



Research Article

Can Students Assess Themselves and Their Peers? - A Five Year Study

Anne Nortcliffe

¹*Department of Engineering and Mathematics, Sheffield Hallam University, Howard Street, Sheffield, S1 1WB*

Correspondence should be addressed to Anne Nortcliffe, A.Nortcliffe@shu.ac.uk

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Abstract

This paper highlights results and conclusions drawn from a five-year study of embedding formative peer feedback and self and peer assessment in a Web Programming module. Traditionally, peer formative feedback offers the opportunity to provide a greater number of voices expressing their view on a submission. Could this be a solution to providing effective formative feedback? The findings indicate that students value constructive feedback from their peers. With group-based assessments, a lecturer has limited knowledge of an individual's learning in a group assignment. While contentious, this provokes questions on the value of peer assessment feedback. Could students assess themselves and one another to provide an insight to another's performance and contribution in group-work? Do students' perceive this to be a fair approach? This paper presents the results of applying such methods of self and peer assessment. The findings suggest that students do perceive it as a fair method of assessment and contribution to group-work, but express uncertainty as to whether to repeat the experience.

Background literature

Traditionally, assessment of a student's work offers one perspective or opinion from a singular member of teaching staff, particularly for non-recursive subjects. Moderation typically only offers a second pair of eyes on a sample of student work. Therefore, typically, a student's work will be seen only by one person - the lecturer. Peer assessment, however, increases the number of assessors involved and therefore increases the assessment reliability and reduces subjectivity (Falchikov 1998). On the other hand, some sources suggest that

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racial prejudice, personality clashes and personal loyalties may distort the results (Conant 1997; Mindham 1998), but evidence indicates that the latter is not a problem (Heyward 2000). These concerns can be resolved with academic moderation (Mindham 1998), and careful student group formulation (Heyward 2000). In the author's experience of eight years of using peer assessment:

- racial prejudice has been witnessed only once;
- only one group each year has required the peer assessment to be moderated due to one or two individual inconsistent peer assessment results;
- one lecturer intervention to resolve one group's severe personality clashes (despite the fact group was formed using psychometric testing) and inconsistent peer assessments by interviewing each student to ascertain the true reflection of each individual's contribution to group-work.

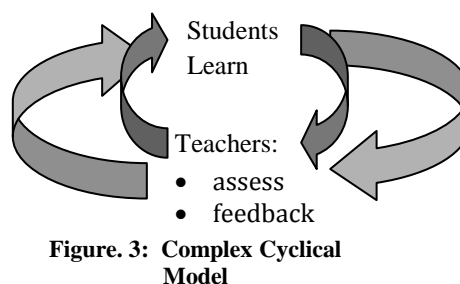
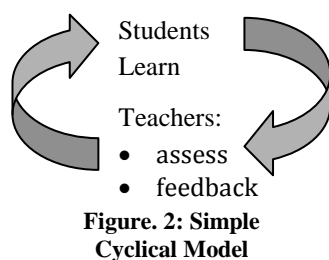
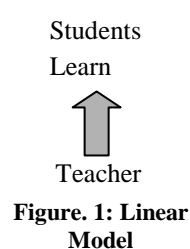
Despite the limitations of peer assessment (Mindham 1998), it provides valuable peer feedback. In practice, such feedback tends to be incomplete and somewhat negatively biased (Conant 1997), and students do not always adhere to the summative assessment criteria (Zariski 1996). However, if students are provided with clear guidance and criteria, their exposure to inconsistencies in peer assessment can be prevented, or at least drastically reduced (Mills and Glover 2006). Also in the author's experience, despite limitations of peer assessment, the greater number of assessors provide a greater picture from which students can draw and reflect upon their understandings, actions, and implementation of their learning to the extent that students may value this particular assessment more than the traditional method of assessment by a single lecturer (Nortcliffe 2005). Students reported being more engaged in the feedback from their peers than from their lecturers (Logan 2009), and that it developed aspects of their learning processes (Orsmond *et al.* 1996). At the same time, it enables a culture of assessment to become more transparent to students (Roberts 2006).

