How can student peer assessment be used to improve the quality of student learning?

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Abstract
This study looks at student peer assessment as a learning tool and a way of enhancing student learning at a university in England. Peer assessment is a formative process and has the aim of improving student understanding of learning as it happens, through assessing each other's work against set marking criteria. In addition, the aim is to improve students' subject knowledge, the quality of learning and ultimately the quality of summative assessments. Peer assessment has gained increased popularity in the recent years, with the growing focus on collaborative learning (Pearce, Mulder and Baik, 2009). The aim of this study was to determine if peer review, as part of formative assessment, can improve student understanding of the assessment process, which, in turn, should improve student learning. Moreover, the study was designed as a resource for improving for teaching staff, who may wish to consider integrating student peer assessment in their modules. Although there are benefits and limitations to using this method in teaching, the study suggests that the benefits outweigh the difficulties and recommends that student peer assessment is used as an alternative way of finding the balance between different forms of assessment.

Key words
Peer assessment; critical feedback; collaborative learning; learning tool; different perspectives; student confidence; student engagement.

Introduction
Sambell, McDowell and Montgomery (2012) observe that formative assessment goes hand-in-hand with learning. Furthermore, they observe that both summative and formative assessment promote learning, but summative assessment is usually the focus for students. NUS Connect (2015) suggests shifting the balance away from summative assessment towards more formative assessment in order to make it a valuable tool for learning. Although there is a significant amount of literature focused on summative assessment (Sambell et al., 2012), an area of formative assessment, student peer review, has been chosen for this research. This study aims to explore the benefits of student peer review as a learning tool and what changes might be needed to the current system in order to facilitate this.

Research context
The main research activity in this study consisted of a peer marking exercise, whereby five trainee primary teachers (Year 1, BA students) at a university in England marked each other's Science work and gave feedback. All the students were volunteers from my Science group. The timeframe for this project was five weeks; this included meetings with students and preparation for the task.

Chapman (2014:2) argues that it is more helpful to the students 'to provide feedback BEFORE the assessment is due'. As a way forward, she suggests a dialogue between students and lecturers, as a two-way process, in order to gain maximum benefit from formative feedback. She recommends peer review exercises in pairs or small groups, as a way of helping students in understanding the feedback and ultimately assignment tasks. The work students were given in this study was deliberately related

to their summative assignment task, in order to gain maximum benefit from the exercise. It was hoped that the task would establish effective classroom dialogue, support learning which happens beyond the formal curriculum and encourage students to work collaboratively and engage in an ongoing flow of informal feedback (Sambell et al., 2012).

My interest in formative assessment as a valuable strategy in improving assessment experience has increased since joining the University and noticing students' particular interest in summative assessment only, i.e. their grades. Sadler (1989) confirms this notion by stating that students often do not bother to read feedback and they do not retain what is written, except the grade. Hager in Rainbird, Fuller and Munro (2004:249) explains the assessment of student attainment 'has largely been shaped by its assumptions', when learning is demonstrated by reproducing verbal or written work, with numbers and grading to quantify the amount of learning demonstrated. Race (2015:97) highlights that the National Student Survey in the UK since 2005 'has repeatedly shown' that the areas where students express least satisfaction are those linked to assessment and feedback. Race (ibid) adds that 'feedback is the oil that lubricated the cogs of understanding'. Similarly, Boud (1988) observes that lecturers have to make formative feedback work and that assessment has a greater influence on learning than any other factor, including teaching materials.

Literature review
This section provides an overview of the features of formative assessment and highlights a rationale for adopting peer assessment as one of the effective strategies.

Assessment *for* learning is formative and is designed to inform student learning, as well as enhance their success (Purnell, 2011). It can take many forms. Peer assessment is a form of shared learning in which students provide feedback on each other's work (Vickerman, 2009). It should be introduced early in the process in order to maximise the development opportunities for students. Falchikov (2006) agrees that peer assessment is a useful and valid exercise. The participants in her study found the exercise to be beneficial, although some expressed dislike of awarding a grade to their peers, in the context of a small and well established group. Similarly, Black and Wiliam (1998) observe that peer assessment is a strategy widely used in schools and it is instrumental in raising standards. They raise an important point; that improved formative assessment helps low achievers, more than any other students. Similarly, frequent assessment feedback help students with learning disabilities and enhances their learning (ibid:3). According to them, significant learning gains lie within educators' grasp and we need to take advantage of them. They suggest new ways of enhancing feedback, as well as using the results to adjust teaching and learning.

Bloxham and Boyd (2007:52) argue that formative assessment should be 'an integral part of teaching and learning'. According to them, it is valuable to lecturers too, who should use formative assessment to inform and adapt their teaching 'as they go along' (ibid). It was therefore intended that this research would inform the teaching too.

Improved formative assessment practices, which would improve students' understanding of the assessment process, which, in turn would enable more effective learning are shared common goals, that have been discussed with academic colleagues, module leaders and mentors. It has therefore been decided that action research is well suited to this investigation, with the purpose of focusing on student peer review in order to improve students' assessment literacy, as well as teaching practice at the University, improve student learning as it happens and definitely BEFORE summative work is due. This research was designed to maximise students' understanding of the process and improve their confidence.

Benefits of student peer assessment
In the literature one can find many instances of acknowledgement of the benefits of peer assessment. For instance, Meer and Chapman (2015, p.3) argue that peer assessment can be a 'useful tool to engage students in using marking criteria'. They quote Carless *et al.* (2006) who highlight the importance of student engagement in the learning process. It is crucial to use a 'learning-oriented assessment' (ibid), which should focus on developing the '*learning* elements of assessment, rather than measurement' (ibid).

