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Should Higher Education encourage the use of Intergroup Peer Assessment among students?

Bidyut Baruah[#], Tony Ward[#], Noel Jackson[#]
[#]Department of Electronic Engineering, University of York
Heslington, York, YO10 5DD, UK

[1]*bidyut.baruah@york.ac.uk,* [2]*tony.ward@york.ac.uk,* [3]*noel.jackson@york.ac.uk*

Abstract— **Peer Assessment is an integral component for promoting active learning in Higher Education. It helps in facilitating an effective and collaborative learning environment among students. It offers students a platform to learn from each other by receiving and giving critical feedback. A lot of researches have focused on the use of peer assessment in the grading of individual contributions of students in group works but very few studies have investigated the use of group peer assessment. This paper explores the effectiveness of intergroup peer assessment using a case study of the MSc Engineering Management programme at York (UK). An intergroup peer assessment element was introduced for the academic year 2018-19 in one of the modules called 'Enterprise'. 11 groups participated in the grading of other groups. Several benefits associated with intergroup peer assessment are discussed which includes reduction in biased grades, multiple perspectives and views within a team, improvement in team coordination and dynamics and a better understanding of academic grades and feedback process. The findings also highlight some limitations with this method of peer assessment such as conflicts among members, lack of engagement, management of contradictory views, time management and varying level of criticality and understanding of grading parameters. Despite these limitations, intergroup peer assessment does have potential in facilitating active learning and critical thinking among students. Its use should be encouraged perhaps in formative exercises in order to build and strengthen team relations and coordination among students.**

Keywords— Peer Assessment, Intergroup Peer Assessment, Higher Education, Group Feedback, Skills development, Teamwork

I. INTRODUCTION

Today, Higher Education (HE) has witnessed a gradual rise in the engagement of students with peer assessment or self-assessment in both undergraduate as well as postgraduate courses. Peer assessment (PA) according to Topping [1, pg 250] is "*an arrangement in which individuals consider the amount, level, value, worth, quality, or success of the products or outcomes of learning of peers of similar status*". Falchikov and Goldfinch [2] highlighted PA as an integral component of active learning within academic environment. Researchers like Zundert et al. [3] have noted the self-directed learning benefits associated with PA. As students judge the work of their peers, the process signifies their active engagement with the criteria and standards of grading and feedback thereby facilitating critical judgment and learning. Fry [4] reflects how this engagement also gives students a close insight into academic assessment processes. Tighe-Mooney et al [5, pg 2832] add "*Facilitating students to partake in some of assessment interaction alters the balance of power and encourages some control over their own learning…*". Baruah et al [6] thereby labeled PA as an important component in the design of an effective learning environment in HE. It promotes a strong participatory and collaborative culture among students. It not only allows students to engage with the HE learning process but it also provides a platform to learn from each other by receiving and giving critical feedback. For Topping [1], this promotes the development of social and transferable skills.

PA can be used for summative as well as formative purposes involving different aspects of students' academic works and performances. The methods used for PA can be customized to fit individual needs according to Zundert et al [3] but the authors caution, "*At present it is impossible to make claims about what exactly constitutes effective PA…*" (pg. 270). A lot of researches seem to have focused on the use of peer assessment in the grading of individual contributions of students in group works. In this context, Lejk and Wyvill [7, pg 61] observe "*The vast majority of the assessment methods that have been reported use some form of peer assessment as a means of differentiating between individual student contributions*". Goldfinch [8] agrees "*Peer and self-assessment are practices that are often performed outside the group environment, where they are applied to work produced by individual students….*". So far, very limited researches have investigated the use of group PA in HE. Can peer assessment be used by groups to assess other groups? Can students working in groups use this method to critique and give constructive feedback to other groups? Can this facilitate the understanding of group dynamics and team behavior among students? Are there any limitations with this method of PA? This paper will address some of these gaps.

