

# STUDENT PERCEPTIONS AND REFLECTIONS IN PEER REVIEW OF GROUP PROJECTS

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## ABSTRACT

The CDIO standards, along with many other active learning philosophies, make practical project work a key aspect of their approaches. While individual projects are common, the use of group projects is generally seen as a positive in many engineering programmes allowing students to experience and develop the team work needed in industry.

Group projects are not without their own issues, which can include lack of clarity with regard to contribution of individual team members, some members doing very little work and internal team conflicts. A common tool often used to help clarify the contribution of team members and identify team conflicts is to carry out some form of peer review.

While there is, in the literature, work related to the efficacy of peer review as a learning and reflection tool, there is little which directly addresses students' opinions of it. This paper presents evaluations of the performance of students on multiple peer review projects over their curriculum and also surveys students' perceptions and experiences on the use of peer review among students.

## KEYWORDS

Group work, Peer review, Assessment, Standards : 5, 7, 8, 10, 11

## INTRODUCTION

The CDIO standards champion an active approach to learning with the use of design-build experiences enshrined in standard 5 but with the use of these of type of projects also have the potential to be key aspects of many integrated learning experiences (std. 7), active learning experiences (std. 8) and introductions to Engineering (std. 4).

While the CDIO standards do not always explicitly focus on whether these practical project activities should be individual or group based, the use of group projects is often seen to have a number of attractive features:

- Reflect professional practice where purely individual work is rare.
- Allow students to experience management of group projects where communication, negotiation and team organisation are to the fore.
- Allow students to develop both the areas in which they excel and those where they are less strong but can improve with the support of their peers.
- Allow more complex projects to be worked on than might be possible for an individual.
- Meet the expectations of accrediting bodies many of whom expect group work in the programmes they approve. (IMechE, 2013)
- May offer a more competitive (or collaborative) environment than with individual projects.
- Offer logistical and resource benefits to the academics supporting the work.

While these are obvious positives, the use of group work can also introduce a range of new issues in relation to the smooth running of the project and also the assessment of individual students in the project.

An approach which can be used to address the allocation of reward among group members in team projects is peer review, moderation or marking whereby team mates have an opportunity to comment on each others performance and influence their assessment mark.

The nature of the peer marking and review can vary, it may be:

- a top up mark added to a staff marked grade.
- a proportional modifier of a staff marked grade.
- anonymous or details may be fully disclosed
- guided by a tight rubric or marking scheme, or may be more open
- a simple single overall grade on the individual's performance.
- broken down into discrete criteria – creativity, technical ability, reliability etc.
- only feature quantitative marks, only qualitative feedback or both.

For such a scheme to be effective it needs to have both the confidence of academic staff in ensuring that the assessment method will be a true and reflective value of the learning and contribution of students involved in a project. From a student perspective however it must also be perceived to be a fair and valid method of assessment.

There is a significant body of literature on aspects of peer review though the student perspective is often neglected. The aim of the work, was to appraise students' perceptions, acceptance and concerns of the approach when working in group projects in CDIO based degree programmes.

## **BACKGROUND**

Hugo (2013) reported mixed teams of Chinese and Canadian engineering students asked to peer review each other following a project as part of a special initiative. This paper largely focused on how the students responded to peer review in relation to gender, friendship, degree programme and nationality, showing some trends in relation to for example the

Canadian male team members appearing to be most critical of their peers. A similar cross-cultural study involving UK and Chinese marketing students was carried out by McLeay and Wesson (2014). This focused on the student's experiences and perceptions of the method and suggest that care needed to be taken to ensure cultural differences associated with attitudes to peer review did not cloud the students' overall experiences but that further work was required.

Shiu et. al. (2013) and Kench et. al. (2008) both carried out studies on nursing / medical students' opinions of peer review in group work with both reporting similar issues and factors – a recognition from the students that it went some way to addressing freeloading but that popularity and amicability of team members might not match their worth to the project. A further, medical education survey was carried out by Parratt et al. (2014) which had some particularly interesting points in relation to whether the peer review process might influence students thinking in terms of professional relationships to each other. This also had some interesting reflections on power issues within groups reporting members being seen as over passive or dominant.