Research has shown that there are many reasons why peer review should be encouraged and supported in the classroom. For example, Yorke (2002) in Race (2015:101) emphasises a strong link between formative assessment and student retention. If students do not know what they are doing and how they are doing, 'a negative mindset can easily develop, leading to a downward spiral and ultimate drop-out'.

Furthermore, Boud (1995) observes that peer assessment encourages students to consider purposes and objectives of assessment tasks. It is an effective way for students to gain a better understanding of the assessment criteria, as some ownership of the assessment process is transferred onto them (Figure 3.). This argument is supported by Hanrahan and Isaacs (2001), who suggest that by using peer assessment, students are provided with a better understanding of assessment requirements and what exactly tutors are looking for. They note that student involvement will alert students to problems and dilemmas tutors face when marking. Moreover, Race (1998) stresses that this process enables students to critique and view a range of styles and ideas, which will make them reflect on their own work and mistakes they have made (Figure 5.). In similar fashion, Topping (1998) proposes that peer assessment improves student verbal and written communication skills and enhances meta-cognitive awareness. Another argument for the use of student peer assessment is improved cognitive development. Healey and Jenkins (2006) quote Magolda (1999), who found that students engaged in research-based learning develop more sophisticated levels of intellectual development.

Furthermore, Rust, O'Donovan and Price (2003:145) observe that 'Active engagement of students may improve their grades'. Brindley and Scoffield (1998) also suggest that this process encourages reflection, promotes self-assessment skills and provides valuable experience for the future workplace. The participants' expectations of improved self-confidence, grades and reflection skills have been closely matched in this study (Figure 6.). Norton (2009) adds that students will really like and benefit from having a research active lecturer who sets a good example and shows interest in their subjects.

Consequently, Race et al. (2005) propose that any form of formative assessment should start as early as possible in a course of a module. Students will benefit greatly from having early feedback from both tutors and peers, and knowing how well they are doing. They add that timely assessment should motivate students to learn; if it is left too late, motivation may be lost. In like manner, Meer and Chapman (2015) quote Nulty (2011) who argued that peer assessment should take place in the first year of University, in order to smooth the transition and raise expectations. Therefore, I chose to carry out this project with the Year 1 students, in order to encourage the students to be reflective and critical early on in their studies.

This links to Ballantyne et al.'s (2002) observation that the chosen assessment task should be one with which both staff and students are familiar, a stand-alone item of sufficient complexity and length, which would require critical analysis by students. If everyone is prepared and familiar with the task, then there is a higher chance of it being successful; teaching and learning will improve too.

Limitations

Some authors raise issues and potential impediments to engaging in this process. Pearce *et al.* (2009) raise questions about the credibility of student peer assessment, namely reliability, bias and fairness. Their main concern is variation in review quality. They indicate that student confidence in their own ability to peer assess is one of the major obstacles to student learning. In addition, Biggs and Tang (2007) observe that some students resent commenting on other students' work, as assessment is solely the tutor's responsibility (Figure 1. and Figure 2.). Likewise, Cheng and Warren (1997) state that students may lack confidence in their own ability, but also they may doubt the competence of their peers (Figure 5.). To deal with this concern, they advise providing guidelines and training as well as discussion on the rationale and benefits of peer assessment. Hanrahan and Isaacs (2001) further explain that students may not take the process seriously as it does not count for marks and it may not be read. Chapman (2014:2) highlights that this may be true even in the case of summative assessment: 'Once the feedback is accompanied by a mark, it is unlikely to be read'. In addition, Ballantyne, Hughes and Mylonas (2002:429) observe that students may be reluctant to award low grades to their peers, even when they are deserved and some students may be uncomfortable with the whole process, as they felt 'unqualified' to mark others' work. In this study, I ensured that these issues were dealt with by organising thorough training of the focus group: face-to-face meetings, providing written information and answering questions, both verbally and in writing. Guidance was provided during each step of the process. Furthermore, each student marked two pieces of work, which eliminates 'the single reviewer' bias (ibid:19).

Wareham and Trowler (2007) reflect on the dimensions of the 'Teaching-research nexus' and its importance and limitations. In their opinion, the research has to be embedded in the curriculum and the research influences what and how of curriculum design. One of the limitations is a patchy coverage of the curriculum and in that case transmission of essential knowledge is affected (p.4). In this study, I was keen to integrate student peer assessment more effectively and prominently into the University curriculum. Similarly, Healey and Jenkins (2006:45) observe that, in order to integrate research and scholarship into undergraduate courses, researchers need to have a solid knowledge of the curriculum, as well as of national policies and departmental and institutional structures. In addition, they explain how the challenges to developing effective teaching-research links are greatest at the undergraduate level, but they are also applicable to postgraduate courses.

To conclude this section, Pearce *et al.* (2009) and Ballantyne *et al.* (2005) note that, although student peer assessment has been reviewed in relatively small number of subjects and its benefits have been questioned, it appears that this strategy is generally perceived as valuable in student learning, it is well received by students and that limitations are outweighed by the learning benefits for students.

This section has explained how different views of peer assessment might be approached to make teaching and learning more effective. The process encourages students to take an active role in managing their own learning and understanding the assessment process.