II. ACTIVE LEARNING IN GROUP PEER ASSESSMENT

The ability to collaborate, support and work with a team is one of the most highly sought after generic skills among graduates. "*Teamwork is one of the fundamental skills*

employers look for and it's on the graduate recruiters' high priority list", says Targetjobs [9], one of UK's leading recruiters. Many curricula in HE therefore, encourages the inclusion of student group activities in the form of projects, presentations and reports. Researchers have noted the benefits of such group assignments. "*..Groups accomplish tasks that could not be done by individuals working alone; they bring multiple skills and talents to bear on complex tasks….Groups play an important part in the development and elaboration of personality….*" [10, pg 365]. But Baker [11, pg 184] highlights that "*Instructors cannot assume that students will develop team skills simply by participating in group projects; learning the skills that improve group performance requires practice and feedback*". In this context, PA can be a useful strategy to promote active learning. Topping [1, pg 256] supports, "*Peer assessment can develop teamwork skills and promote active rather than passive learning*". Liu and Carless [12] found that students who engage in peer assessment activities often identify their own skills gaps and this can help direct their self-developmental focus. It facilitates critical thinking and decision making skills among students particularly in group works. Stanier [13, pg 95] confirms "*Peer assessment and group work can be viewed as vehicles for student empowerment*". Topping [1] discusses the typologies involved with PA, "*Although one assessor to one assessee was the modal constellation, both assessors and assessees could be matched to individuals, pairs or groups*" (pg 252). In this context, Ohaja et al [14, pg 467] explain, "*Peer Assessment can be done individually within a group with the intention of measuring the contribution of each members of the group, or done in groups whereby each group is assessed by their peers in other groups*". With Group PA, there are usually three forms [15]:

- Intragroup PA,
- Intergroup PA and
- Extragroup PA.

Intragroup PA is where each member rates the other members within their group based on their individual contribution and engagement. Intergroup PA involves groups rating the performance of other groups whereas extragroup PA is about individuals who are not part of the group assessing the performance of the group [15]. Students involved with group PA in HE can gain confidence in collaborative activities. According to Barker [11, pg 185] "*…collecting and sharing peer feedback with students increases self-awareness, workload sharing, likelihood of speaking in the group, cooperation among members, and as a result, higher group performance*". It will also help them develop skills such as negotiation, reflective and critical reasoning, professional judgment and decision making [15].

There are very few studies that explore the potential of intergroup PA. As Kritikos et al [15, pg 2] point "*Although peer assessment by small groups has been applied in different settings encompassing a diversity of study designs, no previous study has investigated the use of intergroup peer assessment…*". In fact, their study using a Problem Based Learning (PBL) setting among pharmacy undergraduate students is one of the first to look at the potential of intergroup PA in HE. Therefore, one of the objectives of this paper is to explore the viability of using intergroup PA for grading formative exercises among student groups. What are the benefits and limitations with this method of PA? How closely does students group grading map with that of academics group grading? Is this a reliable method for students to give peer feedback? The findings from this study will help HE in understanding the reliability of adopting intergroup PA in different programmes involving group work assignments. It will help address the question: should HE encourage the use of intergroup PA among students?

III. RESEARCH METHODOLOGY

This study focuses on the use of intergroup PA in HE by using the case study of the MSc Engineering Management programme at York (UK). Active learning is one of the core principles of this programme and students as part of the teaching and learning objectives engage with a wide range of individual as well as group activities. Formative PA has been used in some of the modules in this programme where students get to grade their peers' presentations using a rubric scheme. The authors' previous studies have reported on the use of such PA methods [16]. For the academic year 2017-18, a formative intergroup PA element was introduced in a 10-credit module called 'Enterprise'. This module is delivered during the spring term of the programme and teamwork is a strong emphasis in the learning objectives. There are 57 students enrolled in this module from this programme along with an additional 5 students from other MSc programmes within the department. They were assigned into groups leading to a total of 11 groups. Each group had to deliver a subject specific presentation and as part of the intergroup PA, other groups were asked to mark using a grading and feedback scheme designed by the researchers. Two academics participated in the summative assessment of these group presentations. The grading scheme used by the groups is based on the researchers' previous works on rubric marking [16]. In total, 8 vital grading criteria were derived to assess group dynamics in group presentations:

Grading Component	**Weighting** (%)
1. Introduction of context	10
2. Evidence of Research & Referencing	10
3. Consistency of Layout and design	10
4. Subject related content	30
5. Handover between members	10
6. Timing of presentation	10
7. Group's ability to defend questions	10
8. Evidence of individual input in the group	10

