

How Undergraduate and Postgraduate Science Students Perceive Self- and Peer-assessed Group Work

Luciane V. Mello*
School of Life Sciences
University of Liverpool, UK
lumello@liverpool.ac.uk

Susanne Voelkel
School of Life Sciences
University of Liverpool, UK
svoelkel@liverpool.ac.uk

Abstract

Working in collaboration is increasingly important in the scientific research environment; and preparing students for their future careers is given ever-increasing weight in Higher Education. This study aimed to compare undergraduate (UG) and postgraduate (PG) students' satisfaction with group work and to explore if they differed in the way they engaged with self- and peer-assessment. In both cohorts self- and peer-assessment for contribution was implemented to address the issue of mark fairness. The results show high similarities between UG and PG students: (a) students acknowledged that they learned more in a group than they would have working on their own and appreciated the exercise of self- and peer-marking other groups' work; (b) for self- and peer-assessment of contribution, the difference in attitude and approach between students was still a reason for dissatisfaction for some of them. However, we found that students marked colleagues' work more honestly when the mark served purely for formative purposes, arguing that the contribution to final module marks should be only from staff assessment, not from peer-assessment. Results also show that the group dynamic – the degree to which

*Corresponding Author

students interacted well socially - influenced students' appreciation and liking of the group work, and this was independent of students' level of study.

Keywords: Group work, peer-learning, peer-assessment, scientific teaching, undergraduate teaching, postgraduate teaching.

Introduction

It is increasingly expected that students leave Higher Education with key skills valuable to employers (Bridgstock, 2011; Blickley, Deiner, Garbach, Lacher, Meek, Porensky, Wilkerson, Wonford, & Schwartz, 2013). London and Smither (1999) report an increase in group work in different workplaces: employers value determination, personal initiative and the ability to keep learning and act as a learning facilitator. Dillenbourg (2009) claims that group discussion and reflective thinking are the main goals of collaborative work; and Crosby (1996) shows that group work promotes group discussion and increases students' motivation and engagement with their learning.

The literature on group work is extensive, and some studies provide advice on how a group work activity should be set and assessed ensuring a successful learning approach (Chapman, Meuter, Toy, & Wirght, 2006; Davies, 2009; Gibbs, 2010). The use of self- and peer-evaluation of contribution to the work has been proposed as an effective way to deal with the claimed students' dissatisfaction with mark allocation ensuring fairness (Fellenz, 2006). Gibbs (2010) states that *'if students understand why group work is being used, understand the assessment system, are collaborative and ethical in their behaviour and possess sophisticated group work skills, then only minimal assessment mechanisms may be necessary as safeguards'*. Nevertheless, a more recent publication claims that students are hostile towards group work, particularly the higher achievers (Isaac, 2012).

Group work is just one example how lifelong learning skills can be encouraged in higher education (Candy, 2000). Another way is to integrate student self- and peer-assessment of work. Dochy, Segers, & Sluijsmans (2006) define self-assessment as

'the involvement of learners in making judgements about their own learning, particularly about their achievements and the outcomes of their learning'. Asking students to self and peer-assess should encourage them to critically think about what was asked from them in a particular assessment. The use of marking criteria is thought to help students to evaluate their work and understand the assessment process (Rust, Price, & O'Donovan, 2010; Bloxham & West, 2007).

Both, group work and self- and peer-assessment may be particularly beneficial in the context of science teaching. Handelsman et al. (2004) argue that scientific teaching must encompass the critical thinking, rigour and creativity that define research. Coll, France & Taylor (2005) say that *'in order to successfully develop conceptual understandings in science, learners need to be able to reflect on and discuss their understandings of scientific concepts as they are developing them'*. In a group-work situation, students should approach tasks and solve problems in different ways, which provides an opportunity to exercise creativity and critical thinking. Another characteristic of group work is its association with learning based on self- and peer-learning, instead of through teacher transmission (Caruso & Woolley, 2008), fostering students' independence. An active engagement with assessment criteria during self- and peer-marking is beneficial in helping students to be critical (Elwood & Klenowski, 2002) while developing their awareness of how they will be assessed by tutors. Therefore, it is particularly appropriate for scientific teaching, where a continuous stimulation of critical evaluation of new problems and situations is essential, both at undergraduate and postgraduate levels. Group work might be of particular importance at postgraduate level, where the development of skills increasing students' capability to work collaboratively is vital. In a collaborative learning activity students are required to work together, and their participation becomes the core of the active process (Dillenbourg, 2009). However, even though plenty of studies discuss group work in schools or in undergraduate settings, there is a lack of group work analysis at postgraduate level, particularly discussing students' perception of group work.

Herein we focus on the use of self- and peer-assessment in a group work setting aspiring to help students to become reflective practitioners, increasing their involvement in and responsibility towards their own learning. This study had two

aims: the first aim was to compare undergraduate and postgraduate students' perception of group work. In particular, we intended to find out whether there is a difference between UG and PG students' satisfaction with the group work process and their appreciation of its benefits. The second aim was to find out whether UG and PG students differ in the way they engage with self- and peer-assessment. We present two examples in the biological sciences where we introduced group work as part of module assessments. In the undergraduate setting the group work involved the production of a poster focusing on communication skills. In the postgraduate class, a collaborative essay writing task was set; the latter was conducted in two consecutive years allowing a comparison between two cohorts. In both settings students were asked to self- and peer-evaluate the group work contributions. Also, self- and peer-assessment of the work (poster/ essay) was carried out.

Methods

Group work: Undergraduate study

Group work was introduced as part of a final year zoology undergraduate module which focused on communication skills. The class (28 students) was divided into 7 groups of four students and each group was required to produce an A0 poster. The students were allocated to groups according to their self-declared preference for a certain topic. The students were introduced to the task in a session which comprised of a lecture about the aims and conventions of posters and advice on poster design, followed by a workshop in which the groups discussed example posters. They were then asked to rate those example posters using the same criteria that would later be used to mark their own posters. The students then had three weeks to research and design their posters within their groups. The posters were viewed and marked during a poster exhibition session.