While observing that students can perceive peer assessment as a tool for reducing the marking workload of academics, Sher (2004) found that it freed academics to take on a more supportive and valuable tutorial/learning facilitator role. This encourages student/academic dialogue and the deepening of student learning beyond traditional methods of assessment:

- An examination promotes a linear model of learning, Figure 1. Two distinct processes are involved (learning and assessment) and these are carried out by two distinct groups of people (learners and lecturers). It provides little opportunity for the learner to receive, reflect and act upon the feedback, i.e. feed-forward their learning from assessment and feedback;
- An essay, on the other hand, promotes a simple cyclical model of learning, see Figure 2. In this case three distinct but related processes are involved (learning, assessment and feedback) and carried out by two distinct groups of people. However, this is only achieved if the work is returned and is not an end-of-semester submission.

Peer assessment promotes a more complex cyclical model of learning (Nortcliffe et al. 2003), involving three interrelated processes (learning, assessment and feedback) and carried out by a group of people (students) with multiple roles (see Figure 3 below). In principle the students learn from both roles as:

- as assessor, just as academics do when assessing a piece of student's work, learning as recipients/readers of the assessment;
- as being assessed, learning from the assessment feedback given.



Peer assessment and feedback methodology

In order to maximise the learning opportunity from peer assessment and feedback, best practice needs to be adhered. Previous research has indicated that formative peer assessment element can be further enhanced if students are encouraged to utilise a feedback sandwich (Nortcliffe 2005). A feedback sandwich provides a constructive framework in which students can wrap their feedback communication to their peers, principally conveying what they liked and disliked about the work (Dohrenwend 2002). This peer feedback sandwich can be likened to a springboard from which students can improve their learning performance. An example of how formative peer assessment can be applied in practice would be to ask students to feedback on their peers' group presentation, as illustrated in Figure 4.

Equally the level of learning in a group assessment can be further enhanced if combined with self and peer summative assessment of the group (Nortcliffe 2002). This approach enables students to reflect upon their group collaboration, specifically performance, problem identification, planning and communication. Figure 5 is an example of one method of self and peer assessment, whereby each student completes the one form. Figure 6 demonstrates another method and requires each student to complete a form for each member of the group and including a reflection on themselves. Both forms are consistent with good peer assessment practice (Mindam 1998), particularly in guiding students to assess that yields a weighting factor and an opportunity for students to justify their peer and self-assessment. Peer and self-assessment is particularly effective at promoting reflective practice (Sluijsmans et al. 1998). Reflection is an important element in Kolb's theory of experiential learning (Fry

et al. 2001). In the case of a group presentation, self and peer-assessment would encourage evaluation of group working skills and dynamics promoting Kolb, such as:

- Concrete Experience - Group Work Member
- Reflective Observation - Peer Assessment Process

In addition self and peer-assessment with clear assessment criteria can provide valuable insight into the dynamics of a particular group to the lecturer. The self/peer grades can highlight whether a member of a group made a valuable contribution. If a member was consistently graded higher than their peers, then that student can be perceived as having been a dedicated member of the group and a great contributor.

Group Time Week Formative Feedback from peers on the ½ hr presentation and ¼ hr question and answer session on
What was good about the presentation? e.g. I never knew that
What was bad about the presentation? e.g. It was inaudible at times
What was bad about the presentation? e.g. The problem could have been better researched, as.....
What was good about the presentation? e.g. The answers to questions were informative.

Figure 4: Formative peer assessment (feedback sandwich)

Self and Peer assessment of group collaboration

Name of AssessorMember A Member B.....

Member CMember D.....

Consider each member's contribution and effectiveness to the group task including your own.

Award 2 if the member contribution was outstanding and was an effective member of the team.

Award 1 if the member was average within the team.

Award 0 if the member's contribution and effectiveness was poor, minimum effort applied.

Area	Contribution, skill and effectiveness	M e	A	B	C	D
Problem Identification	Established features of the task and components of the task					
	Effectively researched the problem					
	Developed strategies to explore teaching the subject					
	Identified examples to demonstrate points					
Communication	Share information with others					
	Discussed and re-evaluated information with others					
	Presentation skills, able to communicate/teach the problem					
Planning	Established resources and schedule to meet the task					
	Planned their time, did not waste others					
	Established role within the group and others within the group					
Own performance	Disseminate and understand the information required from relevant sources					
	Showed good communication within the group					
	Continually re-assessed your performance in the group and your effectiveness, and improved performance (i.e. started off as the quiet member of the group, slowly became more vocal)					
Total Weighting Factor						

Justification of Self and Peer Marks Awarded:

Individual marks will be derived from the presentation, handout marks and reference list on Blackboard, but will be weighted according to peer and self-assessment results. Therefore each individual mark will be a true representation of their contribution to this assignment and will be unique to that person.