Using this grading scheme, students were asked to justify their scores by inputting their group feedback for each component. As a group, how do students agree on a particular

score in the grading parameters? What are the challenges with this method of peer feedback and grading? How do they manage conflicts arising from differences in opinions among team members on grading? The consistency or differences among groups' grading for a presentation were compared and analyzed against other groups. The students' grading was also analyzed against academic grading. Are there any significant differences in student vs. academic grading of group presentations? Do personal factors influence students' grading of their peers? Does this method of group PA motivate students in improving teamwork and team performance? Does it help them understand the factors behind successful teamwork and team conflict management? The study explores some of these areas by analyzing the data from this grading scheme. The ability to reflect on a group's performance and justify a group's score on a particular grading parameter was further reviewed by interviewing a random sample of 19 students involved with this module. The findings from the analysis further report on the effectiveness of this method as a peer assessment tool.

IV. CASE PRESENTATION

The Engineering Management (EM) programme is a one year full time MSc course offered in the Department of Electronic Engineering at the University of York. This programme "*enables ambitious technically-qualified graduates to become more effective as managers within engineering firms*" [17]. The programme is designed to help graduates gain practical experience of management skills applicable to the management of engineering roles and functions within companies. Some of the core objectives of this programme involve developing employability skills such as "*creativity and innovation, capacity for analysis, problem formulation and solving, planning and time management, communications (written and oral), team working and interpersonal skills, research skills and activity management*" [17]. In total, there are 10 core modules in this programme followed by a 60-credit final project. Group work is vital in some of these modules and project tasks as it helps in the process of active learning and critical reflection. It aims to facilitate the "*ability to assess the engineering and business implications of ideas, and effectively convert them into commercial successes*" [17]. Peer assessment is one of the learning objectives in this programme and students engage with this using rubric marking, reflective writing and group assessment.

'Enterprise' - a 10 credit module which students undertake during the spring term is aimed at developing an understanding of commercial exploitation of a new product or technology and the process of a start-up business. Students need to work in teams and investigate the marketing and financial viability of their business idea. There are three assessments in this module including a business pitch presentation worth 25% in week 8 and 9 of the term. In groups, students need to showcase a new business idea and in the given 10 minutes, they need to pitch for funding. They need to identify the market potential for this business idea and highlight any unique selling points. Marks are awarded on the quality of the presentation, relevance of contents, overall team dynamics and viability of the business proposal pitched. The other assessments include a professional business plan - another group work weighting 50% followed by an individual reflective essay on peer assessment of team members worth 25%. The formative intergroup PA was used during the business pitch presentations. Prior to the presentations, the lecturer explained the grading schemes and distributed marking sheets to be used for each group. The graded sheets were later collected at the end of the session once all groups had a chance to review their feedback and grades.