Methodology and investigation

This study looks at student peer assessment as a learning tool and a way of enhancing students' assessment literacy. I decided that action research was well suited to this study. Baumfield et al. (2013:3) observe that the term 'action research' was first used by Lewin (1946) who described it as 'research that will help the practitioner'. Similarly, Somekh (1995:340) in Cohen, Manion and Morrison (2011:345) states that 'action research is designed to bridge the gap between research and practice', therefore it strives to overcome the perceived failure of research to impact on practice. In addition, Stenhouse (1979, in ibid) suggests that action research should contribute to practice, as well as a theory of education and teaching, making it more accessible to others and making educational practice more reflective. Mc Niff (2013:8) agrees that we have to evaluate what we are

doing and constantly check that what we are doing is working. The intention is that, through action research, 'one person improves their work for their own benefit and the benefit of others'. In addition, McNiff (2013) links individual's work with the work of the whole organisation and discusses the benefits of research collectives, once enquiries and ideas have been shared. She adds that change is often involved and may destabilise the organisation and threaten managers. However, she highlights that change can be 'liberating and exciting' too (p.8) and that it is up to us whether we wish to engage or not.

The research method involved a mixture of qualitative and quantitative questions in the two surveys and a qualitative and quantitative marking test. For this research task, a Focus group of five Year 1/ BA QTS students was formed. This is a very small sample and therefore any generalisability is not possible. However, the research highlights an approach that could be useful for the improvement of student assessment literacy. Each student was asked to complete a task in two skills each for their Year 1 Science and DT assignment, which was then marked by their peers. Therefore, the formative task was topical and relevant to the summative assignment. The skills they marked were 'An ability to identify and apply key ideas and themes to the chosen context' and 'Evidence of an appropriate range of reading and resources to support your discussion'. Everyone completed the same skills to ensure parity. In order to ensure anonymity, each student was assigned a code.

The students were asked to complete a short pre-survey questionnaire (10 mins), designed and pre-populated by the researcher. The questions asked about students' previous experience of peer review, their confidence as peer assessors, their confidence into their peers' suitability to assess their work and ultimately, how they think their written work will improve as a result. Barbour (2008:115) highlights the benefits of short questionnaires prior to interviews or other tasks as this ensures that 'all such details are recorded in one accessible place. Furthermore, this information is invaluable when researchers start to identify patterning in their data.

I then asked the students to peer review two pieces of work, anonymously, 15 minutes each. I provided the marking criteria, which included a numerical grade too. Students were then given a chance to read the peer feedback (10 mins) and completed a post-survey questionnaire (10 mins), which I designed and pre-populated. It contained a mixture of quantitative and qualitative questions. Baumfield, Hall and Wall (2013:22) note that the types of questions we ask will be different at different times but they are usually influenced by 'own our preferences and our awareness of audience'. My own preference was to use qualitative questions, but I needed solid, measurable data, that I could only collect by using a range of quantitative questions. In the quantitative questionnaire, the students were asked if their confidence as peer assessors has improved, if the exercise was useful, how they felt about their peers' feedback and if they think that their written work will improve as a result of this exercise. Barbour's guidelines (2008) were followed. Barbour suggests starting with the least threatening questions and moving gradually to more probing ones. In addition, she recommends using open-ended questions '… to allow respondents to elaborate' (p.115). Finally, I compared students' grades with my own, once the students submitted their summative pieces of work (Figure 7.).

Murray (2008:132) observes that conducting research requires sensitivity to the effect of our research methods on those around us, particularly our participants. As a researcher, I had to consider all the possible moral dimensions of what I was doing (ibid) and I keep my participants informed at every stage of the process. During this research project, ethical consent was taken into consideration throughout the process. Informed consent was gained and participant information sheet was provided to all the participants. Moreover, additional information was provided during two face-to-face meetings. According to the BERA Guidelines (2011), a researcher has clear responsibilities towards their participants. This research has adhered to these guidelines; students signed the

participant consent form, openness and disclosure were discussed as well as their right to withdraw at any time. When participants decide to take part in a research project, researchers incur serious ethical obligations towards them. Moreover, Scott in Scott and Usher (1996:69) points out ethical dilemmas associated with research: 'Gathering information bestows certain obligations on the gatherer and yet they are motivated by conflicting impulses'. My results had to be credible, of course, but the participants' account of reality could have been totally different to mine. Scott (ibid) stresses that the way the researcher chooses to manage the data is crucial; it determines 'the epistemological status of those data'.

Sharing recorded data and the results of research with participants is another important ethical consideration, observed by Murray (2008). This consideration has been adhered to as part of research etiquette. The students' feedback was that this clear information provided by the researcher, as well as the reciprocal beneficial nature of the project, highlighted by Giddins and Wood (2005), were major factors for the focus group students to encourage them to volunteer for this research.

Survey results

Five students took part in the study. The response rate was 100%. Turner (2010:759) highlights how important it is for the researcher to 'make sense' of the data and compile the data into groups or sections. Pearce et al. (2009) observe that it is important to seek feedback from students first about their learning expectations and experience and prepare students accordingly. Therefore, in order to assess the effectiveness of the exercise, a suitable questionnaire was designed in order to gather valuable information from students.