A study to specifically look at friendship as a variable in peer review confidence and reliability was carried out by Pandero et. al. (2013). This was essentially examining whether the use of rubrics can help improve the use of peer review with regard to the likely ever presence of friendship (or otherwise) among the peers. In this case the work was based on assessment of individually executed exercises rather than group work. This indicated that the rubric was generally positive when friendship levels were low and medium but might amplify over-scoring when friendship is particularly strong among peers. The paper did not appear to show a significant difference in the students "comfort and fairness" whether the rubric was used or not.

Asikainen et al. (2014) also looked at experiences of students working on peer reviews in a life sciences context. This indicated a concern among students regarding time and training however in this case the focus was on direct assessment of the submitted work of students rather than a more subjective peer review.

With group design and engineering projects being core to much of what we do in relation to CDIO, a survey of student perceptions in this context was needed.

## **METHODOLOGY**

Students enrolled on CDIO based programmes at Aston and Leicester Universities in the UK and École Polytechnique de Montréal in Canada were asked to complete questionnaires based on their historic experience of carrying out peer assessment of group projects in their own institutions.

The questionnaire data was gathered anonymously however the students were asked to provide some demographic data in relation to institution, gender, degree programme and year and whether a domestic or international student. The main questionnaire consisted of 18 questions with 5 point Lickert scale responses. These probed students attitudes to peer review, whether they feel it influences commitment both with regard to themselves and their team mates, how fair they feel the system is etc. Two open text boxes allowed students to comment on what they felt were the greatest advantage and disadvantage of peer review.

Data was gathered using two formats – an online survey which students were invited to complete in their own time and an in-class electronic polling supplemented by simple paper forms for the open questions.

A total of 168 students participated in the survey, 128 from Aston and 20 each from Leicester and Montreal. 120 students were male, with 40 female, 132 reported as being domestic students with 28 international. The students were almost entirely undergraduate students with a mean study year of 2.50.

Each University had their own variation on the peer review process.

At Aston University, following a year 1 or 2 group project, students would peer review team mates anonymously on a single overall impact criteria. These would be normalized and then used as a proportional modifier of tutor assessed group marks. The system was set such that a team average after peer review would still equal the tutor awarded team mark, though as a result of the peer modifier, individuals might be higher or lower than this.

At Leicester University peer review exists in projects managed by 4<sup>th</sup> year students and staffed by second years. An individual weighting mark for each individual is then submitted by the managers in conjunction with the team members. As with Aston the weighting was such that the team average mark would equal the team mark.

At École Polytechnique de Montréal a more sophisticated approach is used with years 1, 2 and 4, mechanical engineering students in cohorts of around 220. Prior to undertaking peer review students are formally given a course and refresher on constructive feedback and teamwork. In year 1 four criteria are used when assessing students. Peer review is anonymous and modulates student grades around the average for the team. After each peer review process, a human resources specialist is brought in to review the team performances and to advise how best to act on feedback.