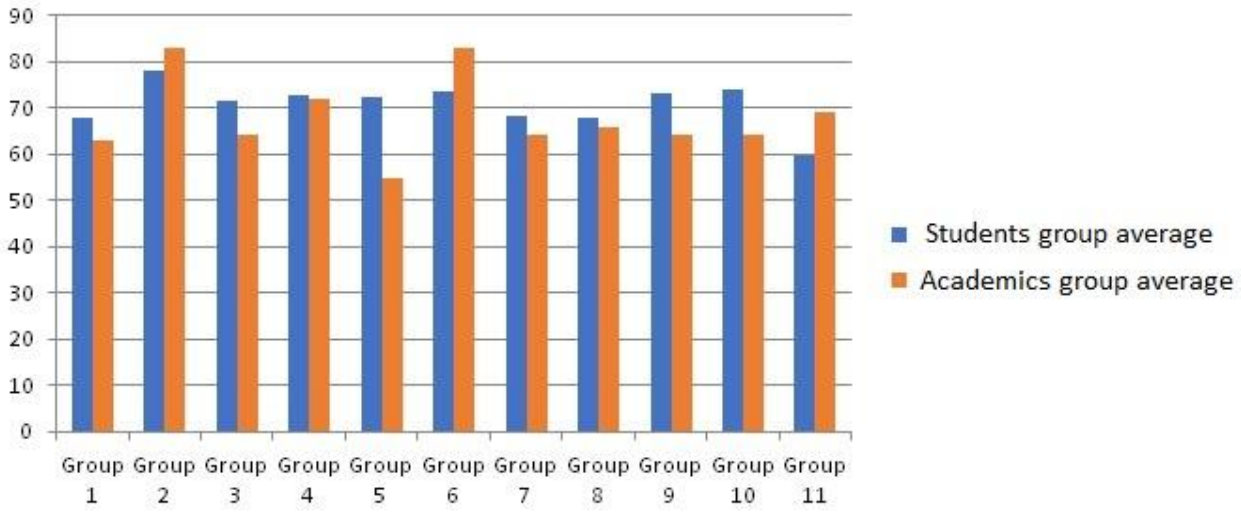

Figure 1: Students group average vs. Academics group average

A. Consistency in grades among student groups

The graded scores of the 11 groups were compared against each group who participated in the marking. Overall, the grades for most groups stayed within a range of 10% difference from each other. This shows consistency among group marking. It must be noted that 10 out of the 11 groups have students who have prior experience with PA and group works as part of the Engineering Management programme. This might have given them some level of understanding and familiarity of the grading schemes thereby facilitating the process of peer decision making on grade allocations and feedback. There were however, two groups where the grading patterns were inconsistent. For instance, group 6 on most occasions tended to mark lower than other groups. They showed a lot of criticality in their feedback and expectations. This was further investigated in a follow-up interview in which some students from this group reflected "*I think we were much more critical than others…we looked at the questions and started to find gaps in others' works….I think we ended up being overcritical".* Group 11 on the other hand, awarded relatively low scores to two groups and a significantly high score to another group as compared to others in the cohort. One of the possible explanations for this inconsistency in their grading is that group 11 comprised of students from other MSc programme who had no prior PA experience in their programmes. Perhaps, this might have influenced their decision making skills as their level of familiarity with peer grading is relatively new.

B. Consistency in grades among students vs. academics

The average grades of the student groups were compared against the two academics' average grades. Figure 1 shows the grades of the overall 11 groups based on students' group average and academics' group average. The overall average grades derived from the students intergroup PA ranged from 60% to 78%. Based on students' grading, group 2 scored the highest with an average of 78% followed by group 10 with 74% and group 6 with 73.5%. When these grades are compared against the academics' average grades, there seems to be some significant differences. Academics' grades ranged from 55% to 83%. Based on their marking, group 2 and 6 scored 83% whereas group 10 scored 64%. Although there is a consensus on group 2 being the highest scorer, there is a 5% difference in their grades. Group 6 on the other hand, has a relatively lower score from students' perspective with a difference of 9.5% when compared against academics. Group 10 similarly has a 10% difference but on this occasion academics marked this group relatively lower than that of students. Overall, it appears that students tend to mark slightly higher than academics in most occasions (8 out of 11 cases). On three occasions involving group 2, group 6 and group 11, the students' group average is lower than that of academics.

C. Benefits of intergroup PA

Following the intergroup PA exercises, a total of 19 students from the participating MSc programmes were selected in random for interviews to discuss the effectiveness of different PA methods. They were asked to reflect on their experience of PA using rubric and intergroup PA grading schemes and their preferred PA methods. 63% from this sample preferred individual PA using a rubric scheme. The general consensus is that as this method doesn't involve discussing one's opinions with other peers, it thereby minimizes conflicts. The remaining sample preferred PA in groups as they found this method more reliable and credible than a rubric PA.

Several key benefits of intergroup PA emerged from the discussion with students and this includes:

- Reduction of bias in PA and grade allocations
- Justified and fair grades following peer interactions
- Multiple opinions and views from team members
- Encouragement of team interaction
- Improvement in group dynamics
- Instigates sense of responsibility within a team
- Motivates team for future group activities
- Better understanding of academic grades and feedback