Figure 1. shows that one student has never taken part in a study like this, two have participated once and two students took part more than once. I wanted to see how experienced the participants were and the survey provided a clearer picture. Pearce et al. (2009) explain that student peer reviews may vary in quality significantly, due to the two main factors, 'either lack of skill and experience or lack of effort and motivation' (ibid:17). They suggest advice and training as two critically important forms of support. To deal with this area and eradicate any concerns, I provided detailed guidance during our briefings (Cheng and Warren, 1997).
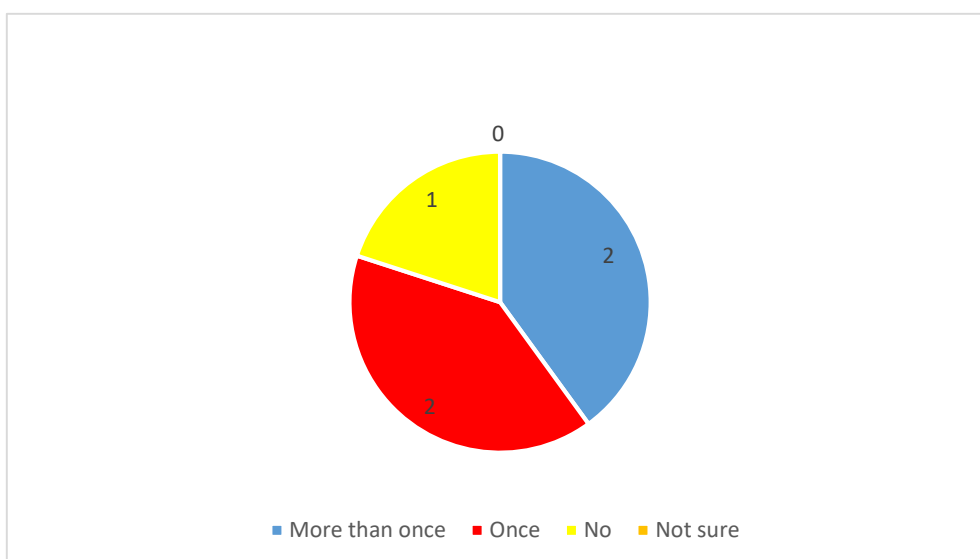

Figure 1. I had previously participated in peer assessment before undertaking this project.

Figure 2. identifies that only one student indicated in the survey that they felt confident in their ability as a peer assessor and one indicated that they were not confident at all. In the post survey evaluation, the data showed a sound increase in the 'confident' outcome (from 0% to 60%), but there was a 20% decrease in the 'neutral' outcome. I provided tutorials and briefings, in order to prepare the participants, but Pearce et al., (2009:17) suggest that they may be insufficient on their own without some form 'of opportunity for learning by doing'. Brindley and Scoffield (1998) stress that one of the key benefits of peer assessment is improved student self-confidence, a goal that has been achieved in this study.
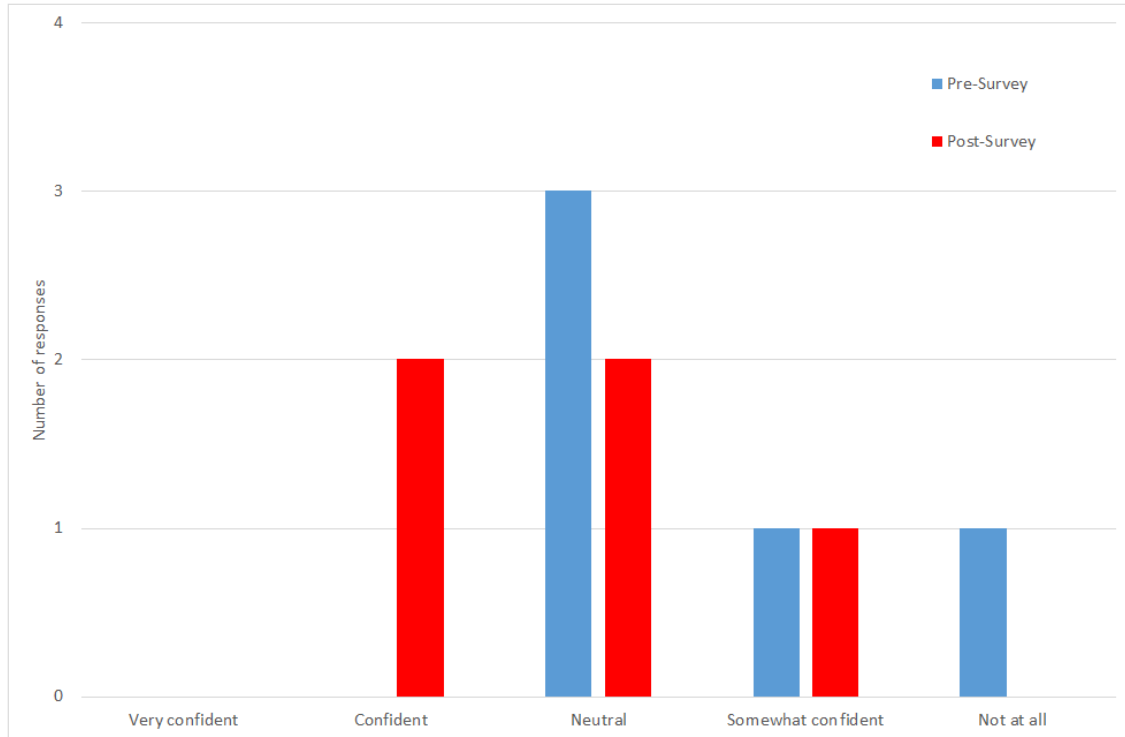
Figure 2. How confident are you in your ability as a peer assessor?