Overall, the task was worth 15% of the module mark. This was split into three parts: one third (5%) comprised of a mark given by staff marking the posters during the poster exhibition ('staff mark'). Another third was obtained by taking the average of students' self- and peer-assessment of the posters ('student mark'). Each student

was required to mark his/her own group's poster as well as all the other posters during the poster exhibition, using the same marking criteria as the staff: aesthetics, use of diagrams, organisation, language, factual content, validity of conclusions and referencing, and handling of questions ('handling of questions' criteria was only used by staff). The final third of the mark was a peer-moderated mark which aimed to take into account each student's contribution to the group work ('contribution mark'). It was comprised of the staff mark multiplied by a factor which was calculated from the students' self- and peer-rating of their contribution to their group task according to DRCFB (2009). This factor reflected whether a group member had contributed less than the other group members, the same, or more.

Group work: Postgraduate study

Group work was introduced in a bioinformatics Master level course which focused on genomic analysis for two academic years, 2011-12 (PG1) and 2013-14 (PG2). In PG1 and PG2, the classes consisted of 15 and 9 students, divided into four and three groups, respectively. The groups were set by the staff responsible for the assessment, and, in both years, nationality and programme of study (Master or PhD level) were taken into consideration when setting the groups aiming for similar composition within the groups. Students were asked to produce an essay discussing a two-hour hands-on activity performed in the module. The collaborative work was produced using GoogleDocs in the first year or Wiki tool in Blackboard (University VLE) in the second year. Help setting up the GoogleDocs and in the use of Wiki was also provided since it is known that students' IT capabilities can vary (JISC Executive 2009). The concept of synchronous collaborative writing was explained, linking its importance to their future scientific career: collaboration between members of different institutions will be a key part of the scientific process (Handelsman, Miller, & Pfund, 2007).

Overall, the task was worth 12% of the module mark and the task was divided into four parts, adopting the same procedure in both years. First, each student was given a week to produce an individual draft of the essay, a work plan and key points to be discussed in group meetings (15% of total mark). This activity was followed by formative feedback from the teacher highlighting mistakes and suggesting points for

group discussion. Feedback and a mark for this piece of work were released before continuation of the activity. Second, students worked collaboratively to produce a joint essay to a 3 week deadline using GoogleDocs or the Wiki, which was marked by the staff (60% of total mark). Third, a matrix for self- and peer-assessment of the work contribution was distributed and completed by each student, aiming to evaluate students' contribution to the work in four different categories: attendance; contribution and dissemination of new material, ideas, outside reading; contribution to discussion; and attitude and approach (15% of total mark for completion of the questionnaire).

The fourth and final part (worth 10%) was awarded for attendance at, and contribution to, a class meeting where students anonymously and formatively self- and peer-marked the final essay produced by each group using the teacher's feedback on each group work and University marking criteria. Next, students' marks were revealed and the groups were asked to comment on their self-assessments based on the marking criteria. After discussion, an opportunity for self-reassessment was given to the groups. At the end teacher's marks were shown to all students fostering a further discussion of the marking criteria aiming improve students' performance in future assessments.

Evaluation

Research ethical approval was sought and obtained before the beginning of the activity through the University Research Ethics Committee, Governor Office. Students were informed about the study at the beginning of the module and it was made clear that participation in the evaluation was entirely voluntary and anonymous. A questionnaire, together with the participant information sheet and the consent form, was distributed during the class meeting for the marking exercise (postgraduate study) and the poster exhibition (undergraduate study). The signed consent form and the questionnaires were later collected separately. The questionnaire consisted of a series of closed questions (quantitative) and also provided the opportunity to give further comments (qualitative). Some questions were different between the postgraduate and undergraduate study, as they targeted students' evaluation on the use of the assessment marking criteria.

Where possible, i.e. where expected frequencies were at least 5, relationships between cohort status (UG and PG) and student answer frequencies were analysed using Chi-square test for independence using IBM SPSS Statistics-22. Significance was assessed at the $p < 0.05$ level.

Results

In the UG class, 89% of the students answered the questionnaire. English was first language for all of them. 24% had never done assessed group work before, 36% once before, 40% more than once. In the PG1 class, 100% of students answered the questionnaire, and 67% in PG2. In PG1 33% of the students had only once done assessed group work before, while all other students (PG1 and PG2) had experienced it more than once.

– Student perception about the group work benefit and assessing contribution mark

Nearly three quarters (72%) of the UG students agreed that they learned more in a group than working on their own although only 8% agreed strongly (Figure 1). Most of the students in PG1 (75%) and all students in PG2 agreed that they learned more in a group than working on their own but only in PG2 half of them agreed strongly (Figure 1). In all UG and PG settings, more than 90% of students felt that the responsibility towards other group members was an important aspect in the learning process (Figure 2). Chi-square tests for independence indicate no significant association between PG and UG status and student agreement to 'I learned more working in a group than working on my own' and 'The responsibility I felt towards the other members of the group was an important component in the learning process'.

Figure 1. Percentage of respondents agreeing/disagreeing with the statement ‘I learned more working in a group than working on my own’. $N_{UG}=25$ (case study 1), $N_{PG1}=12$, $N_{PG2}=6$ (case study 2, PG1=2011-12 and PG2=2013-14 cohorts).