It is important to emphasize that this is team assignment, each team member contribution is important in order to meet the project's objectives and ascertain a good mark. A team who solely relies upon the effort on one individual is not acting as a team; the mark awarded will reflect this fact.

Individual marks will be calculated using the following formula:

$$I = G * (1 - ((AvePS - PS) / MaxPS))$$

where

I is individual mark

G is group mark for the assessment both lecture and lecture notes, Blackboard reference list

Figure 5: Peer and self-summative assessment group collaboration

Alternative Self and Peer assessment of group collaboration

Read each of the following questions carefully and consider whether each member and yourself have contributed effectively to the group. State whether you strongly agree, agree, disagree or strongly disagree with each question in respect to the indicated peer or yourself.

Self/Peer.....

Area	Contribution, skill and effectiveness	Strongly Agree	Agree	Disagree	Strongly Disagree
Problem Identification	You established the features of the task and components of the task.				
	You effectively researched the problem.				
	You developed strategies to explore teaching the subject.				
	You identified examples to demonstrate points.				
Communication	You shared information with others				
	You discussed and re-evaluated information with others?				
	You were able to communicate/teach the problem, i.e. have good presentation skills.				
Planning	You established the resources and schedule to meet the task.				
	You planned your time, and did not waste the time of others?				
	You established a role within the group and others' role within the group.				
Own performance	You disseminated and understood the information ascertained from the relevant sources.				
	You showed good communication skills within the group.				
	You continually re-assessed your performance and your effectiveness within the group and their performance improved with time				

Once completed the peer and self assessment form, please clarify your rational for your decisions.

Justification of Self and Peer Marks Awarded:

Figure 6: Alternative peer and self summative assessment group collaboration

Research Study Methodology of Peer Assessment In Practice

Participants of the Study

Peer assessment of both formative and summative assessment was applied in a core 10-credit curriculum module, titled: *Web-based Design and Development*. This was taken by computer networking students in a post-1992 university. The module ran for five years as a core module of a BSc Computer and Network Engineering course. A total of 217 students had studied the module over five years. The module consisted of three Assessments:

- Assessment 1 was a group assessment. A supplementary learning instruction approach was taken as described by Nortcliffe (2005). The students were required to conduct some research and deliver a lecture on a sub-topic of the module to their peers. This utilised peer-formative assessment feedback and peer-summative assessment;
- Assessment 2 was a group assessment to develop an enterprise website. This assessment utilised peer summative assessment;
- Assessment 3 was an electronic phase test consisting of 25 random questions from a pool of 50.

During each group's delivery of their lecture in fulfillment of module assessment 1, the student audience was asked to complete a peer-formative assessment feedback sandwich form (as shown in Figure 4) in order to provide constructive anonymous feedback to their peers. These forms were collated, photocopied and copies of the forms were returned to the group. The turnaround was typically within two days and in some cases on the same day.

Survey Research Methodology

Student reflection on innovative learning approaches was gathered each year, through anonymous, non-compulsory completion of a bespoke module survey. The survey questions deployed on the peer and self-assessment were similar to those developed and utilised in a pilot research study of whether computer engineers can lecture, teach and assess one another (Nortcliffe *et al.* 2002). The only difference was that the latter had an expanded Likert-scale as recommended by computer engineers. The surveys were deployed in the first three years in paper copy format and electronic format in the latter years using the institution's virtual learning environment (VLE) survey facilities. Each cohort of students were asked to complete the survey anonymously by the module leader after completion of a computer-based phase test at the end of semester one. For over five years, the survey was deployed to 217 students. The students were made aware that the collated data would be analyzed and used to inform the wider educational community on student perceptions of the methods used in the module. All data from survey has been collated and disseminated in an anonymous format.

Results and Discussion Peer Assessment in Practice

Peer Formative Assessment Feedback in Practice

The peer formative assessment feedback was used with every cohort over a five-year period. During this time, the author observed that students highly valued peer feedback more than tutor feedback. In the majority of cases, peer feedback provided students with a constructive critique of their group's presentation. The feedback was reliably verifiable and valid, as their peers were commenting on similar issues as evidenced in Figure 7.