As shown in Figure 3., students had high expectations of peer assessment being of value to their learning, with 100% expecting a 'useful' or 'very useful' outcome. After the exercise, post survey evaluation reasonably closely matched their expectations with a significant increase of 40% indicating the exercise was 'very useful', but there was a 60% decrease in 'useful' and somewhat useful' outcomes. Topping et al. (2000) in Ballantyne et al. (2002:42) highlight the cognitive challenge and the strain of peer assessment as one of the least liked features in this process.
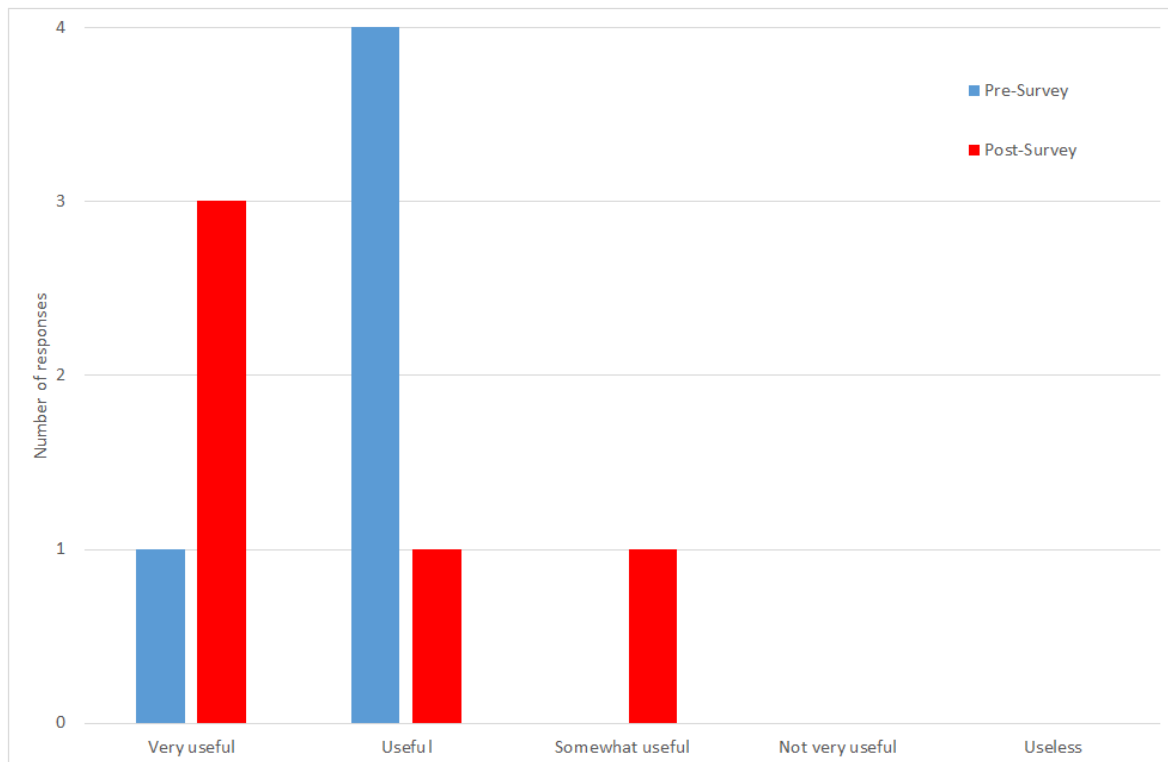
Figure 3. As a learning tool, I expect peer assessment to be.

Figure 4. demonstrates that 'Marking and receiving feedback' seemed to be more valuable to students than any other outcome (80%). One student (20%) indicated that they expect most from receiving feedback. There was no change between pre and post survey data, which indicates that the students were very clear in their expectations. These evaluations show that their experience was positive and useful (as the task was directly related to their summative assessment) and that 'they have learnt from providing and receiving reviews' (Pearce et al., 2009:13).
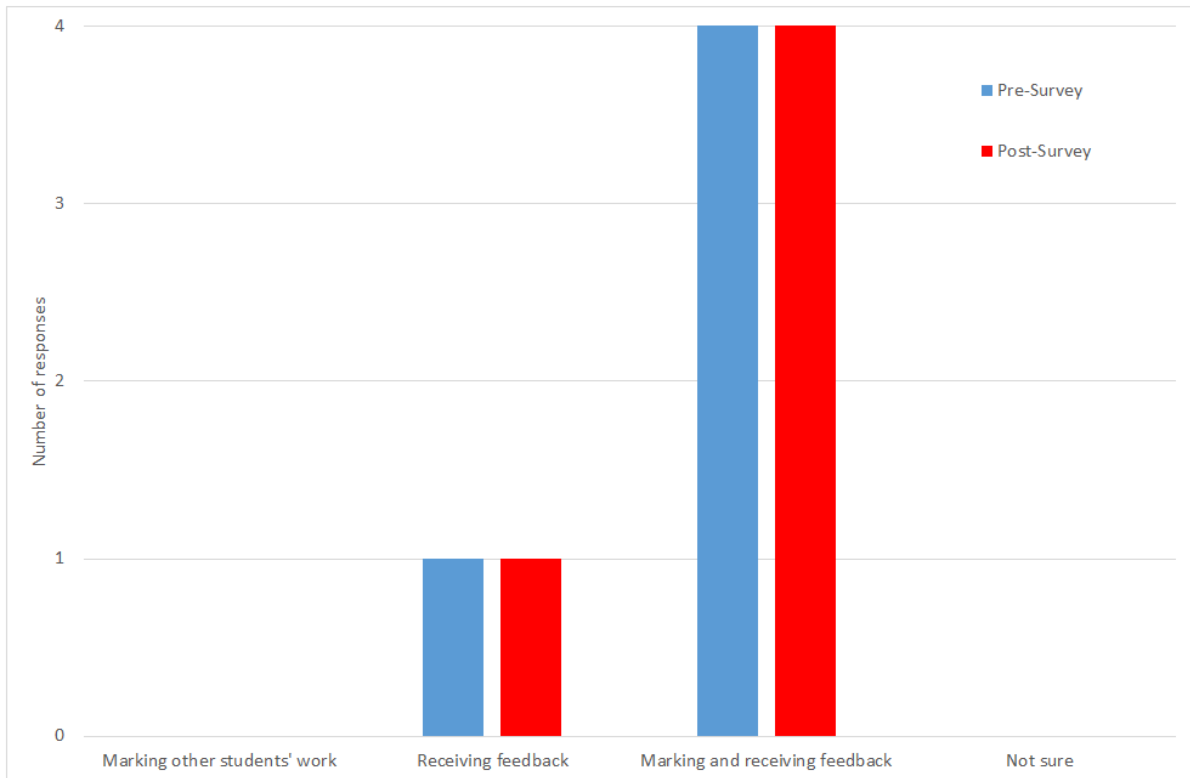
Figure 4: I expect I will learn most from.

