Peer Assessment Assisted by Technology

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Abstract

A common theme from the National Student Survey is that students want more feedback, but increasing the amount of teacher-student feedback is not practicable. Peer assessment, if carefully supported, can be a cost-effective solution. In addition, peer assessment can help to reinforce transferable skills such as collaboration and communication. Yet despite this, and despite the emergence of computer-assisted tools, the uptake to using peer assessment in HE is patchy. This paper gives a brief analysis of some of the major online tools available and assesses them from the point of view of a large, traditional university. The paper concludes that there is scope for supporting a suite of complementary tools for peer assessment. It uses case studies to examine staff and student perceptions of peer assessment and concludes that having staff dedicated to supporting the technique and the technology has been a major reason for the moderately successful uptake of peer assessment at this institution.

In 1998 Topping wrote a paper entitled "Peer Assessment Between Students in Colleges and Universities". This concluded that peer assessment can be as successful, if not more so, than teacher assessment in terms of the effect made on student achievement and also in terms of the attitude of the student (p255) In 1998 computer-assisted peer assessment was in its infancy, and Topping focussed on peer assessment per se, rather than peer assessment assisted by technology. This paper is an attempt to conduct a review of some of the major tools currently available for online peer assessment exercises and consider how they might best be used at this institution. In addition, it is an attempt to look at the main reasons for using peer assessment, and to consider how to engage staff and students, particularly in the light of recent work with regard to graduate attributes.

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Definition and Terminology

As Topping says in his 1998 paper, there is no agreed terminology for the different types of exercise that might be categorised as peer assessment: "[t]he varying nomenclature adopted by different authors in the literature can prove confusing and needs careful scrutiny" (p250). This is not merely a linguistic point. The connotations of a word can change staff and student attitudes, and this point has been made more recently by many others. For example Falchikov distinguished between assessment and feedback, Brown et al make a similar distinction between assessment and critiquing (Morrow, 2006, Falchikov 2001, Brown etc 2011). As will be seen below, the Aropä team use 'review' as the preferred term to capture the idea that their tool should not be used for peer marking, but only for peer feedback. Students can worry about having to assess their peers, and it is important to convey to students that it is participation in the exercise *itself* that is valuable because of what they learn from completing a peer assessment: it is the process, not the product, that is valuable (Topping 2012 p2). Having said this, we use 'assessment' in this paper for the sake of consistency.

The real benefit of peer assessment

Peer assessment can be seen to be cost-effective, in that it is possible for students to receive a greater volume of feedback in a relatively short time frame, but there can be concerns about the reliability of grades given by student assessors (see Topping 1998 p257-8 for a summary of these, Liu & Carless 2006, and Swanson et al 1991). This could be an issue where the marks given by peers form part of a student's final grade (although some, such as Liu and Carless 2006, argue that peer feedback is reliable, there is still a good deal of resistance to this viewpoint from practitioners who are not engaged with the educational literature). However, more recent studies have looked at peer assessment in other terms and have found other benefits. If the focus shifts to the process of conducting an assessment then the necessity for grading to match that of an 'expert' marker is removed. It is thus becoming clear that the real value of peer assessment resides not in the feedback itself (the product) but in the process of constructing the feedback. Topping (1998) discusses the strengths of peer assessment from both a Vygotskian (social constructivist) and a Piagetian (constructivist) perspective (1998, p254; 2012 p5), and the thought that it is the giving, rather than the receiving, of feedback that is constructive is becoming a prevalent theme in recent literature. For example Nicol takes as a core principle of his PEER project the thought that: "...making judgements and aiving feedback is cognitively more productive for learning than receiving feedback"¹ (See also Nicol and Macfarlane-Dick 2006 and Nicol 2010). Another powerful outcome of participation in a peer assessment exercise is the increased ability of students to understand what is expected of them. If the criteria they are given in order to complete a peer assessment are the same (or relevantly similar) to those by which they will be formally marked, students report that they are better able to complete their future formally marked assignments - that they 'know the way to go on' (Wittgenstein, 1953) S201) - they have increased confidence in their ability to perform well and are likely to



¹ <u>http://www.reap.ac.uk/PEER.aspx</u>

achieve a higher mark than before. In other words, they have "internalised the criteria"²(See also Nicol and Macfarlane-Dick 2006 for a similar point.)