<p>Group7..... Time 15:00-16:00..... Week ...9..... Formative Feedback from peers on the ½ hr presentation and ¼ hr question and answer session on</p>
<p>Examples of different student comments on what was good about a student group's presentation? e.g. I never knew that</p> <p><i>"internic.ent-didn't know about that"</i></p> <p><i>"Some of the slides were well presented. Comments passed about domain names and costs"</i></p> <p><i>"I was particularly interested about the section on domain names"</i></p> <p><i>"Emphasised the importance of backup"</i></p> <p><i>"Very clear well heard at the back"</i></p> <p><i>"Provided significant information which I could extract information from"</i></p>
<p>Examples of different student comments on what was bad about a student group's presentation? e.g. It was inaudible at times</p> <p><i>"Second speaker was good, but his slides were plain and didn't contain much contain much info"</i></p> <p><i>"Many were obliviously reading rather than remembering"</i></p> <p><i>"More research could of have been done...give more detailed data"</i></p> <p><i>"Conclusion seems unrehearsed"</i></p> <p><i>"reading off-sheet"</i></p>
<p>Examples of different student comments on what was bad about a student presentation? e.g. The problem could have been better researched, as.....</p> <p><i>"It seemed that it was well generally well researched...it was oblivious that some people didn't ...they were reading off a printed sheet"</i></p> <p><i>"Needed to be more interesting and longer"</i></p> <p><i>"They didn't ...estimate a total cost for all the services they talked about"</i></p> <p><i>"Points could have been made more forcefully to emphasis costs/benefits"</i></p> <p><i>"handout should contain more detailed info' than the presentation"</i></p>
<p>Examples of different student comments on what was good about a student group's presentation? e.g. The answers to questions were informative.</p> <p><i>"Fairly informative answers to questions"</i></p> <p><i>"Questions quite well answered"</i></p> <p><i>"Well presented, informative dialogue"</i></p> <p><i>"Interesting prices"</i></p> <p><i>"Most had good voice projection"</i></p>

Figure 7 Sample of student feedback quotes on a student group's presentation

As shown in Figure 7, peer-formative feedback generates a common voice bringing key feedback to the receiver's immediate attention. This highlights key positives and areas of concerns, either on the presentation skills or in presentation content. Also, as feedback was returned in a timely fashion it was relevant and fresh whilst experience of the presentation was still fresh in their minds. In principle, it enabled students to act upon information within the course timescales, preventing lost learning opportunities for students to reflect, develop

and progress their learning (Mutch 2003). This methodology in theory and in practice enables the lecturer to provide more effective and timely feedback to students. However, as shown in the following anonymous free comments by students in the survey on the self and peer-assessment (below), there are still areas for improvement as students are not always consistent in their peer assessments (Orsmond *et al.* 1996). To prevent these issues, students require guidance in giving professional, constructive feedback to their peers to minimize conflict (Mills and Glover 2006):

"A lot of them had very little points making it a waste of time, some were unreadable, but the ones that were readable did have some good points."

“Comments from audience were often conflicting with each other.”

Student Reflection of Self and Peer Assessment

Table 1 illustrates the first cohort of student reflections on the self and peer-summative assessment method as depicted in Figure 5 (Nortcliffe 2005). The feedback response rate was typically 73% per question. The questionnaire results illustrate that the majority of the students were positive about the summative assessment, indicating it is a fair and appropriate method assessment for this exercise and they are not averse to doing it again. Students believe that it did provide them with an opportunity to reflect on their own performance within the group.

Table 1: The First Cohort Student’s Reflection on the Self and Peer Assessment, A Cohort of 78 students and Response Rate Typically 73% per question

Question	Strongly Agree	Agree	Disagree	Strongly Disagree	Don't Know	Maybe	Can Be	Neutral
In general, can students assess fairly?	3	35	13	2	3	2	1	3
Did it empower you?	1	22	17	3	10	7		1
Was this a fair method of assessing each member's performance in a group?	3	20	17	3	14	2		3
Will the final mark of the assignment be a fair reflection each individual contribution?	1	23	15	3	13	2		1
Is the formula of weighting peer results with academic mark fair way to derive each individual mark?	1	20	12	5	13	5	1	1
Was the assessment method clearly explained?	1	18	7	2	13	15		1
Was peer assessment stressful?	2	34	7	9	3	1		2
Was peer assessment helpful for this assignment?		22	10	9	10	5		
Would you like to do it again to measure individual contributions in other group-work assignments?	3	14	9	10	14	5		3
Did the assessment guide assist in evaluating your peer’s performance to the group assignment?	1	26	14	2	8	5		1
Did the peer assessment guide enable you to reflect whether you were an effective member of the group?	5	22	4	6	13	5		5