Bias among students engaging with PA seems to be a consistent topic of discussion among researchers [6, 18]. This is one of the reasons why many academics hesitate or refrain from using student PA in HE curricula. As highlighted earlier, the PA methods usually applied in HE involves students grading their peers individually without any consultation with others. Although this method might be popular, it does have some limitations particularly the impact of an individual assessor's emotions and decision making skills. As one of the students in the interview explained, "*Because of individual circumstances, sometimes your emotions or feelings might impact your mark. For instance, if you had a bad day, you might give low marks without critical thinking*". But group PA could reduce such risks as the student pointed out "*Assessing as a group is a good way to avoid this risk*". Bias can also be introduced when an assessor is not familiar with the content of the assessment. This can be a case with a programme like Engineering Management where students are from a wide range of disciplines like civil, computer science, electronics, agriculture and mechanical engineering to name a few. Here is an example quote from one of the interviewed students, "*For me, if someone gives a confident presentation, I will give a high mark even if I don't know the content. I am biased in that way*". Such grading approaches are unreliable and therefore, needs addressing. Group PA can help bring multiple perspectives and opinions within the team. This can be particularly beneficial for members who might lack expertise on a particular area covered during the assessment. One of the students supported "*If I don't know much about that topic, I can listen to others in the group who has better knowledge in that area*". Another similarly explained "*Everyone picks up different things in the group…everyone has different experience and sees things in a different way….You can pick*

up more stuff because everyone watches. It offers a more detailed way of marking". "*It can also help members fill any gaps or points they might have missed during the presentation*", says one of the students. Different members can offer different insights based on their expertise and experience. During the process, students might be introduced to views that they may not necessarily see from their own perspective. It therefore, gives them a broader and diversified platform on decision making. Some students highlighted this aspect with comments like "*One of the advantages with group PA is that you will have more views and opinions. You can therefore make an objective decision*". All these suggest that intergroup PA can help make student grading more objective and balanced. One of the students summarized "*Although I prefer to mark individually, a group marking is better because you get more feedback from others, it is fairer*".

Academics might find intergroup PA an effective way to improve team dynamics among groups. As this PA method involves team members coordinating and collaborating on decision making strategies, it can help build team relations. It will also give team members a sense of responsibility within the group as they need to justify their views and opinions over a grade in the various assessment categories. Some students in the interviews discussed how grading other groups motivated them to review their own work as a group and identify potential areas for improvement. One student elaborates "*We will have a little talk about what we liked in that presentation and remember to use some of the good points in our future presentations. It is very useful".* Another adds "*I can't stop comparing our contents with other groups. It's like a natural tendency…therefore, assessing in groups, the grades are fairer*". Such PA also gives students a better understanding of academic grading as they get to critique and take into account multiple perspectives and views of team members before allocating any final grades to the assessed group.

D. Limitations with intergroup PA

There are some limitations with intergroup PA as observed by students in this study. Some of the key issues derived from the interviews include:

- Conflicts among team members
- Difficulty finding balance on contradictory views among team members
- Lack of equal participation among members
- Not taking grading responsibility seriously
- Reluctance to share honest opinions with a team
- Influence of team leaders on group grading
- Reaching consensus as a team
- Time dedication required for group discussion
- Varying level of criticality and expectations on performance standards and measurement
- Different views on grading parameters

One of the common problems with intergroup PA is conflicts arising from multiple opinions among group members. Although multiple perspectives can help teams give a more conclusive and justified feedback and grading, it can also lead to a lack of agreement. Many highlighted that it can be a challenge for groups to find a balance when team members have multiple views and contradictory opinions over a grading parameter. This might cause issues on reaching a consensus on scores. Some students in the study noted this to be an issue on multiple occasions during their intergroup PA activities. "*We argued a lot in our group*", admits one student. Another similarly explains "*Sometimes not all have the same way of marking as their level of expertise are different. These can lead to conflicts*". Engagement of team members was another common issue few students experienced during the PA. Not all members in a group will want to put the same level of dedication and participation with the PA activities. If the PA is formative in nature, it could play a role in influencing the level of commitment and motivation among students. Some will take their responsibilities a lot more seriously than others while others might look for a window to slack during the process. As one of the students observed, "*Some group members don't think that it's their responsibility to mark others…. Some don't engage with PA seriously because they think that as their marks won't count towards the final grade (as it is formative), it is not a big deal*".