## **RESULTS**

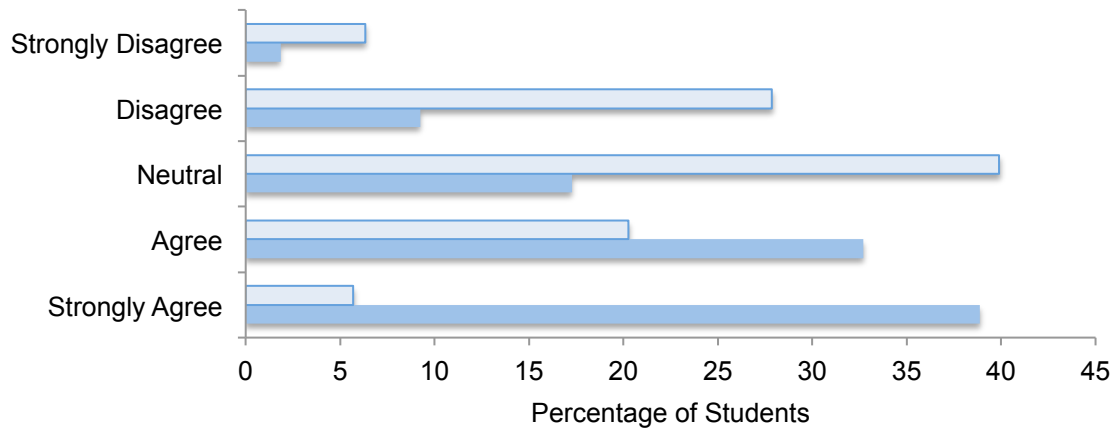
The trials produced a large data set and more results than can then be noted in this paper. The items presented are the results of a preliminary data analysis.

Figure 1 shows the responses to questions probing whether the use of peer review improved the commitment to projects. Around 70% of students agreed that it was not a positive influencer on their personal level of commitment however they did feel much more strongly, that their team mates were influenced into greater commitment by peer review.

In almost all questions very similar distributions were observed between male and female students. However, the unfairness of assessments (Figure 2 and Figure 3) was highlighted more by female students and could warrant further study with more precise questions.

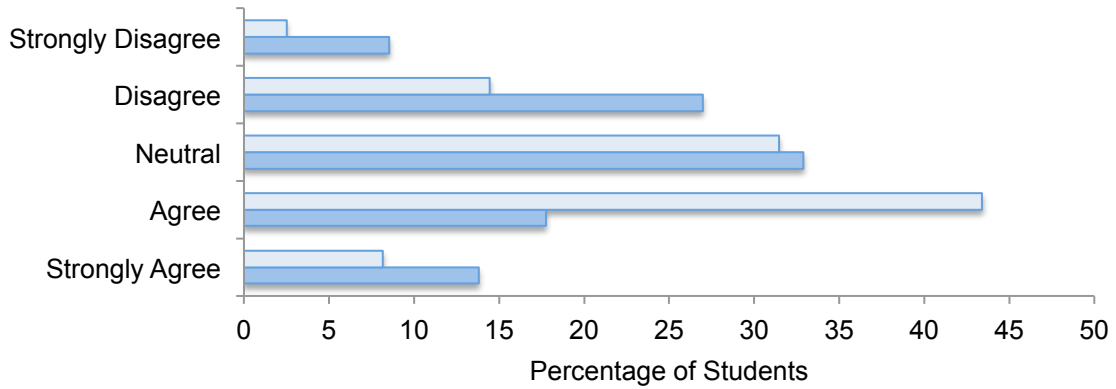
Some interesting aspects appear when filtering the data between domestic and international students (Figure 4). International students appeared to believe the use of peer assessment in projects increases their commitment to their teams to a notably greater degree than domestic students. While the number of international students was modest (n=19) and so the significance of these results uncertain, the possible reasons for this variance should be explored. Peer assessment might be an interesting tool to help international students better

integrate their new environments by encouraging exchanges between team members generated by this assessment method.



- I feel my team mates are equally committed to a project regardless of whether peer review is to be used or not.
- I feel I am equally committed to a project regardless of whether peer review is to be used or not.

Figure 1 : Students' perceptions on peer review's impact on commitment.



- My peer review from my group mates is generally in line with my expectations
- I have been treated unfairly in previous peer feedback