However, comments made by students illustrate they still have the usual fears of peer assessment:

“It is very difficult to fairly assess those you have worked with. We are all human and emotion can often get in the way of expressing the truth.”

“Depends on the individuals some are too immature.”

“Peers tend to favour people they know over the people they don’t and be more lenient on people they know.”

Student reflection highlights the need for the tutor to spend time explaining how self and peer-assessment methodology should be applied and how it will be used summatively in the assessment process, ensuring that all students understand the process.

Nortcliffe (2005) concluded from the Table 1 survey results that the peer-assessment method depicted in Figure 5 could be improved in design to that illustrated in Figure 6. Therefore this methodology for self and peer-assessment could be used by:

- students to reflect upon their peers and their contribution and performance to group assessments;
- and the tutor to provide insight into group dynamics and performance, providing information to derive individual grades for each member.

The second and third cohorts of this module adopted alternative self and peer-assessment methodology (Figure 6) for the module group assessment 1. The summative self and peer-assessment (Figure 5) was adopted for group assessment 2. Tables 2 and 3 illustrate that students have no real preference as to which method of summative self and peer assessment used, though there was a slight leaning towards self and peer-assessment method (Figure 5) adopted in assessment 2. These cohorts agree that it was a fair method for assessing individual performance, which enables them to effectively reflect upon their own and their peers' performance within the group. However, contrary to views expressed by the first cohort, these students were not convinced that the method yields individual grades that reflected individual contributions to the group assignment. This may be due to the method of self and peer- assessment used in assessment 1 (Figure 6), which has not been explicitly defined as reflected in the method represented in Figure 5. Figure 5 illustrates how individual grades were derived from group mark and self and peer-assessment results, whereas Figure 6 does not. This is further supported by the following free comment:

“How can you assess people you work with or yourself without being biased especially when it is only tick boxes?”

Also the following free comments highlight other concerns by students about these methods of self and peer assessment, such as student bias:

“Peer assessment is a little awkward as it creates an atmosphere between group members and the assessments weren’t always fair.”

“Assessment could not be done dispassionately and was coloured by other issues, making [it] unfair.”

Table 2: The Second Cohort Student’s Reflection on the Peer Assessment, a Cohort of 44 students, and Response Rate Typically 74% per question

Question	Strongly Agree	Agree	Disagree	Strongly Disagree	Don't Know	Maybe	Can Be	Neutral
In general, can students assess fairly?	1	21	4	1		6		
Did it empower you?	1	10	9	2	5	7		
Was this a fair method of assessing each member's performance in a group?		16	11	1	1	3		
Was the method of peer and self assessment used in assignment 1 preferable to the one used in assignment 2	1	10	10	2	8	3		
Will the final mark of the assignment be a fair reflection each individual contribution?		9	12	4		6		
Was the assessment method clearly explained?	1	12	6	1	1	2		
Was peer assessment stressful?	2	12	14	2	1	3		
Was peer assessment helpful for this assignment?	2	12	14	2	1	3		
Would you like to do it again to measure individual contributions in other group-work assignments?	1	9	12	6		6		
Did the assessment guide assist in evaluating your peer’s performance to the group assignment?		22	8	1	1	2		
Did the peer assessment guide enable you to reflect whether you were an effective member of the group?	2	19	6	1		6		

Table 3: The Third Cohort Student’s Reflection on the Peer Assessment, a Cohort of 30 students, and Response Rate Typically 82% per question