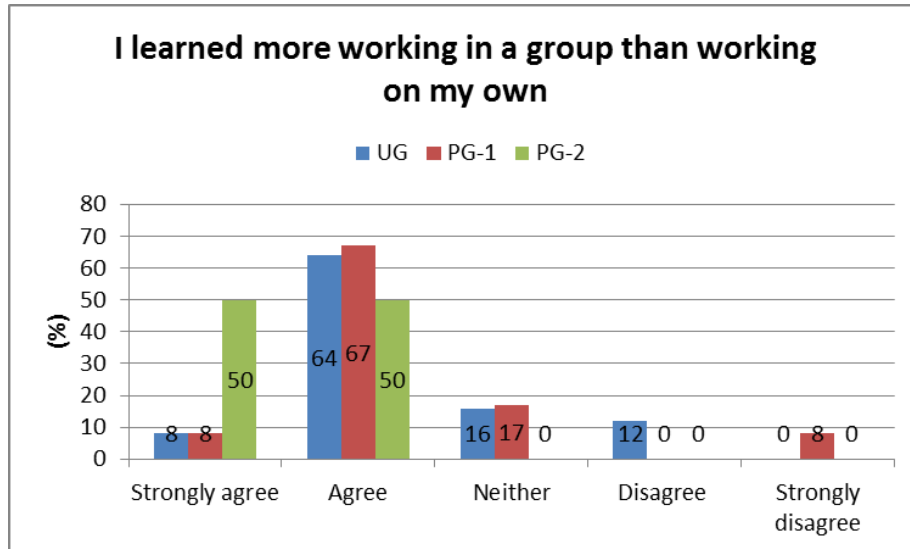
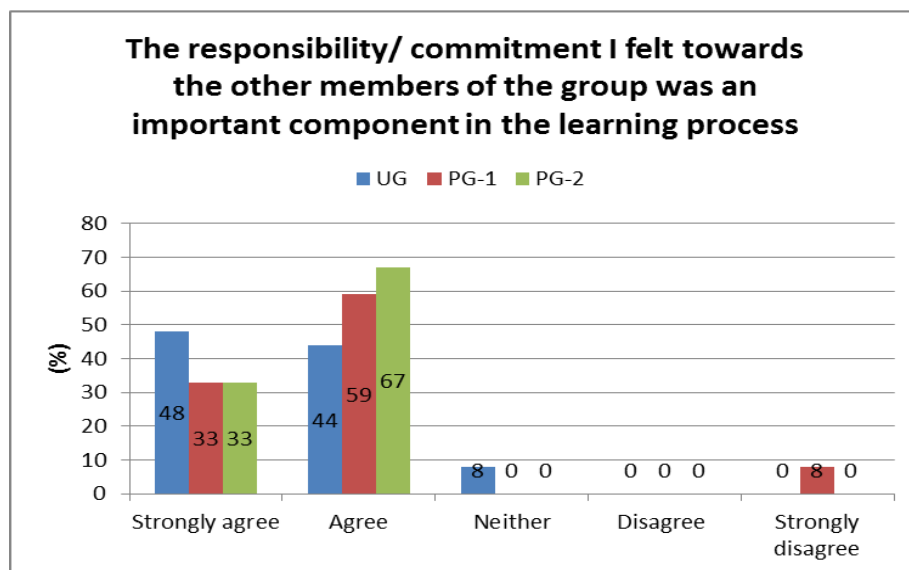


Figure 2. Percentage of respondents agreeing/disagreeing with the statement ‘The responsibility/commitment I feel towards the other members of the group was an important component in the learning processes’. $N_{UG}=25$ (case study 1), $N_{PG1}=12$, $N_{PG2}=6$ (case study 2, PG1=2011-12 and PG2=2013-14 cohorts).



Asked about their attitude towards peer-rating of their group's contribution, none of the UG students had any strong positive or negative feeling: a similar percentage (about 40%) felt comfortable, or a bit strange (Figure 3). By contrast, 75% and 100% of the PG1 and PG2, respectively, enjoyed and felt comfortable about peer-rating their group's contribution (Figure 3). There was a significant relationship between UG and PG status and students' answer to this question ($X^2 = 15.99$, d.f. = 4, $p = 0.003$). Regarding self-rating for contribution, 40% of the UG students enjoyed the self-rating agreeing that it made them think about their attitude towards their work. This same perception was shared by 42% and 83% of the PG1 and PG2 students, respectively (Figure 4). In contrast to the PG students, however, 24% of the UG students disliked self-rating. A Chi square test indicated a significant association between UG/PG status and their enjoyment of self-rating ($X^2 = 8.89$, d.f. = 3, $p = 0.031$).

Figure 3. Respondents' perception on peer-assessment of colleague's performance during the group work. $N_{UG}=25$ (case study 1), $N_{PG1}=12$, $N_{PG2}=6$ (case study 2, PG1=2011-12 and PG2=2013-14 cohorts).