Figure 2 : Students perceptions on fairness of process

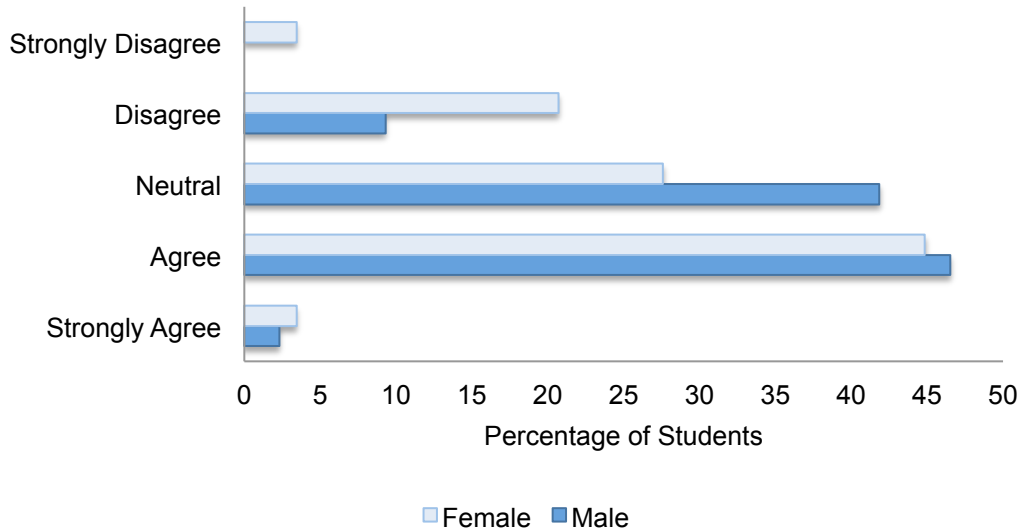


Figure 3 : I feel the assessment given by my peers is generally fair (male vs. female)

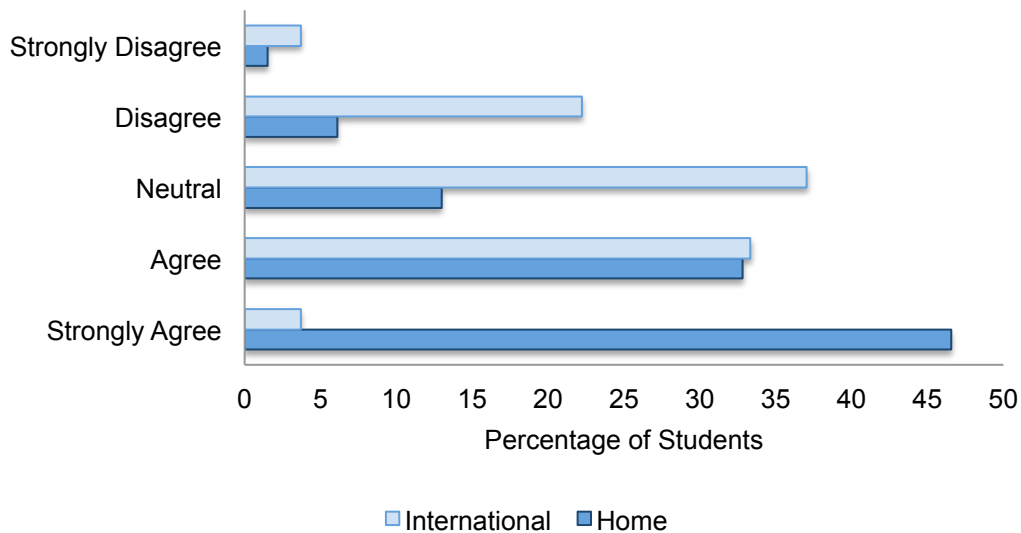


Figure 4 : I feel I am equally committed to a project regardless of whether peer review is to be used or not. - Domestic vs international students.

Figure 5 shows the responses to the question probing whether the students feel uncomfortable assessing friends. This question gave the broadest spread of answers among the cohort, around 30% of the students agreed that they feel uncomfortable and around 45% disagreed. It is likely that factors such as group composition, cultural background, past experience and formal training may influence the answer to this question.