The current vogue is to talk in terms of employability, graduate attributes and transferable skills. If this is the focus, then peer assessment can be seen to help students with skills such as collaboration and communication.³ This will particularly be the case when students are given a chance to reflect and comment on the feedback they have given and received (see the Aropä case study below for an example of this).

There are further benefits of using technology in order to organise a peer assessment exercise. It is time saving, it is easier to distribute and organise when there is a computer artefact rather than paper copies, and so forth. Yet despite all of this, uptake to using online peer assessment tools is low, and we wondered why this was. We therefore decided to review the main tools available to us and see if they were fit for purpose.

Software review

There are a number of peer assessment tools that have been developed specifically for the needs of computing science classes, and others that are specific to assessment or review of essays. Many of these domain-specific tools are discussed in Luxton-Reilly (2009). These domain-specific tools are likely to have valuable function at many universities, however our interest is in tools which have the potential to to become a centrally supported tool at an institution such as ours, and to be used by a wide range of disciplines. For this reason we have restricted our selection for review to packages that are not designed for one specific subject, and are able to be used to review a variety of types of digital artifact rather than just word-processed documents. We have also restricted the selection to software that is available at a number of U.K. universities and colleges and has evidence of ongoing support from developers.

Peer assessment software can be used in many ways, and software packages provide differing support for these pedagogical strategies. The starting point for the peer assessment can be either individual work or group work, and in the case of group work peers may be assessing the work of other groups, or the contributions of individuals to their own group's work. The assessment process may be used at the end of the activity, or it may be an iterative process with one or more opportunities to modify the work being assessed following review. The purpose of the assessment may be purely formative, giving students the opportunity to receive and provide feedback, or it may be contributing to final marks. Where the peer assessment is contributing marks it may be done entirely by students, moderated by a teacher, or with a component contributed by the teacher. Where the initial work is group work students may be distributing teacher allocated marks among their peers to differentiate their contributions to the group project. The level of



² <u>http://www.sussex.ac.uk/tldu/ideas/assessment/peer</u>

³ <u>http://www.gla.ac.uk/media/media_218774_en.pdf</u>

anonymity can also vary, and can make a considerable difference to how students behave (Figl, Bauer & Mangler 2006, referred to in Luxton-Reilly 2009), and where the peer marking is software mediated this may well relate more to the size of the class than to the intentions of the teacher (for example, as Honeychurch found, anonymity may not be possible in a small class). The packages reviewed here are all able to be used in a variety of ways, although one, WebPA, is very much orientated towards group work, while the others are more suitable for individual work. These tools are also integrated with the VLE or in future will be able to link to the VLE using IMS LTI 1.1, reducing the technical obstacles to uptake.

Blackboard self and peer assessment building block

Blackboard is the most common choice for the main institutional virtual learning environment (VLE) in UK universities and colleges. (Browne et al. 2010), meaning that the Blackboard self and peer assessment building block is widely available within the UK HE sector. Creating new self or peer assessment exercises within Blackboard is fairly straightforward, however we felt that the Blackboard user interface was less intuitive than other tools. Assessments consist of one or more questions, each of which is an extended text answer with a WYSIWYG interface displayed in the browser. When setting up the questions the teacher has the option of putting in a model response. Students are able to attach files to their response, so the system is capable of dealing with more than just conventional essay questions. For each question, the teacher then adds one or more marking criteria which will be used in the peer or self assessment phase of the exercise. Each criteria has a point value, which can be set to be awarded as either a boolean all or nothing or to allow partial credit. There is also an option of including feedback with each criteria. The process of setting up these marking criteria is fairly slow, and there are no preset templates. Whilst the Blackboard self and peer assessment tool is fairly capable, the unintuitive interface and the large number of stages and mouse clicks involved in setting up a peer assessment exercise are off-putting.

Workshop In Moodle

Moodle is widely available at Universities and Colleges in the UK and (as of 2010) was the main VLE at 23%, and available at 55% of institutions (Browne et al. 2010). Workshop is the somewhat confusingly named activity for peer assessment within Moodle. Students upload a file for peer assessment, and complete peer assessments on other students according to criteria previously set by the teacher. The teacher also sets the amount of assessments to be completed and has the option to upload sample answers. Each criteria has a point value, which can be set to be awarded as either a boolean all or nothing or to allow partial credit. There is also an option of including feedback with each criteria.