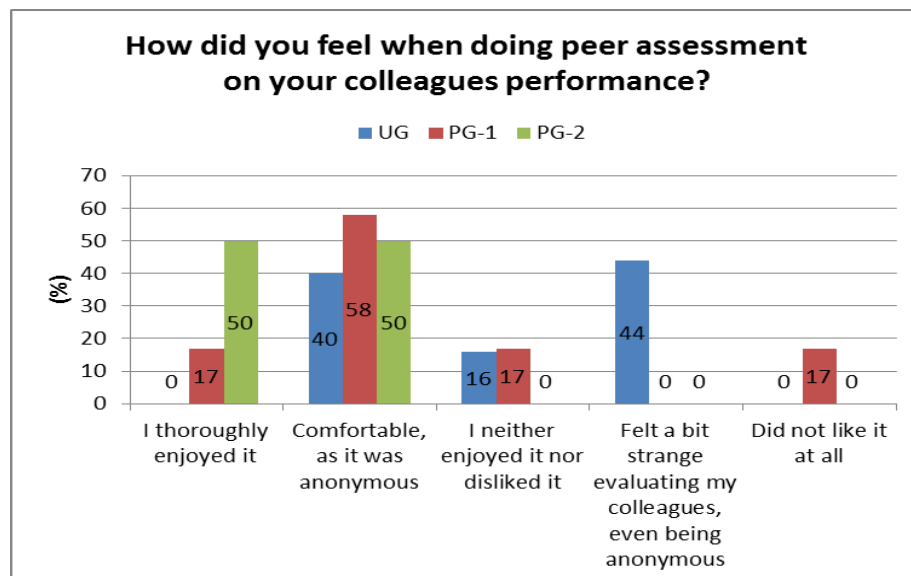
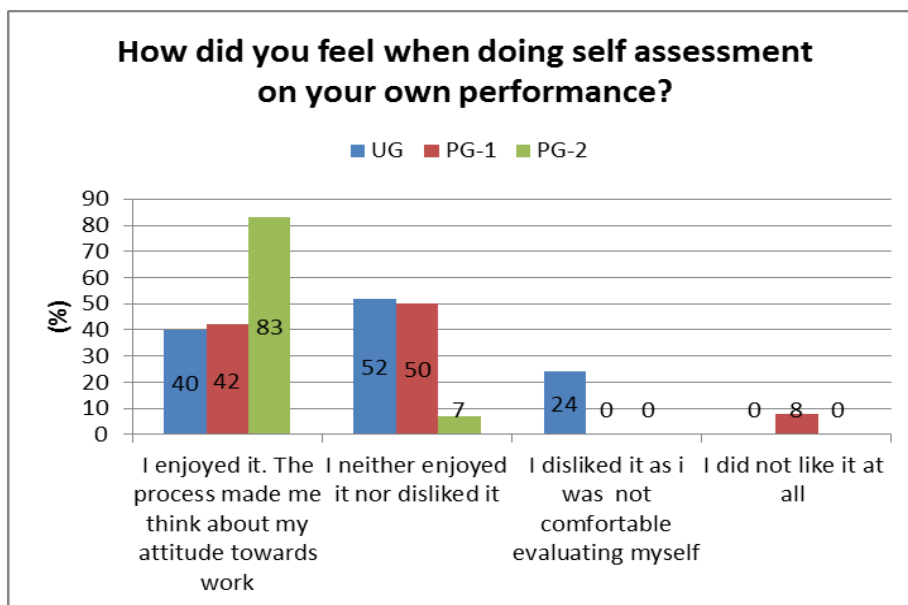


Figure 4. Respondents' perception on self-assessment of their own performance during the group work. $N_{UG}=25$ (case study 1), $N_{PG1}=12$, $N_{PG2}=6$ (case study 2, PG1=2011-12 and PG2=2013-14 cohorts).

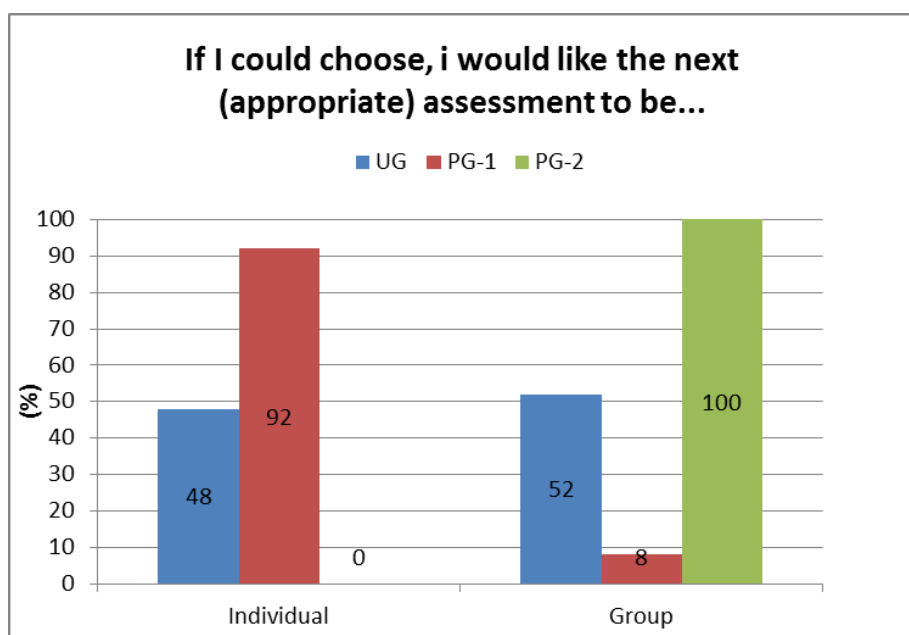


Text comments from the UG and PG classes are shown in Table 1. The comments are split into two categories: one category appears to see group work as a valuable learning experience; in general all students valued the interaction with other group members and some expressed an increased sense of responsibility, combined with the need to compromise (particularly mentioned at UG level). The other category of comments relates to worries about unequal workload and the potentially negative effect on marks. Here, UG students seemed more worried about the potential negative effect on marks than the PG ones. For these the main aspect of worry was task management: division of workload and delivering work on time. However, this issue was not strongly expressed in PG2, where the negative comments to group work were outweighed by the positive ones. Students' opinion on the group work are mirrored by the students' responses when they were asked if they would appreciate another opportunity to engage in group work (Figure 5). Only half of the UG class would choose group work over individual work. In the PG setting, there was a huge difference in response between the two cohorts. While PG1 students overwhelmingly preferred individual assignments, all in PG2 would prefer a group assignment. Overall, Chi square test for independence (with Yates Continuity Correction) indicated no significant association between PG and UG status and students' preference for individual or group work ($\chi^2=0.565$, d.f. = 1, $p=0.452$).

Table 1. Text comments on group work experience.