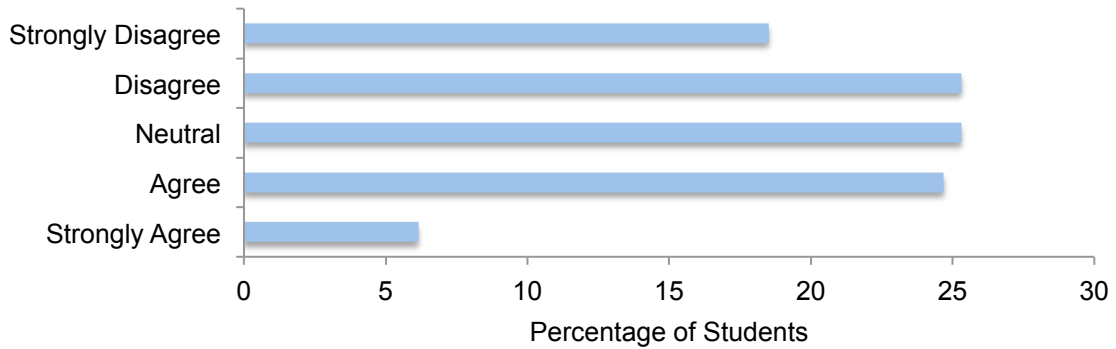


Figure 5 : I feel uncomfortable assessing friends

A more general summary of the student responses can be seen in table 1.

Table 1. Summary of survey data, grouped in themes

	Agree/ Strongly agree	Neutral	Disagree/ Strongly disagree
<b>1. Influence on performance in a team</b>			
I feel motivated to perform as a good team member if peer review is used	79	17	4
I feel my team mates are more likely to be motivated to perform as a good team member if peer review is used	68	21	11
<b>2. Fairness</b>			
I feel the assessment given by my peers is generally fair	44	41	15
I have been treated unfairly in previous peer feedback	32	33	35
My peer review from my group mates is generally in line with my expectations	52	31	17
<b>3. Highlight internal team problems</b>			
I believe peer reviews helps problems come in the open earlier so they can be resolved faster	36	29	35
I feel peer review makes internal latent team problems more visible	65	20	15
<b>4. Commitment to team project</b>			
I feel my team mates are equally committed to a project regardless of whether peer review is to be used or not.	26	40	34
I feel I am equally committed to a project regardless of whether peer review is to be used or not.	72	17	11
I would be happy to work on group projects with no peer review system	39	28	33

<b>5. Assess friends</b>			
I feel uncomfortable assessing friends	31	25	44
<b>6. Anonymity</b>			
I think anonymous feedback will be more representative of the real team situation	61	29	10
I feel more comfortable giving feedback to others if it is anonymous	61	25	14
<b>7. Training for effective feedback</b>			
I feel to give more constructive peer feedback I must be trained in giving feedback	37	26	37
<b>8. Feedback as a source of discussion</b>			
I feel after feedback is given by peers it must be discussed in the group to be useful	60	20	20
I believe feedback has more value if it is discussed in the team	71	21	8
<b>9. Teacher moderated feedback discussions</b>			
I feel group discussions on peer feedback should be moderated by the professor or other teaching staff	52	32	16
I would prefer group discussions on feedback be moderated by teaching staff that is not involved in my course grading	28	38	34

### **Open Comments given by students in the survey**

Students were also asked for more open comments on the advantages and disadvantages, of peer review with around half the students taking advantage of this.

Negative comments tended to express students' concern around popularity or personality playing a significant role in the peer review process;

*"May feel like people are 'ganging up' on them."*

*"The anonymity could allow for ill intentions and personal attacks because you do not have to defend your stance"*

Others were also concerned that giving a colleague poor feedback could cause ill feeling or even retaliation in relation to previous or future collaborations.

*"Can cause friction unnecessarily."*

*"...Revenge of team members who have previously been badly rated."*

On the more positive side the students appreciated the feedback and that there was a mechanism for high levels of contribution to be rewarded.

*"Shows peers where they went wrong as a team member."*

*"Provides more feedback, and sometimes identifies issues that might not otherwise be noted"*

*"People are motivated to work harder"*



## DISCUSSION

The survey questions were formulated to assess similar issues with different wordings to improve the survey's robustness, no significant disparity in data was observed. The following will discuss each of the themes explored in the survey (Table 1).