Group PA involves team coordination as members are expected to discuss their scores and feedback. However, some students found this process difficult as the opinions of their team members weren't always clear. "*You cannot understand each member's quality and the way they are judging other people*", confirms one student. Some might be reluctant to share their views or opinions. As one explains, *"I prefer to mark on my own, I don't like talking or discussing the marks with others*". Another adds *"Not everyone is transparent in a group".* If somebody in a group didn't follow the content of the presentation that they are assessing, they might hesitate to admit that in front of the team. Time dedication is another limiting factor in the use of intergroup PA. Groups need time to discuss and make decisions on their grading. This can be further complicated when there are contradictory opinions thereby requiring more time to reach an agreement. "*When marking as a group, we spend too much time discussing the grades and contents*", says one student. Individual PA method in this context is straightforward as students don't have to consult or discuss with anyone thereby making the overall process quicker.

Another issue students faced during their intergroup PA is the influence of strong members especially team leaders within the group. One of the students who experienced this states, "*Dominancy can change inner factors….dominant person can influence the scores*". On a similar note, another highlights, "*When we collect opinions from each group member, it's the group's overall opinion….but depends on who writes the feedback…Maybe it might not end up being the group's overall suggestion*". Somebody with a strong personality can influence the group's overall views and opinions and may even disregard others' opinions or feedback to push or prioritize their own views and grades. All these can potentially introduce bias in the group's grades and feedback.

In this context, one of the students suggested, "*When you mark as a group, some people's advice or opinions will be ignored. Perhaps it is better to collect every member's opinion rather than getting an overall group opinion*".

Different students based on their experience might have different views on grading parameters and what makes a good presentation. Their expectations and level of criticality might vary from others in the group. One student explained "*Some might think a score of 9 is good. For me, 6 is good*". Another suggested "*We all have different opinions on what is a good presentation; the standard of marking a presentation…there is a need to generate a common standard of marking within the group".* This otherwise might introduce inconsistency in students' grading approach. Some recommended setting up ranges of marks within their group to define what constitutes a good, bad or mediocre presentation. This can help bring consistency in their decision making. As one student explains, "*I think ranges are very important to make things simple. We can list a range of scores within the group. For example, a score of 1-4 is low, 5-8 is medium and 9-10 is high. The group can make decisions based on this*".

Other factors like distractions, conflicting schedules, and group rivalry and competition should also be considered by academics as these can limit the effectiveness of group PA. As some groups had their own pitch presentations scheduled on the same day, they felt distracted and couldn't fully focus on the PA activities. One of them notes "*It is difficult to hear the presentations and concentrate on the marks you want to allocate the groups*". Rivalry and competition among groups can also introduce bias in group grading. Nonetheless, despite these limitations; intergroup peer assessment shows potential in facilitating active learning and critical thinking among students. Its use should be encouraged perhaps in formative exercises in order to build and strengthen team relations and coordination among students.

V. CONCLUSION

There has been a gradual rise in the engagement of students with PA in HE. Researchers have deemed it as an integral component for promoting active learning environment. PA has been used in the context of grading individual as well as group works. So far, very limited researches have investigated the use of group PA. To explore the effectiveness of intergroup PA, this study utilizes 11 groups of students who participated in a formative intergroup PA activity using a specific marking scheme designed by the researchers. Follow-up interviews with a sample of students explored their experience with this PA method. Findings show several advantages of intergroup PA especially in reducing bias and building team dynamics. As groups get to discuss their views and opinions, it appears that the grades awarded by the groups are justified and fair. Such PA process also gives students a good familiarity and understanding of academic grading and feedback. It gives everyone a sense of responsibility to reflect on the team's overall views and thereby improves group dynamics. This method might be an effective way to understand team members. There are however, some limitations with this PA method. Some students found this method to be time consuming as it involves discussing and reflecting on the group members' views and opinions. Some reported a lack of engagement from some members towards formative exercises. There were students who weren't comfortable sharing their views and opinions about grading peers. For some groups, there was a lack of agreement due to contradictory opinions among members leading to conflicts. There is also a risk of inconsistency with such PA method as different group members might have different understanding of grading parameters thereby offer varying level of criticality. Such factors might limit the effectiveness of this PA method. However, despite these limitations, intergroup PA still has several potential particularly in facilitating team engagement and collaboration. HE therefore, should encourage different forms of PA engagement including intergroup PA. This will facilitate active learning among students and help develop reflective and critical decision making skills.

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