The student interface is relatively straightforward, but the teacher marking interface is unwieldy and unnecessarily complex. The help files were confusing (since the exercise Honeychurch has rewritten these). In addition, a rubric must be rewritten each time.



However, a huge benefit of Workshop is that it is part of Moodle and does not require a separate login, meaning that all of the learning tools are conveniently situated in one place.

WebPA

WebPA, a peer assessment tool developed at Loughborough University, is different from the other tools in that it is orientated towards allocation of marks between the members of group projects rather than for reviewing individual work. The JISC funded ceLTIc project (Vickers et al, 2010) has provided an IMS Learning Tools Interoperability (LTI) connector for WebPA meaning that it can be integrated into Blackboard or Moodle VLEs, and a hosted service is planned for the JISC community (Phone conversation 4th May 2012 with Paul Bailey, JISC Programme Manager, e-Learning), meaning that it will be widely available soon. In WebPA students assess and comment on each other's contributions to the group project, and the final group project marks are weighted to reflect students' individual performance within the group project, as rated by themselves and the other members of the group. WebPA separates the assessment from the form containing the rubric or criteria, meaning that teachers can reuse their existing criteria definitions. Unlike the other tools covered here, students are not asked to upload work to WebPA, and their assessment of their own and other's contributions is based on material outside the system. The assessment cannot be anonymous, and each member of a group assesses each other member as well as their own contribution.

Aropä

Aropä is a web-based peer review tool developed at the University of Auckland. It supports reviewing of individual and/or group projects and also allows both peer and teacher reviewing. Aropä can also be used for review practice activities, where the instructor chooses the work to be reviewed. Students are then able to compare their own reviews with those written by other students, or with reviews selected by the instructor. It is also possible to use Aropä as a marking tool, although this is not its intended use. Rubrics are written using a WYSIWYG document editor that provides the instructor with controls to add areas for students to write comments, and to specify groups of radio buttons with which students can select a mark for part or all of the work being reviewed. Rubrics can be shared and reused, so an instructor can select a pre-existing rubric of their own or from the rubric library and modify it as appropriate. The system also supports reviewe marking, in which the reviews from a previous exercise are in turn reviewed, either by the students or by the instructor.

The University of Glasgow has allocated resources to develop an LTI link for Aropä which will allow it to be launched from the University's Moodle VLE. The LTI link will also be suitable for use with Blackboard, Sakai and other LTI 1.1 compliant VLEs. It is hoped that this will result in Aropä being used by more teaching teams than at present.



Peer assessment at our university

Although there is a recognition that peer assessment should be embedded within teaching at our university, uptake to it is slow. However, there have been some successful implementations. In this section we discuss how Aropä and Workshop have recently been used at our institution.

Workshop Case Study: Nursing

In October 2010 a member of staff in Nursing decided to move her paper-based peerreviewing exercise online. She found that there was a Moodle plugin and decided to set that up. Initial teething problems were experienced as she did not understand the help files, which were not clear. However, once these were resolved with the help of Honeychurch and Barr the exercise was completed by roughly 50% of students.

After the exercise was completed the course leader decided to ask for student feedback. She therefore designed a short questionnaire and sent it to all students, Nearly half of the cohort responded. A paper was presented to CAA 2011 by Brown and Honeychurch with some findings about this (Brown et al 2011).

In summary it was found that less than a quarter of students felt comfortable marking their peers' work. However, the most interesting result, for the purposes of this paper, was that approximately half of those surveyed felt that they now had a better understanding of the assessment process as a result of participating in the exercise. Since this exercise another member of the teaching team has spoken to these students. A prevailing theme in conversations is that students did not understand how a peer assessment exercise would help them, and found the topic they were set was not relevant to their studies.

This was a small study. However, the project team feels they can make the following comments and recommendations.

- Peer assessment is not an exercise that can be set up at the last minute unless there has been prior thought about the assessment criteria as well thought out marking schemas need to be in place.
- It is important to consider what type of exercise students will engage with (especially if this exercise is voluntary and no credit is given for participation).
- Students will benefit more from this sort of exercise if they appreciate how it will help them merely informing them beforehand that it will have benefits is not sufficient.



Following this exercise Honeychurch rewrote the Moodle help files and in 2012 Nursing introduced a peer assessment exercise to their third year course using lessons learned. In particular time was taken to ensure that the topic chosen was relevant to the students' studies. Importantly, both Brown and Honeychurch were experienced in using Workshop, so the teething problems from the initial exercise did not reoccur. At the present time the exercise is still running, so no data is available for this paper.