UG class
Makes you appreciate other people's opinions/ likes and dislikes and encourages you to find a compromise to maintain a good working relationship within the group.
I found that working in a group can be frustrating sometimes especially if you are the one organising everything. In conclusion it would be harder to produce a poster on your own.
I think group work is an important task for my degree, I don't feel all work should be grouped though feel it's important to work in groups to a large degree.
Group work forces the individual members into working as a team which forces you to think about other people and that your work affects their work too, extra responsibility.
People may have the feeling that they can fall back on the work of others, not put in much effort.
It's good if everyone takes responsibility for their own work. Need to learn how to mark others.
Best to be randomised.
Its better with the random allocation of groups than letting people choose as people work harder.
It allowed me to get to know course members better.
If someone in the group did not put the work in then your marks could suffer.
Working in a group can be beneficial but only when you are comfortable with your group, so large pieces of work worth a high % should be individual.
It takes some pressure off people individually by sharing the workload, however the success of the group largely depends on the commitment of each member, so as long as everyone inputs fairly group work is good!
PG1 class
Helped learning.
I feel some tasks are more suited to group work than others; an essay is perhaps not the best choice. Although it did provide its own unique challenges.
I always enjoy group work, but after feel I sometimes get lower marks for group work depending on who I am working with. I feel this is unfair as this will affect my final results.
Difficult to get everyone to contribute equally.
Have found on all occasions of group work that I am left with most of the work when peers at the last minute fail to contribute their part. For this reason I feel better with individual work.
PG2 class
Group work allowed me to think about the project with a more open mind as more viewpoints were given.
Fantastic assignment – thoroughly enjoyed it and learned a lot from it.
I liked the fact that ideas can be shared. Discussion amongst ourselves is very useful.
Having an involved task allows all members to help each other. Learning is enhanced for some.
I think group working can be time consuming for a PhD student. Generally more so than individual work.
It was difficult to establish who of our group was actually active.

Figure 5. Respondents' choice of type of assessment. $N_{UG}=25$ (case study 1), $N_{PG1}=12$, $N_{PG2}=6$ (case study 2, PG1=2011-12 and PG2=2013-14 cohorts).



Students' past experience with group work was also enquired in the questionnaire. The majority of students (86%) had experienced group work at least once before (32% once, the rest more than once). There was no significant association between group work experience and preference for future group or individual work. However, students who had more experience with group work in the past were more likely to say that the responsibility they felt towards other group members was important for their learning, and they were also more likely to enjoy peer-rating than those who had less experience ($X^2 = 42.94$, d.f. = 24, $p = 0.01$; $X^2 = 56.88$, d.f. = 32, $p = 0.004$, respectively). Interestingly, students' previous experience with group work had a positive impact on the students' feeling of responsibility with others and appreciation of peer-rating for contribution ($X^2 = 42.94$, df 24, $p = 0.01$; $X^2 = 56.88$, df 32, $p = 0.004$, respectively). These results indicate that although previous group work has no impact on the preference of group work for future assignments, but does affect students' attitude and enjoyment.

Student perceptions about the self- and peer-assessment of work

In all settings (UG and PG) the majority (around 80%) enjoyed peer-assessing other groups' work (posters/ essays) and felt that they learnt something by doing so (Figure 6). Similarly, most students liked evaluating their own poster or essay and found it improved future work (Figure 7; Table 2).

– The understanding and use of assessment marking criteria

In the UG class, the overall average poster mark was 69%. The overall mark consisted of three components: the average staff mark for the posters was 63%, the average student mark was 82%, and the average contribution mark was 63% (Table 3).

Figure 6. Respondents' perception on peer-assessment of other groups work. $N_{UG}=25$ (case study 1), $N_{PG1}=12$, $N_{PG2}=6$ (case study 2, $PG1=2011-12$ and $PG2=2013-14$ cohorts).

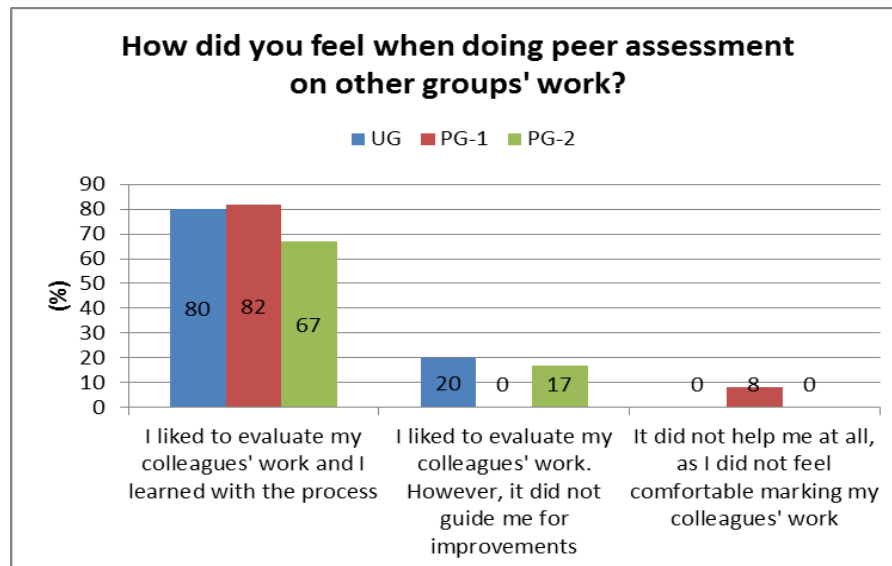


Figure 7. Respondents' perception on self-assessment of their own group work. $N_{UG}=25$ (case study 1), $N_{PG1}=12$, $N_{PG2}=6$ (case study 2, PG1=2011-12 and PG2=2013-14 cohorts).

