answers to question 3: 56 percent of the respondents supported the idea of including peer evaluation marks into final project mark of the students, whereas only 22 percent opposed the idea.

When asked whether peer evaluation should be introduced earlier in this subject (Question 6), 73 percent of students said yes, 17 percent had no opinion, and 10 percent were against the idea.

During the focus group interview, most of the interviewees expressed concern about the peer evaluation marks. However, the students (78 percent) agreed or strongly agreed that their contributions of their group members, the majority of the students agreed or strongly agreed. A total of 8 students participated. The entire process took about one-and-a-half hours and was recorded.
‘...as I was completing the form, I focused on recalling my peers’ contribution to the project, what their inputs and outputs are... I didn’t think about who were my good friends... I think I can assess fairly...’

‘... I can assess peers fairly, and I believe my peers can do the same because I trust them...’

However, an interviewee raised the concern that the maturity level, friendship, and trust between the members could affect the reliability of the grading.

‘I intend to rank fairly, but I am an ordinary student. I would give a little higher mark to my closed friends...’

‘If I anticipate some members will rank me lower, I will rank them lower too’.

4.1.3 Questions 4 and 5: Appropriate format and clarity of the procedure

When asked on the procedure of the peer evaluation (question 4), the replies showed that 77 percent of the students found the explanation clear, and only 5 percent considered that the procedure was not explained clearly.

During the interview, all students confirmed that they clearly understood the assessment method and process, and no further explanation was required.

A total of 73 percent of the respondents felt that the peer evaluation form (Table 1) was appropriate for assessing the performance in and contribution to the project of the member (question 5); 17 percent had no opinion, and only 10 percent considered the form inappropriate.

During the interview, the students expressed that the grading criteria in part A were helpful in standardising the assessment. Part A was also a valuable means of providing formative feedback to peers as students assess each other on a number of specific tasks.

4.1.4 Question 7: Is 50 percent the correct value?

About half of the respondents felt that 50 percent was the correct value for the peer evaluation; 33 percent considered it to be too much; and the remaining 17 percent felt that it was too low.

In the interview, the students in general felt that the weighting of peer evaluation between 30 percent and 60 percent was acceptable.

‘I think 50 percent is the correct value allocated to peer evaluation’.

‘The 50/50 evaluation is too risky because I don’t know whether my group members can judge fairly. Thirty to forty percent is pretty safe, and I am happy with it...’

‘Peer evaluation should contribute 60 percent of the total mark because students who contribute more will get higher marks’.

4.1.5 Question 8: Reasons for liking/disliking peer evaluation

Of the 58 students who responded to the survey, 89 percent replied to this question. ‘Peer evaluation is a fair evaluation tool for students’ contribution’ was their only one reason for liking it. Based on the interview, the other reasons for liking it were ‘students’ contribution to the project is reflected in the final mark’ and ‘it provides useful feedback for improvement’.

Students were also asked what they did not like about the process. None of the respondents replied to this question. In the interview, the students stated that the reasons for disliking the process had been mentioned previously, that is, the perceived subjective nature and the potential of the process to alienate friends.

4.2 Suggestions for Improvement

No additional comments to question 9 were supplied by the respondents. In the interview, a student suggested that peer evaluation should be implemented twice because the formative feedback facilitated better performance in the students during the latter part of the project.

‘The peer evaluation of the project work should be conducted two times: in the middle and at the end. Those who do not contribute enough in the beginning can still work harder in the latter part in order to get a higher mark’.

5 Discussions and Conclusion

The survey results showed that majority of the students expressed a positive agreement to the statements that the students should assess their peers, that the students were able to assess fairly, that it was fair to divide marks, that the students understood the process, that the assessment form was appropriate, that 50 percent is the correct value for peer evaluation, and that peer evaluation should be used earlier.

The focus group interview confirmed and reinforced the questionnaire answers and gave better insight into the opinions of the students on the proposed peer evaluation method. The interviewees felt that it was fairer and important to include them in the assessment of contribution because the group members knew what was happening during the work. They also believed that through peer evaluation, some students would be more willing to work harder because they would be aware that their efforts would affect their own mark. They were confident that they could assess the contributions of the group members fairly and objectively but doubted the objectivity of others, especially in relation to the assessment of friends.

The objectivity of the students can be improved if the lecturer can stay involved in the process and encourage students to participate positively. Initial instructions followed by continuous monitoring of the situation are required to uncover and fix problems as soon as possible (Topping, 2003).

Regarding the allocation of mark, the interviewees generally felt that the peer-assessed weighting of 30 percent to 60 percent was acceptable. The result is consistent with the study of Clark (2005) that the split of an individual assessment worth 40 percent and a team assessment worth 60 percent has the majority support. Ormond et al. (2000) consider involving students in deciding the weighting of peer evaluation prior to the commencement of the project work would be a possible
option because perception is a necessary condition for promoting student learning. The idea is good but it may be difficult in getting consensus from student groups. Moreover, a too high weighting would call the integrity of the assessment procedure into question, whereas a too low weighting would provide little incentive effect for the student to participate actively in the project work.

The reasons given for disliking the process were its perceived subjective nature and the potential of the process to alienate friends. This issue may be overcome by requesting each student to write personal report detailing his/her contribution to the group project. Each student also has to indicate agreement or disagreement with the reports written by each of their team members. If a significant disagreement is found, individual contribution reports would be discussed at the team meetings with the lecturer. This process is regarded as a fair way of indicating student’s contribution and has been used by many scholars (e.g. Herbert, 2007; Gates et al., 2000; Hayes et al., 2003). However, the possible drawback is students may complain on the over-loading of paper work.

With regard to the students’ suggestions for improvement, the idea of conducting peer evaluation twice is useful and will be included when modifying the peer evaluation approach. It is because the subject ‘Project Work’ is a full-semester subject, the interim feedback can be based on a meaning amount of work (for example, about 6 weeks) and could be received early enough to allow other group members to consider and implement behaviour changes in response to peer feedback (Tseng & Tsai, 2007). In fact, similar approach has been adopted by Clear (2010). He advocates the implementation of two summative assessment points in his capstone project, one at the project proposal stage when the project is confirmed, two at the final presentation and portfolio submission stage. This early intervention strategy is considered effective in risk mitigation.

In summary, the available data on student reactions allow an initial assessment of students’ perceptions of the proposed peer evaluation approach. The findings indicate that the proposed peer evaluation approach is effective in achieving its explicit goal of fairness in assessment, and subsequently enhance the value of group project. On the other hand, students value the learning they have gained from experiencing in a transparent and well structured peer evaluation process. Therefore, the peer evaluation approach as proposed will be implemented to the computing students in the next academic year.

The limitations of this study are it fails to discuss the cultural factors which may have inhibited peer judgement. The collation and summarizing of student feedbacks create additional heavy workload to the lecturer. The development of a database driven web-based peer assessment system will result in providing timely feedback to students and enabling the lecturer to manage the assessment of larger and more diverse student cohorts. These issues should be addressed in future study.

6 Acknowledgement

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7 References