Workshop in Moodle Case Study: Education

Workshop in Moodle is also used successfully by a member of academic staff in the School of Education. In this instance, the software is used in order that students do some writing prior to a tutorial. Although students are asked to peer assess one piece of work each week, this part of the exercise is secondary to the primary reason for using Workshop. Students in 2009 (the year that Honeychurch taught the course) reported that they felt more confident in writing their final essays because they had used the marking criteria by which they would also be teacher-assessed and now felt that they understood what was expected of them. A point of particular interest was that although the peer assessments were conducted anonymously, because of the small class size (N=11) students commented about knowing whose work they were marking, and had no inhibitions about this as they realised that they were not giving a mark that would form part of the final assessment.

In conclusion, Workshop is relatively easy to set up as long as there is prior understanding of the teacher interface, and students did not report any problems. However, technical support is likely to be needed initially in order to understand the unintuitive teacher interface.

Aropä Case Study: Computing Science

A Computing Science Professional Issues class had, for several years, included a paperbased peer-review exercise for an essay assignment. Students were given anonymised paper copies of other students' essays, and were asked to write reviews which were passed on to the essays' authors. In 2010, Aropä was introduced to make the administration of this process more efficient (the class has just over 100 students), and also to allow the introduction of a process to encourage students to think about what makes feedback useful. Students often state that they do not know how to give good feedback to other students, and they have rarely if ever been required to mark someone else's work before. Aropä provides a 'review marking' facility whereby the feedback provided by students can itself be subject to review.

All students wrote a short (150 word) piece on an IT-related topic of their choice. These pieces were peer-reviewed by three other students, guided by a marking rubric designed by the instructor. After this exercise, the qualities of 'good' and 'bad' feedback were discussed in class, with reference to some examples. Each student was then allocated

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three randomly selected examples of feedback that had been given by other students in the initial exercise, and they were asked to comment on the usefulness (or otherwise) of this feedback. Each student thus not only received three reviews of their initial essay, they also received three reviews of the feedback they had provided to other students on their essays. This review marking exercise was particularly useful in that it opened up a discussion on good and bad feedback, and encouraged students to reflect on how best to provide constructive and useful comments.

Following on from this exercise, students then submitted drafts of their main coursework essay to Aropä, and were given an opportunity to revise it based on two reviews provided by other members of the class, before submitting a final version for marking by the instructors.

This iterative process made peer-review an established and regular aspect of the course, and also encouraged transferable reflective and critical analysis skills. Many students reported that they found the use of peer review in this course unexpectedly useful and interesting, although some still express scepticism at their peers' (and their own) ability to provide appropriate feedback.

In conclusion it seems that peer assessment, if carefully managed, can be successful and is worth pursuing. We suggest a suite of tools is needed - that an institution could consider using either a Moodle or Blackboard plugin as a basic "off the peg" for assessing individual submissions, WebPA for group work and Aropä for a more "bespoke" service.

Conclusion

It is clear to us that peer assessment has worthwhile benefits in terms of student confidence and performance. However, it needs to be emphasised (both to staff and to students) that the main benefits are achieved through the process writing a review, rather than through receiving feedback. Online tools have advantages over paper based exercises, but the teacher interfaces are still unintuitive and support is often needed in order for people to engage with the technology.

The real reason that Aropä has had the success that it has is that it has dedicated advocates to explain its benefits and to ensure that exercises run smoothly. There has also been the gradual emergence of local champions who are able to offer support and encouragement. This is important as a model for future roll out of teaching innovations - it is vital that appropriate support is written into projects from the outset and consideration is given about how to make this sustainable (see Smith & Davies 2006 on this point).