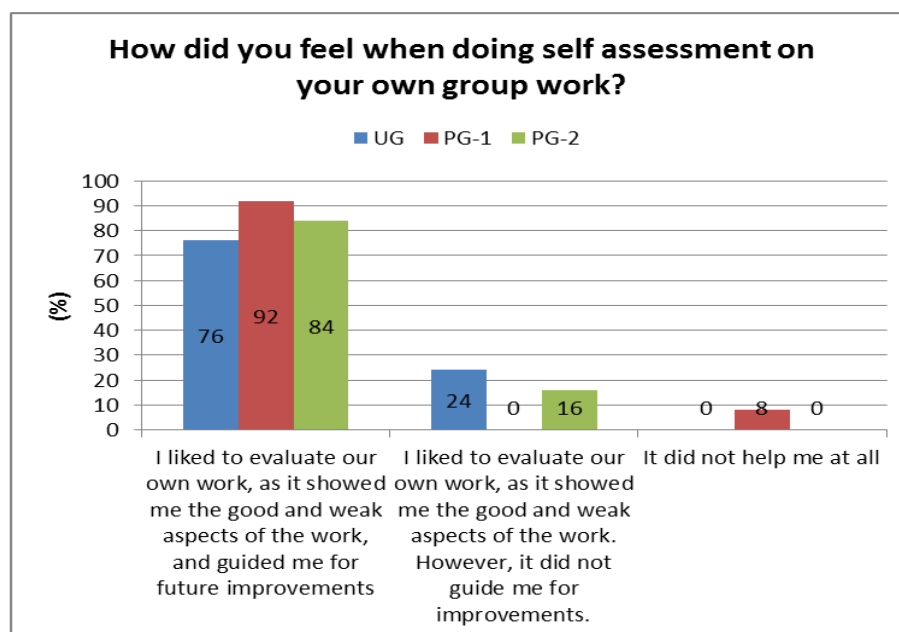


Table 2. Text comments on self and peer-assessment of the work.

UG class
The self-assessment I thought was pointless as I can't see anyone giving themselves low marks
PG1 class
I was glad the peer-assessment for the work was anonymously done.
The marking scheme put emphasis on content and additional reading.
PG2 class
I think it is good to get as many opinions on my work as possible.
It was a good session.

Table 3. Comparison of the UG average poster marks awarded through self-assessment, peer-assessment and assessment by staff (%).

Group	Self-assessment	Peer-assessment	Staff-assessment
1	92	75	47
2	84	80	49
3	85	80	53
4	93	80	70
5	92	86	80
6	91	85	69
7	84	79	53

The student mark was calculated from the average of 28 marks for each poster: four self-assessment marks (where the four group members rated their own poster) and 24 peer-marks from the other students in the class. On average, self-assessment marks were higher than peer-assessment marks (89% as opposed to 81%) and both were considerably higher than the average staff mark (63%).

In the PG class, the overall average marks for the group work were 73% and 66% for PG1 and PG2, respectively. The overall work included the four components: the staff mark for the initial individual work, the staff mark for the group essay, the self- and peer-mark, and student's attendance and participation in the class meeting. As seen in Table 4, in all cases students' marks were higher than the staff marks, in some cases placing them in a different UK marking class; e.g. 1st class (mark $\geq 70\%$), 2.1 (mark between 60 and 69%) and 2.2 (mark between 50 and 59%). However, despite working with the marking criteria and having staff's comments on the essay, a significant variation on assigned marks for the same piece of work was observed between different marking groups. Interestingly, the groups did not always assign the highest mark to their own work and in most cases a lower mark was given during the self-reassessment (SRA) opportunity. Typically, the new marks (SRA) were closer to the staff marks suggesting a better self-evaluation of the work after reading the others' group work and after a discussion-prompted re-evaluation of the marking criteria.

Table 4. Comparison of the PG essay marks awarded through self-assessment (bold, boxed), peer-assessment and assessment by staff (%) using the marking criteria. SRA is the self-reassessment by each group after group discussion of each group work and the marking criteria. () indicates the difference between the two self-assessment marks.

		Group1 mark	Group 2 mark	Group 3 mark	Group4 mark	SRA after discussion mark	Staff mark
Piece of work assessed	PG1 - G1	71	58	59	59	67 (-4)	56
	PG1 - G2	68	78	71	65	72 (-6)	62
	PG1 - G3	78	69	69	75	71 (+2)	69
	PG1 - G4	65	58	60	65	65 (0)	63
	PG2 - G1	66	67	59	-	66 (0)	62
	PG2 - G2	60	77	70	-	70 (-7)	60
	PG2 - G3	70	81	75	-	75 (0)	72

Discussion and conclusion

The comparison between UG and PG experience has shown that overall, both groups of students found the group work activity a positive experience that enhanced their learning. This is a very encouraging result, as group work is known to enhance students' collaborative learning which, as claimed by Isaac (2012), 'is something that all our students will employ once they finish their formal education'. Students' comments shown in Table 1 highlight that useful discussion within the group increasing learning was valued by the UG and PG2 students. This corroborates the views of Smith et al. (2009) who argued that the use of peer-learning improves the student learning experience.

However, a striking difference emerged between PG1 and PG2 regarding their keenness for future group work: almost all PG1 students preferred individual work

and all PG2 students preferred group work (Figure 7). In PG1 several students highlighted personal difficulties when working in groups and common claims were: lack of participation from others and strong/unpleasant leadership (Table 1). The lack of satisfaction with some peers might have created a more negative experience of the activity; similar results were found by Payne, Monk-Turne, Smith, & Sumter (2006), Myers et al. (2009) and Smith et al. (2011). There are three potential explanations for the contrasting experiences between the two PG cohorts, (a) simply a variation in personality and expectation among the students (different cohort); (b) a better introduction by the staff for the second cohort, explaining the benefits of the group work in the scientific environment and for future employability; and/or (c) a greater willingness to intervene in the group dynamics to offer guidance where necessary; the last two were consequence of staff experience with PG1. Peebles-Wilkins' study (2004) showed that group interventions and monitoring can improve communication and foster collaboration among groups. It seems that despite all effort staff may put into a group work activity, the group dynamics may play an important part on the whole exercise, making the same activity being differently received by different students.

We conclude that no significant difference was found between UG and PG students' appreciation of the benefits of or their preference for future group work despite the fact that PG students enjoyed the self- and peer-rating more. Also, as observed in the two PG classes, it seems that the dynamic of the group played a major part in the success of the activity, rather than their level of study. Interestingly, despite their positive experiences, many students stated they would still prefer individual over group work. The main reason may be that students fear that their individual work will be lost in the product of the group (Nordberg, 2008). Some students also feel uncomfortable having to rely on the work of others to achieve a good mark (Isaac, 2012). This could be particularly relevant in final year and postgraduate settings where degree classifications may be affected. A comparison between year 1 UG and PG could show a different result. On the other hand, the results also allow us to suggest that studying at postgraduate level (a step up from final year UG for the students) does not imply their attitude towards group work has changed; at least not for assessments carrying a mark. Our findings are in agreement with those reported

by Nordberg (2008) when studying group work at postgraduate level in Business: group work allows more learning, but it is perceived as being less fair.

The evaluation of students' satisfaction regarding contribution marks proved to be complex and in line with the experiences of Gibbs (2010). As mentioned above, the students' main concern was about mark fairness and variable student participation in the work. This latter issue was not simply regarding the amount of participation, but its effectiveness. Giving students the opportunity to self- and peer-mark for contribution to work, we expected that those feelings would have been attenuated. Cederblom and Lounsbury (1980) say that 'group members themselves would seem in a natural position to provide reliable, valid evaluations of each other'. As shown in this study, the majority of the students felt comfortable doing peer-evaluation on their colleagues' group performance, provided the marks remain anonymous. Therefore, a question still to be answered is the reason why the process of assigning contribution marks does not entirely resolve students' perception of mark unfairness. It is possible that in the cases presented here, the penalty applied (reduction of the marks) for those who did not engage with the activity as they should, was not thought severe enough to satisfy students' feeling of unfairness. Perhaps some students would like to see their claimed higher 'time on task' being better rewarded and not being shared with peers they rate as having poor contribution/effectiveness. Nordberg (2008) claims that the difficulties with group work assessment are shared between two environments: education and work place. Therefore, as we prepare students for future careers where they will need to work in groups (Fallows & Steven, 2000), and collaborative work is part of science education, we conclude that opportunities for group work should be given to the students even if their perception of the benefits of group learning does not fully outweigh their concerns over fairness. Nevertheless, group work assessment should not constitute a large proportion of a module mark.

Addressing the second aim of this study, the evaluation of students' understanding of the activity and the use of marking criteria, indicates that students have difficulty in applying them when either self- or peer-marking a piece of work. The marking criteria were available and were discussed with students prior to the assessment for both UG and PG students. A question here is whether the students' difficulties were only

based on their inexperience applying them, or whether there was still a lack of understanding the criteria that impedes them to use the marking criteria as guideline when doing an assessment. The benefits of self- and peer-assessing their work and some of the fears when engaging in the process are discussed below.

The results show that when students' self- and peer-assessment marks had an impact on the assessment overall mark, as in the UG class, they rated their own poster much more highly than other students' posters. One student commented on their fear of dragging their own mark down, a worry which was not observed in attitudes towards their peers' work. In the PG classes, where students' marks for the group essays had no effect on the assessment mark a different pattern was observed. A high self-assessment mark was not always observed. Students' comments about the process echoed Cowan, Joyce, McPherson, & Weedon's findings (1999) that self- and peer-assessment processes help students to develop a sense of criticality for their own work improving learning; but not without exceptions. For instance, the PG1 self-assessment mark was usually higher than the mark assigned by the peers and staff. In justifying the self-reassessment mark, the group claimed that their 'hard work' should be rewarded, showing a clear dissociation between 'time on task' and 'quality of work'. For PG2, when marking the final group essay work, the work produced by group 3 had the highest mark assigned by all groups of student (table 4). However, the three groups differed in the range of the marks assigned to the work, perhaps reflecting a difference in interpretation of the marking criteria. Orsmond, Merry, & Reiling (1996) showed that students liked to perform peer-assessment of work, as they learned from the process. This made the discussion about the criteria particularly valuable for them.

Strikingly, in both studies, students' marks for their own work were clearly much higher than staff marks. This may indicate that students may not be as critical as staff, perhaps reflecting a lack of experience, or their lack of clear understanding of the marking criteria (PG classes). At UG level, students placed more value on the 'prettiness' of posters, whereas staff were more critical of poster content and quality of figures and diagrams. At PG level, it was evident from the discussion between staff and students during the class exercise (step 4 of the activity) that students did not look for 'discussion and critical thinking' in their essay as much as the staff did, impacting on their marks. These findings are in agreement with those from Orsmond

et al. (1996) who demonstrate 'that specific areas of the marking criteria were prone to over and under-marking'. In both PG years, students claimed that reading the work of others helped them to correct misconceptions about the subject matter as well as improving their own work.

In addition, another aspect of the group essay exercise appreciated by the PG students was the formative feedback in the individual piece of work preceding the group discussion. This finding is supported by Higgins, Skelton, & Hartley (2002) in his three year study showing that formative assessment feedback is essential to encourage deep learning. It is also in line with Gibbs (2010) who argues that having an individual mark as part of a group work activity may not just increase student responsibility for the assessment, but make 'better students benefit from their greater contribution'. However, no comment about the mark aspect was raised by the students, but only the appreciation of feedback.

Back to the comparison between UG and PG attitude when marking peers work, our view is that self- and peer-assessment for work should only be used formatively, if aiming to truly achieve understanding and especially application of the assessment marking criteria by the students. We argue that the contribution to final module marks should be only from staff assessment, not from peer assessment.

References

- Blickley, J. L., Deiner, K., Garbach, K., Lacher, I., Meek, M. H., Porensky, L. M., Wilkerson, M.L., Wonford, E.M. & Schwartz, M. W. (2013). Graduate student's guide to necessary skills for nonacademic conservation careers. *Conservation Biology*, 27(1), 24-34.
- Bloxham, S., & West, A. (2007). Learning to write in higher education: Students' perceptions of an intervention in developing understanding of assessment criteria. *Teaching in Higher Education*, 12(1): 77-89.
- Bridgstock, R. (2011). Skills for creative industries graduate success. *Education + Training*, 53(1), 9-26.