1. Influence on performance in a team: there is a positive perception that peer evaluation promotes personal and other team members performance. Peer evaluation brings motivation to work in teams.

2. Fairness: This is a significant issue for students. They have experienced what they feel was unfair treatment but at the same time feel the evaluation were in line with their expectations. This suggests students felt that while in most cases the system was fair they felt vulnerable to unfairness in certain cases. All peer evaluation systems should take this into account and use ways to identify group attacks on individuals. Moderated team discussions after peer evaluation is one way of managing those situations.

3. Highlight internal team problems: A significant difference in the results from the two differently worded questions is present. A probable explanation is that peer review effectively highlights team problems but might not be perceived as a sufficient method to help solve these identified problems. More focused questioning in this area is required.

4. Commitment to team project: An interesting phenomena appears in these responses. There is an important distinction between the personal perceptions versus the perceived value of peer evaluation to others. In this case, students believe peer evaluation does not contribute to their commitment, however they believe it has an important impact on the other team member's commitment. This personal versus others shift in perception generates interesting questions. How can students so easily separate their own behaviour from others behaviour when presented with similar situations? Is this somehow a moral high ground issue?

5. Assess friends: While not being a very polarized issue there is a wider spread in opinions than in the other survey questions. Assessing friends can be seen as an issue that must be managed in the peer evaluation system to improve its acceptance by students.

6. Anonymity: Anonymity is demonstrated to have a positive impact on the openness of feedback given by students. However classroom experience shows it can also be a fertile ground for aggressive behaviour between students. A moderation approach by teaching staff is a good way to identify aggressive behaviour and manage it before situations degrade further.

7. Training for effective feedback: Only one of the surveyed schools gives structured training to prepare students for peer evaluation. The data shows that trained students believe training is important while untrained students do not see this as important. This situation is intriguing and will require more focused questioning.

8. Feedback as a source of discussion: Students feel feedback from peer evaluation is only a first step. Discussion between students increases the perceived value of peer evaluation.

9. Teacher moderated feedback discussions: Moderation of team discussions by the teaching staff is positively perceived by students. It was thought separating the assessing

teachers from the process and replacing them by teaching personnel not directly involved in grading would be preferred by students. Survey results show very little importance given by students to this.

## CONCLUSION

Within CDIO and more generally within engineering and design education, the use of group projects is seen as an important activity for a wide range of pedagogical and practical reasons. Within this context peer review is a commonly used method to help support the assessment process however fully understanding students' attitudes to this is not necessarily fully understood. We feel the work presented in this paper is interesting and has helped in formally evaluating many of the issues associated with peer review within CDIO based degree programmes.

All survey data was gathered by the institutions involved over the first semester of the 2014/15 academic year. It is intended that this process is continued through into the second semester, in so doing bringing more cohorts into the survey. It is recognised at present that while the overall survey sample is reasonable, certain demographics had minimal numbers making statistically significant differentiation between student classifications difficult.

The work however did throw up some interesting pointers such as the issue of perceived fairness, with the students' survey results and comments both indicating a concern that they could, at times, be exposed to poor reviews by team mates. While all of the institutions involved carried out forms of moderation to temper excesses in this regard, improving student confidence in this respect should be a prime goal.

The survey results showed a positive perception among the students that peer evaluation promotes personal and other team members performance. Anonymous feedback seems to be the preferred way to provide feedback by the majority of the students. However, the feedback from peers is only the first step. The perceived value of peer evaluation can be increased if a discussion in the group occurs after the feedback is given. Moderation of the discussion by a member of the teaching staff is also positively perceived by the students.

While we feel this work has been a useful first step to examining students perceptions of peer review, further work is required to fully utilise the results gathered. Moreover further refinement of the survey method will be useful in making both the existing enquiries more robust while also offering the chance to review aspects such as whether and how peer review can act as a tool for learning or development of professional behaviour.

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