Question	Strongly Agree	Agree	Disagree	Strongly Disagree	Don't Know	Maybe	Can Be	Neutral
In general, can students assess fairly?	2	13	6	2		2		
Did it empower you?	1	13	3	2	2	4		
Was this a fair method of assessing each member's performance in a group?	1	13	5	2	1	2	1	
Was the method of peer and self assessment used in assignment 1 preferable to the one used in assignment 2	4	9		3	6	1		
Will the final mark of the assignment be a fair reflection each individual contribution?	2	9	2	6		6		
Was the assessment method clearly explained?	3	9	9	9		1		
Was peer assessment stressful?	3	14	5	2		1		
Was peer assessment helpful for this assignment?	4	6	8	5				
Would you like to do it again to measure individual contributions in other group-work assignments?	2	10	8	1	1	1		
Did the assessment guide assist in evaluating your peer’s performance to the group assignment?	2	10	8	1	1	1		
Did the peer assessment guide enable you to reflect whether you were an effective member of the group?	2	13	5	1	1	1		

However, others found the approach refreshing and were reassured that individual contributions would be credited and reflected appropriately in the individual grades:

“If somebody had done extra work, or indeed less than the others it was nice to know that they could be recognized for it.”

As a result, second and third cohorts showed no strong preference as to which method of summative self and peer assessment to be used (Tables 2 and 3). To simplify module administration, the fourth and fifth cohorts of the module returned to using only Figure 5 method of self and peer-summative assessment for both the module group assessments 1 and 2.

The fourth and fifth cohort student reflections on the self and peer-summative assessment are illustrated in Tables 4 and 5. The results concur with the initial year of application; that students can assess fairly. However, these findings were more positive than previous cohorts, indicating that this is a fairer method of self and peer reflection of group member performance and of computing individual grades. This could indicate that students are less confused between methods of peer and self assessment as only the method depicted in Figure 5 was used. This method is more transparent as to how individual grades are computed. However, the survey results indicate that the author has been more successful in some years than others in explaining the methodology. Despite the students agreeing the methodology is a fair and valid approach to assess their peers, the students are still not keen to adopt this approach again. This is consistent with previous research, as students would prefer self and peer-assessment to be used limitedly in their course (Rushton *et al.* 1993 and Brew *et al.* 2009).

Table 4: The Fourth Cohort Student’s Reflection on the Peer Assessment, a Cohort of 41 students, and Response Rate Typically 28% per question

Question	Strongly Agree	Agree	Neither Agree or Disagree	Strongly Disagree	Don't Know	Maybe	Can Be
In general, can students assess fairly?	7	2	1	1		2	
Did it empower you?	2	7	2	2			
Was this a fair method of assessing each member's performance in a group?	1	6	1	1	1		
Will the final mark of the assignment be a fair reflection each individual contribution?	2	3	1	1	1	2	
Is the formula of weighting peer results with academic mark fair way to derive each individual mark?	5	2	3		1	1	
Was the assessment method clearly explained?	4	2	6				
Was peer assessment stressful?	6	2	2		1	1	
Was peer assessment helpful for assignment 1 and 2?	2	5	3		1		
Would you like to do it again to measure individual contributions in other group-work assignments?	1	4	2	2	2		
Did the assessment guide assist in evaluating your peer’s performance to the group assignment?	1	4	3	1	1	1	
Did the peer assessment guide enable you to reflect whether you were an effective member of the group?	2	4	4	1			

Table 5: The Fifth Cohort Student’s Reflection on the Peer Assessment, a Cohort of 24 students, and Response Rate Typically 94% per question

Question	Strongly Agree	Agree	Neither Agree or disagree	Strongly Disagree	Don't Know	Maybe
In general, can students assess fairly?	10	3	3	3		1
Did it empower you?	6	5	5	4		
Was this a fair method of assessing each member's performance in a group?	2	10	4	0	4	
Will the final mark of the assignment be a fair reflection each individual contribution?	1	9	3	3	2	2
Is the formula of weighting peer results with academic mark fair way to derive each individual mark?		9	4		2	3
Was the assessment method clearly explained?	3	7	31	6		1
Was peer assessment stressful?	1	4	6	8	1	
Was peer assessment helpful for assignment 1 and 2?	1	4	4	5	4	2
Would you like to do it again to measure individual contributions in other group-work assignments?	2	3	3	7	5	
Did the assessment guide assist in evaluating your peer’s performance to the group assignment?	2	5	3	4	3	2
Did the peer assessment guide enable you to reflect whether you were an effective member of the group?	1	8	5	5		2

Group Time Week

Formative Feedback from peers on the ½ hr presentation and ¼ hr question and answer session on ...