The students provided an overwhelmingly positive response to the next question. Figure 5 shows that they had high expectations of their peers' ability to provide feedback and that was obvious in the data. 100% of students agreed that they felt their peers were well qualified to provide critical feedback. This includes an increase of 20% from 'neutral' to 'agree' in the post-survey evaluation. Marking peers' work and seeing work of other students is a huge benefit (Pearce et al., 2009:13). They remind us that we, assessors, are used to viewing dozens of assignments on a given topic and we sometimes forget that students have a different perspective, as they submit their assignment in relative isolation. Moreover, they stress that critical feedback allows students to benefit from peer input, helps them to understand the process of assessment better and ultimately helps them with final submissions.
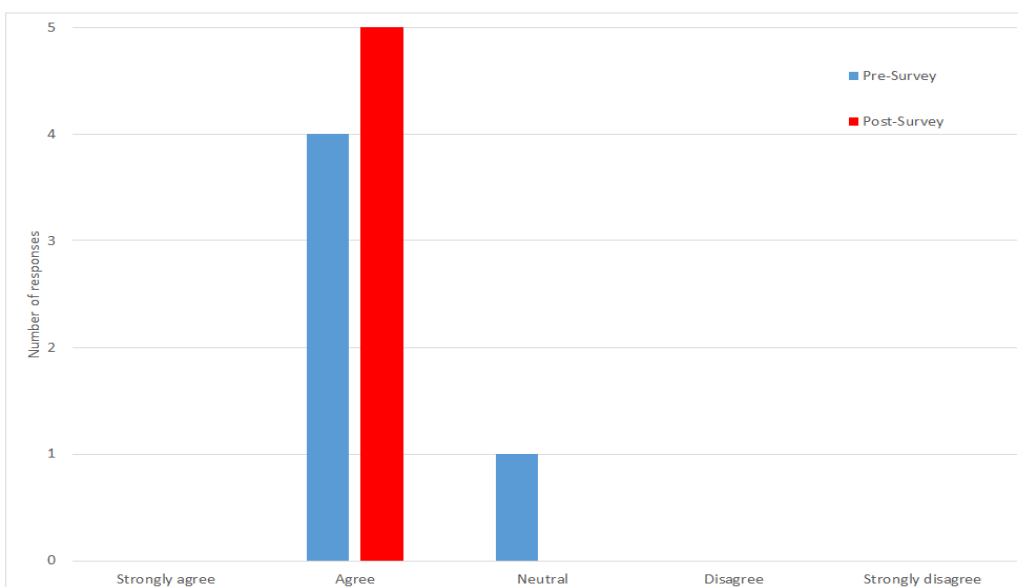
Figure 5. My peers are well qualified to provide me with critical feedback on my work.