References

- Brown, C., Honeychurch, S. & Munro, J. (2011) "Workshop in Moodle: A Tool for Peer Critiquing." In: 2011 International Computer Assisted Assessment (CAA) Conference, 5-6 July 2011, Southampton, UK. Available at: http://caaconference.co.uk/wpcontent/uploads/Brown-CAA2011.pdf
- Browne, T. et al. (2010) 2010 Survey of Technology Enhanced Learning for higher education in the UK. Available at: http://www.ucisa.ac.uk/groups/ssg/~/media/groups/ssg/surveys/TEL%20survey%202 010_FINAL.ashx [Accessed 07/052012].
- Falchikov, N. (2001). Learning together: Peer tutoring in higher education. London: Routledge Falmer.
- Figl, K., Bauer, C., & Mangler, J. (2006) "Online versus face-to-face peer team reviews" In 36th ASEE/IEEE Frontiers in Education Conference. IEEE: San Diego 7-12.
- Graduate Attributes: Staff Guide. Available at: http://www.gla.ac.uk/media/media_191878_en.pdf [Accessed 16/05/2012]
- Liu, N. & Carless, D. (2006) "Peer feedback: the learning element of peer assessment." Teaching in Higher Education 11, (3), 279-290.
- Luxton-Reilly, A. (2009) "A systematic review of tools that support peer assessment." Computer Science Education, 19 (4), 209-232.
- McLuckie, J. & Topping, K. J. (2004) "Transferable Skills for Online Learning." Assessment and Evaluation in Higher Education. 29 (5) 563-584
- Morrow, L. (2006) "An Application of Peer Feedback to Undergraduates' Writing of Critical Literature Reviews." Practice and Evidence of Scholarship of Teaching and Learning in Higher Education, 1 (2), 61-72 Available at: http://www.pestlhe.org.uk/index.php/pestlhe/article/view/15/53 [Accessed 15/06/11]
- Nicol (2011) PEER (Peer Evaluation in Education Review) http://www.reap.ac.uk/PEER.aspx
- Nicol, D. (2010) "The foundation for graduate attributes: developing self-regulation through self and peer-assessment." QAA Scotland. Available at: http://qmwww.enhancementthemes.ac.uk/docs/publications/the-foundation-forgraduate-attributes-developing-self-regulation-through-self-and-peer-assessment.pdf [Accessed 06/05/2012]
- Nicol, D. J. & Macfarlane-Dick, D. (2006). "Formative assessment and self-regulated learning: A model and seven principles of good feedback practice." Studies in Higher Education, 31 (2), 199-218. Available at: http://tltt.strath.ac.uk/REAP/public/Resources/DN_SHE_Final.pdf [Accessed 17/05/12]
- Smith, K. & Davies, A. (2006) "Drivers and Barriers to the Uptake of Learning Technologies: Staff Experiences in a Research-Led University." In J. O'Donoghue, ed. Technology Supported Learning And Teaching: A Staff Perspective. Hershey, PA: Information Science Pub., 125–145.
- http://books.google.co.uk/books?hl=en&lr=&id=IYeywZKuzu8C&oi=fnd&pg=PA125&dq# v=onepage&q&f=false [Accessed 17/05/12]



- Swanson, D., Case, S. & van der Vlueten, C. (1991) Strategies for student assessment. In: The Challenge of Problem Based Learning. Eds. D. Boud & G. Feletti. 260-273, Kogan Page, London
- Vickers, S. P. Booth, S. & Peacock, S. (2010) "Creating Environments for Learning using Tightly Integrated Components (ceLTIc)" http://www.jisc.ac.uk/whatwedo/programmes/elearning/distributedvle/celtic.aspx [Accessed 07/05/2012]
- Topping, K. J. (2012). "Peers as a source of formative and summative assessment." In J. H. McMillan (Ed.), Sage handbook of research on classroom assessment. Thousand Oaks, CA: Sage. (in press)
- Topping, K. J. (2009) "Peer Assessment." Theory into Practice, 48, 20-27
- Topping, K. J. (1998) "Peer Assessment between Students in Colleges and Universities." Review of Educational Research, 68 (3), 249-276
- Topping, K. J. & Ehly, S. (eds.) (1998) Peer Assisted Learning. Mahwah NJ & London UK : Lawrence Erlbaum
- University of Reading (2012) Peer and self-assessment http://www.reading.ac.uk/engageinassessment/peer-and-self-assessment/eia-peerand-self-assessment-main.aspx [Accessed 16/05/12]
- University of Sussex Teaching and Development Unit (2012) Peer Assessment or Review and Feedback http://www.sussex.ac.uk/tldu/ideas/assessment/peer [Accessed 16/05/12]
- Vygotsky, L. (1978) Mind in Society: The Development of Higher Psychological Processes. Cambridge : Harvard University Press.
- Wittgenstein, L. (1953) Philosophical Investigations. G.E.M. Anscombe and R. Rhees (eds.), G.E.M. