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Online peer assessment: helping to facilitate learning through participation

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Abstract

The focus of this article is on the combination of enquiry-based learning, information literacy and e-learning and how they are embedded in an online peer assessment exercise. What it shall present is a structure and strategy that aids student learning in the short and long-term. Ninety-eight students completed a questionnaire before and after a three-week online peer assessment exercise during a first year undergraduate research and study skills module. Qualitatively, the results demonstrate that a significant number of students valued the design of the exercise and the benefits it can have on their future learning and development. Quantitatively, a comparison between formative and summative assessment results indicates statistically significant differences in the grades obtained prior to and post the peer assessment learning intervention. The article concludes by suggesting that new and innovative ways of assessment are needed to keep engaging students and develop their learning in different ways.

Keywords: peer assessment; enquiry-based learning; inquiry-based learning; information literacy; e-learning; technology supported learning.

Introduction/context

First year Sport and Exercise students at Staffordshire University undertake a core study skills module *Research and Professional Development I* in semester one of their undergraduate degree. This module develops learning skills in students and encourages

them to think critically, reflect, communicate and collaborate through regular practice. The module consists of four main phases of learning and has been in operation for four years.

Firstly, during induction week, students answer a question and write a 500 word essay which they submit at the end of that week. The essay question for the 2010/11 cohort was 'what defines success in sport?'. A deliberately open ended enquiry-based approach based on the 'pedagogy of the question' (see Andretta, 2006) is provided, allowing students from any sport related award to engage with the question. For example, a sport therapy student might define success as rehabilitating an injured athlete back to fitness whereas a sport development student might see success in working with a disadvantaged group of people.

The essay is formatively assessed by personal tutors and fed back face-to-face within one week. The second phase occurs during the early part of the module where key skills in effective learning in higher education (including essay writing, research, critical thinking, information literacy, plagiarism and referencing) are taught, all focusing on the enquiry-based question already given to the students. The idea is to build up to the end of week 5 where the students have another opportunity to hand in an 800-word version of the same question; this time formatively peer assessed on Blackboard (the Virtual Learning Environment (VLE) employed at Staffordshire University).

The third phase incorporates aspects of Staffordshire University's online Assignment Survival Kit (ASK) – an information literacy thinking skills framework for completing assignments (Adam et al., 2008) – and concentrates on academic weeks 6-8 where the students participate in online peer assessment in their tutor group. Each group consists of up to twenty students who provide reciprocal feedback on aspects of each other's work on a weekly basis. The structure of this three-week programme is:

- Week 6 – essay introduction.
- Week 7 – essay main body.
- Week 8 – essay conclusion and referencing style.

Students are directed to the ASK section on essay construction (introduction, main body and conclusion) and this forms the basis for feedback during each peer assessment workshop. Despite some studies analysing how students quantitatively score a piece of

work (Mackinnon, 2003), the approach taken in this module is for each student to provide a weekly qualitative written online analysis of each section of their peer's formative submission. Although no grade is given, the students are made aware of the grading criteria adopted and how a piece of work is assessed. Here, students begin to learn the three stages of assessment adopted by Biggs (2003, p.161) at an early stage of their degree programme:

1. **Setting the criteria** for assessing work.
2. **Selecting the evidence** that would be relevant to submit to judgement against those criteria.
3. **Making a judgement** about the extent to which these criteria have been met.

Biggs (2003) suggests that students need to learn the assessment criteria and apply it to themselves. This, he argues, is beneficial as they learn whether a piece of work meets the given criteria. It has been suggested that this helps develop a student's ability and provides them with an opportunity to authenticate and exploit data and information for their own educational benefit and that of their peers; in short, to become 'students as scholars' (Hodge et al., 2008, p.5-6).

Once this iterative practice is completed, students then undertake the fourth phase (review and amend) and submit a summative 1500 word version of the same essay question in week 12. What we argue is that new and innovative ways of engaging students through assessment are needed (Bostock and Street, 2011). This article concentrates on the combination of enquiry-based learning, information literacy and e-learning and how they are built into an online peer assessment exercise. What we shall present is that this learning strategy has positive benefits to student learning. Thus, and in contrast to Topping's (1998) scepticism regarding the actual benefits of self and peer assessment, this article suggests that a well embedded and structured online peer assessment learning intervention provides many long-term benefits to student learning.

Enquiry-based learning

Enquiry (inquiry)-based learning is an umbrella term that embraces a wide variety of approaches including problem-based learning, small scale investigations or context

specific projects (Centre for Enquiry Based Learning, CEEBL, 2010). The approach puts the student at the centre of the process and specifies the need for learners to be able to use a wide range of information resources (hence the need to be information literate which is discussed below) as well as working in groups to solve problems. In enquiry-based approaches the lecturer is no longer seen as the traditional transmitter of knowledge but more of a facilitator who enables students to take responsibility for their own learning. It is envisaged that through this framework students start to formulate research questions and synthesise their work into new knowledge. In this way students not only engage in deep learning but also gain valuable transferrable skills for dealing with real-world problems (CEEBL, 2010).

Given that the notion of enquiry-based learning is, by its very nature, context specific it is no surprise that it is implemented in many different ways depending upon the needs of the discipline. Some approaches are heavily geared towards reflection (Rigby et al., 2010) whereas others lean more towards analysis, evaluation and critical review skills (Pocock and Wakeford, 2010). Other alternative approaches to enquiry can be seen in the 'Write Now' initiative which seeks to focus on the connection between students' academic writing, thinking and learning as a means for promoting deep learning by embedding writing in the academic curriculum rather than viewing it as a study skills 'add-on' (Write Now, 2011).

Whilst the approach adopted by the Centre For Excellence in Assessment for Learning (CEAL) (2009) has many similarities to the pedagogies mentioned above it differs in its promotion of informal as well as formal feedback as an essential part of the learning process. In particular, one case study showed how the pedagogical intervention focussed on elements of peer assessment as a means of promoting learning 'through peer review of writing, placing value on students learning from one another's approaches to writing in a low-stakes situation' (CEAL, 2009, p.12). In essence, with the addition of Andretta's approach, the framework deployed here reflects many of the facets of enquiry-based methods mentioned above.

Information literacy

Information literacy is a well understood concept which has generated its own field of research and upon which there have been many global pronouncements (Leaning, 2009). It is not a subject per se but a thinking skills framework which empowers learners to engage with information of any kind. Whilst there are many models of information literacy in existence they all exhibit a set of core similarities: similarities which focus on the complex set of skills learners need to find, evaluate and use information appropriately (Walton, 2009).

Hepworth and Walton (2009) note that it is not only an important set of skills to enable information to be gathered and used but also essential for effective participation in the 'information society'. Similarly, findings by Hampton-Reeves et al. (2009, p.47) concluded that, 'Many students [in HE] have developed an imperfect sense of the research environment based on past experience, the occasional input from a tutor and the student rumour mill'. Other studies (such as Breivik and Gee, 2006) have argued that even though the information landscape has become ever richer the workforce has a deficit in functional information literacy leading to a demonstrable lack of efficiency.

It is also generally recognised that information literacy instruction requires a shift from teaching specific resources to a set of critical thinking skills involving the use of information. For Levy and Petruilis (2007), information literacy is a fundamental building block of enquiry-based approaches and this mode of delivering information literacy was adopted in the learning and teaching intervention discussed throughout this article.

E-learning

Mayes and de Freitas (2007) argue that implementing e-learning involves a mix of approaches which involves learning as behaviour, learning as construction of knowledge and meaning and learning as social practice. This nested viewpoint fits very well with information literacy in that there is a great deal of procedural knowledge to be learnt as well as higher order learning of meanings and ideas to be recognised, shared with others, discussed and recorded as part of the process of becoming skilled in writing assignments.

In their overview of teaching and learning, Mayes and de Freitas (2007) note the particular usefulness of 'scaffolding' – a process by which skills, rules and knowledge involved in learning are internalised. This they argue then creates the cognitive tools to enable self-directed learning. In essence, scaffolding allows the locus of control to pass from the tutor to increasingly competent learners where the learner becomes able to do alone what formerly s/he could only do in collaboration with the tutor.

Moreover, understanding how communities form, usually because they identify with something such as a need, a common shared goal and identity, and translating this to the e-learning context, is critical in constructing e-learning opportunities. Goodyear (2001) gives practical guidance on how to achieve this online and bases his recommendations on Mayes' (1995) classification of courseware:

- 'Primary courseware' is used to convey information, such as online lecture notes and reading lists (i.e. subject matter).
- 'Secondary courseware' is used to question and encourage reflection in students.
- 'Tertiary courseware' enables the production of materials by previous and current learners in the course of discussing and assessing their learning (i.e. peer discussion).

In effect, tertiary courseware creates a 'cognitive space' (Garrison et al., 2003) where students can give a far more considered reply online rather than in the immediacy of a face-to-face conversation. Indeed, McConnell (2006) regards this social dimension, embodied in online discussion and dialogue, as an essential pre-requisite for online learning. It should be noted that Walton and Hepworth (2011) in their empirical study found that a greater learning effect was found in those students who experienced tertiary courseware compared to those who experienced primary or secondary courseware only. In addition, recent case studies reported by JISC (2011, p.22) showed that online discussion promoted, 'very rich exchanges and debate on topics from modules, relating the discussions to information from other sources and contemporary events', indicating the added value of this approach.

To maximise motivation and higher order learning the online peer assessment design evaluated here used all three levels of courseware and 'scaffolding'. Hence, the online learning and teaching segment of the intervention contained procedural information on

how to do the activities (primary courseware – a Word document), online resources that students could interact with (secondary courseware – the online tool the Assignment Survival Kit) and finally online discourse via the Blackboard VLE (tertiary courseware). Together these three levels of courseware are required to create an effective online environment that encourages online discourse, on which the online peer assessment is based, to take place.

Peer assessment

In trying to encourage a deeper approach to learning, there has been an increasing range of formative assessment opportunities for students to engage in. A reason for this is that traditional assessment methods often encourage surface learning. Of particular interest has been the work on peer assessment in education and how it can help students form judgements about high quality work (see Bostock, 2000; Boud, 1995). To put this in context, Brown et al. (2009) and Orsmond and Merry (1996) state how the learning environment has gradually changed from purely tutor assessment to one where students are frequently involved in the assessment of each other. Acknowledging this change in assessment strategy, Boud et al. (1999) state that education now encourages more self-directed and collaborative learning and as such peer assessment fits perfectly with this type of approach.

Rather than focusing on conventional assessment per se, Leach et al. (2001) argue that education and the assessment within it should be about empowering learners and peer assessment provides one such opportunity. It has been suggested that peer assessment begins to motivate students to collaborate with each other and to begin to develop themselves as autonomous learners. Orsmond et al. (2004), for example, suggest that peer assessment provides students with an opportunity to demonstrate responsibility, collaborate, discuss and reflect; all of which are important skills which should be enhanced during an undergraduate programme. However, Brown et al. (2009) suggest that students are often sceptical of being assessed by their peers and need convincing that it is a worthwhile activity in aiding their learning.

As suggested by Strijbos et al. (2010), the effectiveness of any form of assessment depends on its quality and how each student incorporates it in their learning. For peer

assessment to effectively enhance student learning, the quality of feedback given to each other is crucial. Indeed, despite its perceived importance, feedback does not always lead to better results. Orsmond and Merry (1996) and Tsui and Ng (2000), for example, state that students will incorporate revisions from their peers which are specific but favour tutor feedback.

How important the feedback received from peer assessment is in empowering students in future learning has received relatively little attention in academic research. Several types of peer assessment exist, such as grading or providing feedback on a piece of work, but there is a lack of academic material which focuses on interactive, e-learning regarding peer assessment per se (Bostock and Street, 2011). Those that have researched this area have demonstrated the positive benefits of using online discourse to foster deep learning (Hepworth and Walton, 2009; Walton et al., 2007) and this is the approach taken in this article.

Method

To assess the effectiveness of the module structure and three-week online peer assessment learning intervention, those students who voluntarily completed a consent form were provided with questionnaires pre and post- peer assessment (BERA, 2011). The questions prior to the exercise focused on the students' thoughts of peer assessment and what they expected to take away from it. The questions post-intervention concentrated on their overall thoughts of the exercise and how they felt it would benefit them throughout the remainder of their undergraduate degree. The intention was to only use those questionnaires completed by students before and after the exercise. Thus, to recognise those who completed both questionnaires, the students were asked to write their first four digits of their student identification so that those who only completed one were discounted. 98 students completed this task (out of 129 enrolled on the module) and extracts before and after the exercise from the same students will be used in the analysis discussed later.

After the learning intervention was completed, the questionnaires were inductively analysed through a manual form of content analysis. Gratton and Jones (2009) raise the potential disadvantage of subjectivity when analysing the meanings associated with the answers provided. To minimise this, both authors went through the data separately before

any categorisation took place and similar themes were raised. Despite these concerns, Wilkinson (2004) states that content analysis is a good method to adopt when assessing open-ended questions on a large-scale questionnaire as it allows both qualitative and quantitative data analysis.

Firstly, a quantitative analysis was carried out to obtain a statistical summary of the responses received. Here, the frequency of responses in each category was recorded and converted to percentages. Secondly, each subject's response was qualitatively coded and categorised. As suggested by Miles and Huberman (1984, p.9), once all of the data had been themed into categories, the analysis began to identify 'patterns and processes, commonalities and differences' across the student cohort. The two main themes resulting from the pre-peer assessment questionnaire were the importance of feedback and the feeling of anxiety towards the learning intervention. The two main themes emanating from the post-peer assessment questionnaire were the importance of in-depth feedback and how the intervention had helped facilitate their learning.

In testing the learning intervention, a t-test was also employed to assess the formative (first phase) and summative (fourth phase) grades. These were recorded and compared between two different groups picked at random to see if any statistical differences could be found between the phases of learning.

Finally, to assess the overall structure of the module and the value it can bring to student learning, the module evaluations completed by students at the end of their first year were also analysed as this presented an opportunity to see how the skills learnt would be utilised in the remaining part of their degree.

Results

This section of the article analyses the students' responses to the online peer assessment learning intervention and whether it had helped them develop the key critical skills necessary to become an effective learner (Orsmond et al. 2004). It shall be split into four parts: the response by a sample of students before the exercise had taken place; their response immediately afterwards; a statistical analysis of the students' grades pre and post the learning intervention; and the students' evaluation of the module and its structure.

Pre peer assessment survey

Not surprisingly a number of students were apprehensive about the exercise as most had not engaged in such an activity before (echoing previous work by Walton et al., 2007). However, when they were asked what it meant for them, a large number of students stressed that it had the potential to positively impact on their future learning (corroborating McConnell, 2006). Here are just a few examples of the feedback and anxiety themes to which students regularly referred in the initial survey:

Feedback:

It's a really good idea, hearing everyone's different comments to improve. Effective feedback will help me know where I went wrong. It is good as we're all communicating with each other giving positive feedback and effective criticism to help improve. (Student 15)

It will be good as it is not only helping ourselves via feedback but it also helps others. I am looking to gain more knowledge and understanding of how to write in higher education. If the feedback is logical and fair I will take it on board, if not I'll discard it. (Student 54)

I'm looking for a much wider range of constructive criticism to help improve my writing style and learning process (research, referencing etc.) for future modules. (Student 91)

Anxiety:

Nervous that I won't meet the standards of others and my assessment will be negative. I'll be a bit defensive at first but will learn that we are all in the same situation. (Student 33)

Don't feel confident enough in my essay being shown to my peers although I feel it could help me. Hope to get helpful feedback but feel quite nervous that I will not be up to the standard of my peers. (Student 74)

Slightly apprehensive but intrigued as to the different opinions that may occur through this exercise. (Student 95)

Despite a large response on these two major themes, a small number of students felt that it was not a worthwhile activity for them. This could possibly be down to the large number of students who enter higher education immediately after finishing further education and have simply followed a more traditional assessment route. With similar findings to Tsui and Ng (2000), the results of the initial survey found that some students are sceptical of feedback from their peers and instead focus on tutor comments. For example:

I don't think it will be useful due to people not wanting to constructively criticise other work due to peer pressure. (Student 17)

Interested to see what others think – however, don't see it as useful for me. I'll take it all in but the lecturer's advice and feedback is more useful. (Student 88)

Post peer assessment survey

Despite their initial apprehension to this exercise, 90 per cent of students that responded to the questionnaire, when asked about their thoughts regarding the online peer assessment learning intervention, indicated that it had been worthwhile and had aided their learning (supporting the conclusions of Hepworth and Walton, 2009; Walton et al. 2007). This may be due to the scaffolded approach discussed earlier which enabled students to demonstrate greater independence in their feedback and reflection. Indeed, despite their initial scepticism to the exercise some students seemed to change their opinion once it had been completed:

At first I didn't think it would be helpful but I changed my mind once it began. (Student 33)

At first I wasn't 100 per cent comfortable but I then discovered that it was really beneficial to my learning. This whole process helped my understanding of essay writing and the ways in which I can improve. (Student 74)

Better than I thought. Really helpful as I got a range of feedback from different people. It also benefitted me reading my peers work and seeing how they write.
(Student 95)

During this survey, the most regularly used comments were 'helpful' and 'useful' and this indicated that it had been a beneficial exercise to expose the students to. Here two major themes became apparent: the importance of feedback and the facilitating of learning.

1. The importance of feedback:

As suggested by Leach et al. (2001), education and assessment should be about enhancing learning and the strategy adopted in this module is supported through their conclusions:

I found it a good exercise. It gave me a chance to get a range of feedback on my essay from both my tutor and my peers. It also gave me the opportunity to read through other essays and comment on their writing style. (Student 15)

It was a very good exercise. A lot of feedback was provided which enabled me to progress my work to a much higher standard. Some comments were short but some were very good. It would be good to use this in all our assessments. It motivates you to get the work done so that you can get feedback. (Student 54)

The feedback gained will make my summative submission better because my peers helped me with their feedback and I found it good to read their work and gather similar ideas that had worked well for them. (Student 91)

However, not all students found the feedback a positive experience. A small number valued the feedback from their peers but stated that they preferred tutor feedback (as suggested by Orsmond and Merry, 1996; Tsui and Ng, 2000). It is clear that students look at the credibility of feedback, and feedback from an expert is received more favourably than a perceived non-expert. One of the limitations of a study like this is that constructive feedback is heavily reliant on the time and effort the students devote to it. For example:

I didn't feel it was very productive as the comments from my peers were often short and not thought out very well. Prefer tutor feedback 100 per cent more than my peers. (Student 20)

Didn't think it benefitted me at all. I think that people who are in the same situation as you can't possibly comment on your work. Would much prefer a normal marking system. (Student 90)

2. Facilitating learning:

Despite these views, an overwhelming majority of students felt that the exercise had enhanced their learning and welcomed its presence in their award. One of the advantages of embedding peer assessment into a programme of study is that it also helps students form judgements about high quality work (see Boud, 1995). As suggested by Orsmond et al. (2004), peer assessment encourages students to collaborate, discuss and reflect; all of which are important skills that should be developed at undergraduate level. Indeed, 91 per cent of those that responded mentioned that they will take away improvements in their learning from this exercise. Encouragingly, there was a range of different learning skills that each student said they would concentrate upon during the remainder of their degree:

Reference differently and the different ways people went about writing their essay. (Student 33)

Can rely on my peers for constructive feedback; lecturers aren't the only source of advice. (Student 54)

I will take quite a lot in respect to information and resources other people used and how there are different ways to approach the question. (Student 74)

Through the online peer assessment exercise, it has been shown that students strongly identify with their information literacy skills as a focus for reflection. The process of referencing was a particular skill that many students mentioned for further improvement. This indicates that the online peer discourse may have

sensitised students to information literacy issues in a way that a straight forward face-to-face approach might not.

Statistical analysis

In evaluating the intervention and its effect on student learning, below are the results for two groups of students (see table 1 and 2), each of which highlight the indicative grade they received from their 500-word submission during induction week and their 1500-word summative submission in week 12:

Table 1. Group A Grades for Research and Professional Development I.

Student	500 Word (%)	1500 Word (%)
A	35	57
B	40	52
C	35	52
D	32	52
E	34	53
F	37	50
G	35	45
H	33	55
I	30	53
J	41	63
K	30	61
L	35	60
M	36	74
N	36	45
P	34	57
Q	40	56
R	40	54
S	53	71

Table 2. Group E Grades for Research and Professional Development I.

Student	500 Word (%)	1500 Word (%)
A	40	63
B	48	55
C	47	55
D	51	62
E	41	56
F	50	66
G	43	54
H	53	61
I	37	60
J	35	60
K	36	57
L	45	53
M	50	80
N	41	52
O	48	60
P	37	58
Q	40	58
R	50	64
S	38	54

To test the statistical significance of these grades, an independent samples test was conducted. The test indicated a significant difference between students' performance on the two assignments ($t(1, 74) = 11.380, p < .001$). For assignment one, the mean across both groups was 40.22 with a standard deviation of 6.50; for assignment two, the mean across both groups was 57.92 with a standard deviation of 7.05.

Students' evaluations

In evaluating the structure of this module and the importance of the four stages of learning discussed in the introduction, perhaps it is appropriate to finish the article with a demonstration of how effective students feel it is in facilitating their learning once the

module has been completed. Below are a range of comments left by students on their module evaluation, each of which point to the key learning skills developed within the module:

We were taught how to use the various online library aspects such as e-books and e-journals that we were bound to be using during other essays. This was copied in the workshops where we were given tasks to undertake which tested our understanding of using the online library to help with all aspects of assessed work.

One of the best aspects of the module was the revisiting of basic concepts for higher education. Even going back to sections such as referencing I find that I am still learning about the intricacies of what is required to be a successful student.

The progression of the module made it easier as the work gradually built up. We were given three attempts at the essay which allowed us to gain good feedback and improve our work each time. The point about the importance of re-drafting work is one which firmly is embedded in my psyche now!

Summary

Overall, this article has indicated that the combination of enquiry-based learning, information literacy and e-learning had a positive impact on student views regarding their learning during a three-week peer assessment learning intervention. As suggested by Strijbos et al. (2010), the effectiveness of any form of assessment depends on its quality and how each student incorporates it in their learning. Over 90 per cent of students undertaking the exercise saw the value and the benefits of online peer feedback. Importantly, the students also recognised the need to take the skills learned in this module with them in the remaining part of their degree programme.

To meet the challenges posed by the changing ways in which students now work in a networked world, it is recommended that academic colleagues consider the learning potential afforded by the e-learning structure evaluated here. This study has indicated that by establishing a module that follows a clear and effective scaffolded structure, a positive student learning environment can be achieved.

Whilst there are a number of limitations to this study in that it examines a specific group of students and there is no control group with which to compare results, it is nevertheless a valid study from a real-life educational situation. It is suggested that future research should focus upon delivering the teaching and learning structure evaluated here to a cohort of students drawn from different subject areas to examine to what extent this intervention is transferable. Another area which could be exploited in further research is to review the importance of a modular structure like this in a more longitudinal way with second and third year students to see how useful the skills learned are to them in their remaining period of study.

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