What was good about the presentation? e.g. I never knew that ...
What could have been improved in/on the presentation? e.g. Need to rehearse more...
What could have been improved in/on the presentation e.g. Need to be completed more detailed research, as...
What was good about the presentation? e.g. The answers to questions were informative.

Figure 8: Improved Formative Peer Assessment (Feedback Sandwich)

Conclusion

Can students assess themselves and their peers? The evidence suggests 'yes'. Peers can assess one another. Peer formative assessment can be an effective means of providing timely and detailed feedback to students and timely opportunities for the students to reflect upon their learning and understanding. Both current and previous students valued their peer formative feedback sometimes more than the feedback offered by their tutor. However, this approach could be further enhanced by advising students to offer constructive professional feedback to ensure more students provide valued feedback. Also, the feedback sandwich framework could be further enhanced, as shown in Figure 4, to enable students to support their peers' learning development by highlighting areas for improvements in their assessment. This approach is currently used by the author.

The student reflection indicates more recent cohorts were more responsive to peer and self-assessment. The students do agree that self and peer-assessment is a fair method of assessing individual contribution to group-work. However, it is important that the tutor spends time ensuring that all students understand the approach being used. Essentially there is a need to explain that a summative peer assessment process is the means for students to reflect upon whether they or their fellow peers had completed a required component, and which degree of competency was required to fulfil the learning outcomes of the assessment. Students should not be afraid of self and peer-assessment, as in reality we all apply peer-assessment in our daily lives (Nortcliffe *et al.* 2002). In the future, students will work in teams in the commercial sector and may confront difficulties working alongside individuals. So, they will need to adopt a professional attitude and the ability to evaluate one another's strengths and weaknesses. In conclusion any successful summative peer assessment implementation should adhere to Nortcliffe *et al.* (2002) peer-assessment strategy recommended for best practice for any summative assessment:

- Moderate grades (Mindham 1998) highlighted the need for moderation to resolve the issues of equal marks and provide objectivity;
- Use a guide or weighting factor in conjunction with the academic's mark (Mindham 1998);
- Ask students to provide either verbal or written justification for the allocation of marks (Mindham 1998);
- Promote anonymous marking or marking under exam conditions, i.e. in silence and not over seeing one and another's forms, thus reducing the threat of undue influence by others. This allows the peer assessment to be a true reflection of the impact, contribution and effort of each individual within the group (Mindham 1998);
- Provide clear guidance to the students and assessment criteria to ensure consistent peer assessment (Mills *et al.* 2006);
- Carefully plan groups to be homogenous (Heyward 2000), in order to minimise personality clashes, racial prejudice and friendship bias;
- Ensure that assessment criteria are carefully planned and implemented. Keep the assessment criteria simple and check that all the students interpret it in the same way. If flaws arise, reflect on the assessment and revise it (Sher 2001);

- Staff to take on supportive and tutor role. Sher (2001) found staff were more available to support students and answer questions, than if preoccupied with marking;
- Remind students that peer assessment is a part of everyday life;
- Highlight the advantages and benefits of being involved in peer assessment, e.g. academics cannot be there twenty-four days, seven days-a-week, and a higher level of learning can be achieved by reflecting on one's own performance and that of others.

Future work

However it should be noted that collating individual paper-based or electronic peer assessment forms is time consuming. It requires the module leader to collate and enter data and computations into a spreadsheet, which in the author's experience can take half-a-day for a cohort of sixty-students. Also, as the form is made available on the VLE, the author increasingly has experienced the students submitting an e-copy of the form via email to the tutor, enabling them to complete the form easily in isolation and ensuring anonymity (good self and peer-assessment practice). Therefore future is in digitalization of the process, both to aid staff workload, and meet student expectations. WebPA, and the new self and peer-assessment feature in the VLE Blackboard already offers academics the opportunity to digitalise Figure 5 self and peer-assessment method and other approaches. WebPA is simple to implement and efficiently computes student individual grade from group mark as well as their self and peer-assessment of their performance and contribution to a group assessment (Loddington and Crawford 2007). This depends on all group members completed the self and peer-assessment. In addition, digitalization of the self and peer-assessment process would reduce the administrative burden upon the tutor in collating and computing individual grades. Therefore, this would enable grades to be communicated to students in a more timely fashion.

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