- Candy, P. C. (2000). *Knowledge Navigators and Lifelong Learners: Producing graduates for the information society*. *Higher Education Research & Development*, 19(3), 261-277.
- Caruso, H. M. & Woolley, A. W. (2008). Harnessing the power of emergent interdependence to promote diverse team collaboration. *Research on Managing Groups and Teams*, 11, 245-266.
- Cederblom, D., & Lounsbury, J. W. (1980). An investigation of user acceptance of peer evaluations. *Personnel Psychology* 33(3): 567-579.
- Chapman, K. J., Meuter, M., Toy, D. & Wirght, L. (2006). Can't we pick our own groups? The influence of group selection method on group dynamics and outcomes. *Journal of Management Education*, 30(4), 557-569
- Coll, R. K., France, B. & Taylor, I. (2005). The role of models/and analogies in science education: implications from research. *International Journal of Science Education*, 27(2), 183-198.
- Cowan, J., Joyce, J., McPherson, D. & Weedon, E. (1999). Self-assessment of reflective journaling – and its effect on learning outcomes. *4th Northumbria Assessment Conference*, 1-3 September 1999. University of Northumbria, UK.
- Crosby, J. (1996). Learning in small groups. *Medical Teacher*, 18(3), 189-202.
- Davies, W. M. (2009). Group work as a form of assessment: common problems and recommended solutions. *High Education*, 58, 563–584.
- Docky, F., Segers, M, & Sluijsmans, D. (2006). The use of self-, peer and co-assessment in higher education: A review. *Studies in Higher Education*, 24(3), 331-350.
- Dillenbourg, P. (2009). What do you mean by collaborative learning? In P. Dillenbourg (Ed.), *Collaborative learning: Cognitive and computational approaches* (pp. 1-16). Amsterdam: Pergamon, Elsevier.
- DRCFB (2009). Group work peer assessment. Retrieved August 15, 2013, from <http://www.scribd.com/doc/18261604/Group-Work-Peer-Assessment>
- Elwood, J. & Klenowski, V. (2002). Creating communities of shared practice: the challenges of assessment use in learning and teaching. *Assessment and Evaluation in Higher Education*, 27(3), 243–256.

- Fallows, S. & Steven, C. (2000). Building employability skills into the higher education curriculum: a university-wide initiative. *Education + training*, 42(2), 75-83.
- Fellenz, M.R. (2006). Toward fairness in assessing student group work: a protocol for peer evaluation of individual contributions. *Journal of Management Education*, 30(4), 570-591.
- Gibbs, G. (2010). The assessment of group work: Lessons from the literature. *Assessment Standards Knowledge Exchange*. Retrieved July 27, 2014, from http://www.brookes.ac.uk/services/ocslid/group_work/brookes_groupwork_gibbs_dec09.pdf
- Handelsman, J., Ebert-May, D., Beichner, R., Bruns, P., Chang, A., DeHaan, R., Gentile, J., Lauffer, S., Stewart, J., Tilghman, S. M. & Wood, W. B. (2004). Scientific teaching. *Science*, 304(5670), 521-522.
- Handelsman, J., Miller, S. & Pfund, C. (2007). *Scientific teaching*. Wisconsin: Roberts and Co.; New York : W.H. Freeman and Co.
- Higgins, R., Skelton, A. & Hartley, P. (2002). The conscientious consumer: Reconsidering the role of assessment feedback in student learning. *Studies in Higher Education*, 27(1), 53-64.
- Isaac, M.L. (2012). 'I Hate Group Work!' Social Loafers, Indignant Peers, and the Drama of the Classroom. *English Journal* 101(4): 83-89
- JISC Executive. (2009). A guide for learning developers and learning support staff. Retrieved July 2, 2014, from <http://www.jisc.ac.uk/media/documents/publications/lxp4.pdf>
- London, M. & Smither, J. W. (1999). Empowered self-development and continuous learning. *Human Resource Management*, 38(1), 3-15.
- Myers, S.A., Bogdan, L.M. , Eidsness, M.A., Johnson, A.N. , Schoo, M.E., Smith, N.A. , Thompson, M.R. & Zackery, B.A. (2009). Taking a trait approach to understanding college students' perception of group work. *College Student Journal*, 43(3), 822–831.
- Nordberg, D. (2008). Group projects: more learning? Less fair? A conundrum in assessing postgraduate business education. *Assessment & Evaluation in Higher Education*, 33(5), 481-492.
- Orsmond, P., Merry, S. & Reiling K. (1996). The Importance of Marking Criteria in the Use of Peer Assessment. *Assessment & Evaluation in Higher Education*, 21(3), 239-250.

Payne, B.K., Monk-Turner, E., Smith, D. & Sumter, M. (2006). Improving group work: Voices of students. *Education*, 146(3), 441–448

Peebles-Wilkins, W. (2004). Group intervention can help with diversity. *Children and Schools*, 26(4), 195-196.

Rust, C., Price, M., & O'Donovan, B. (2003). Improving students' learning by developing their understanding of assessment criteria and processes. *Assessment & Evaluation in Higher Education*, 28(2), 147-164.

Smith, M. K., Wood, W. B., Adams, W. K., Wieman, C., Knight, J. K., & Guild, N. (2009). Why peer discussion improves student performance on in-class concept questions. *Science*, 323(5910), 122-124.

Smith, G.G., Sorensen, C., Gump, A., Heindel, A.J., Caris, M. & Martinez, C.D. (2011). Overcoming student resistance to group work: Online versus face-to-face. *The Internet and Higher Education*, 14(2), 121-128.