This was an interesting outcome. Figure 6 suggests that the students were overwhelmingly positive about their peers' ability to mark. Contrary to some research theories that question the credibility of peer feedback, the data showed that 100% of the students 'agree' or' strongly agree' with the statement that their written work will improve as a result of this project. Ballantyne et al. (2002) observe how students often lack confidence in both their own and their peers' ability as assessors. Surprisingly, the students in McDowell's study (ibid:429) were not convinced that their peers would mark fairly. Similarly, Pearce *et al.* (2009:16) stress that in peer reviews, there may be some concerns about the likely quality of reviews, due to students' inexperience and better marks being awarded to their friends. However, on this occasion, all students were well prepared and these issues were discussed during our briefings. After the exercise, there was a 40% increase in the 'strongly' agree' outcome, but 20% decrease in the 'agree' outcome'.
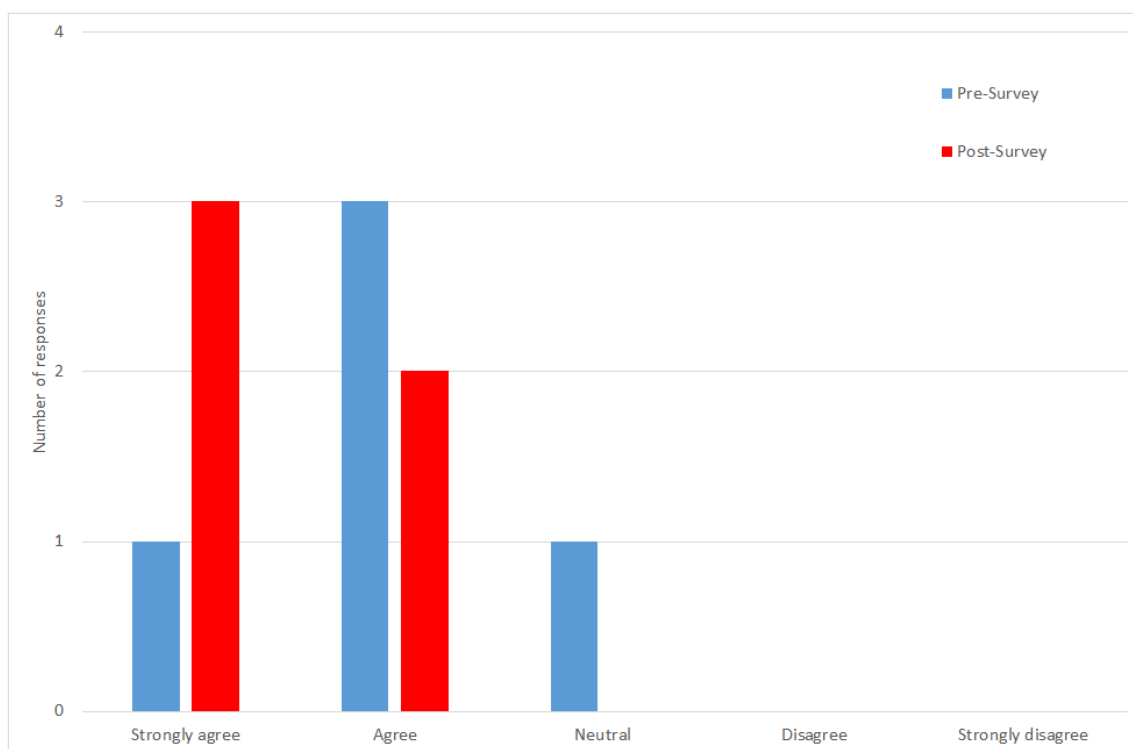

Figure 6. My written work will improve as a result of the feedback I received or wrote.

In the final phase of the project, I marked the students' summative work and compared the marks with the students'. As shown in Figure 7, although there were minor alterations of the grades (40% were increased and 60% were decreased), it appears that students were reasonably accurate in interpreting criteria and conducting evaluation. Sambel et al. (2012) observe that, in order to avoid relying on lecturers to perform evaluative judgement of students' work, a systematic approach is needed, where students are trained and engaged in a sustained and planned manner. That way, students will be 'gradually inducted into the process' (p.122) and their effective evaluation skills will be developed. In this research, students were trained in a professional and timely manner; therefore they were able to complete the task successfully.

The grade allocation was an important indicator of the extent of students' assessment literacy. Meer and Chapman (2015) observe that the more practice that students have in dealing with marking

criteria, the better will be their understanding of the process; 'This is evident by the fact that the students are better at grading each other than themselves' (p.4).
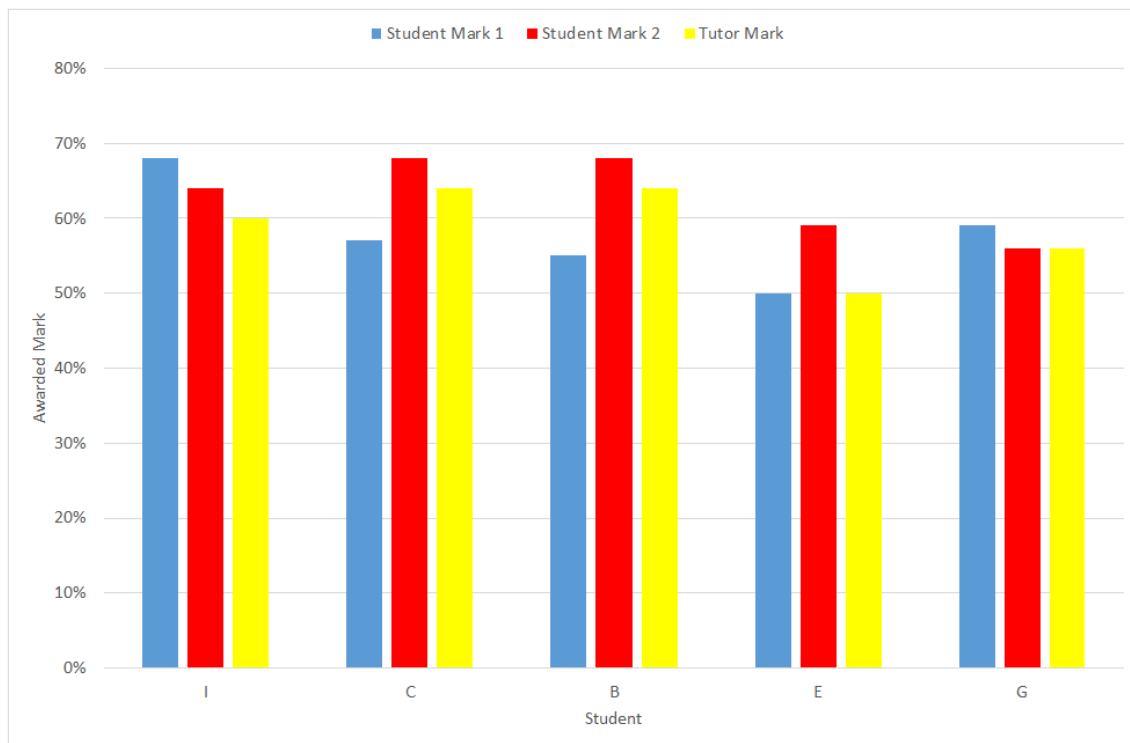

Figure 7. Lecturer's grades compared to students' grades.

The students were given an opportunity to write comments both before and after the peer review process. Table 1 shows that the main expectations were related to understanding the assessment process better and gaining different perspectives., which would ultimately improve their grades. The experiences closely matched their expectations, with one student stating that marking was harder than they originally thought. All students thought that the exercise was useful. Students' general comments support the impression that there was significant value in doing this study and potentially integrating student peer assessment more prominently in all modules across the University. Purnell (2011) points out that this information can be used to shape future teaching and inform future practice. Therefore, this research will be shared with the University staff via staff training sessions and teaching conferences. Ballantyne *et al.* (2002:437) stress that it is desirable to maintain this cyclical process of 'action and reflection' together with continuous monitoring of the outcomes. Consequently, I have adapted my teaching and ensured that peer review tasks are used in all the modules I teach.

Table 1. Examples of qualitative questions and comments in each of the category illustrate a range of responses.

Question:	Students' responses:
Pre-survey What do you expect from this exercise?	I expect to have a clearer understanding of the assessment task. To get ideas on how answers were structured and see what parts pick up marks.

	To gain a better understanding and knowledge of how marking is carried out and what is expected to achieve a better grade. To get someone else's perspective rather than the teacher's. I believe that the feedback I receive will support my learning and make improvements on my work as I am an individual who learns quickly from peers/friends. To gain perspective on how active student interaction feels in action and works as an active principle.
Post-survey Did this experience match your expectations? Explain why.	Yes, because it has given me a better understanding of what I could do to improve. Yes, it was similar to what I expected it would be. Very useful and enjoyable gaining another perspective – as if from the teacher's perspective. I was expecting improvement feedback as I knew my work needed improving. However, I was not sure what I had to improve. I knew I would get feedback on proofreading which I did. It was harder to mark my peers' work than I thought. Now I understand what parts to include to get higher marks. Also, the feedback and comments on improvement give me an idea on what to do better next time.
What aspect of the peer assessment did you find most useful? Explain why.	Receiving feedback from other students. Mark other people's work. It was harder than I expected. Now that my peers have suggested proofreading, I will proofread my work twice, ensuring it makes sense before handing in. Feedback was more useful because it gives me an idea of what went well and what to improve in for other assignments. Receiving the feedback.
Any other comments.	I am happy as I am now clear on what improvements I need to make. I felt as though I may have been more generous with the mark as I thought that my peers may have known it was me that marked their work. Great exercise! Thank you for the opportunity! Two students left no comments.

Discussion of Findings

The study suggests that there are benefits and limitations to using student peer review in teaching, but it was clear from the study that the benefits in relation to student learning outweigh the difficulties. One of the main benefits is that peer review allows students to get a different

perspective, rather than a single perspective (the lecturer's), which usually includes some form of commentary with a mark attached (Pearce, Mulder and Baik, 2009). Helmes and Haynes (1990) in Bloxham and Boyd (2007) observe that students are more likely to contribute to the process if they know their efforts will be rewarded. The participants in this study have found that peer feedback was useful as it gave them an indication on what went well, what they could improve and how their grades might be affected.

In addition, it was interesting to note that these first year students have found marking their peers' work more difficult than they thought, but they all agreed that the exercise was beneficial. Ballantyne *et al*. (2002) observe that students' prior experience with assessment tasks must be taken into consideration. The first year students are less likely to have preconceived ideas of how assessment tasks are marked (ibid:436). Second and third year students are likely to be more confident and more attuned to the requirements of assessment tasks (ibid), which, in turn, may result in higher levels of satisfaction. My next project could involve students with more assessment experience, and it will be interesting to see the difference between the groups.

A common thread through this study is a better understanding of what is required in order to reach a particular standard. Race (1998) in Ballantyne et al. (2002) observes that peer assessment helps in understanding of what academic staff are looking for when marking. Moreover, students are encouraged to learn both from mistakes and good examples of their peers' work (ibid, p.428).

In summary, peer review is still not a commonplace at the University, and the novelty of this approach may be a contributing factor to the students' enthusiasm about this project. Whilst nobody can predict the long-term acceptance of peer review (Pearce *et al*., 2009), if it helps students learn and their learning is rewarded, then it should be used as an alternative way of finding the balance between formative and summative assessment.

Conclusion

The study confirms that there are clear benefits of using student peer review in teaching, in order to gain a better understanding of the assessment process. The participants have learnt how to read carefully, paying attention to detail, and they have become more confident in giving and receiving feedback. Although the number of participants in this study was limited to five, the project could be a useful preparation for a possible larger study with a more representative number of participants. In addition, it is hoped that student peer review will encourage students to be critical, reflect on their own experiences, help them see things from a point of view of the assessor and help to take the 'mystery' out of the assessment process. This implies a positive impact on practice.

Acknowledgements

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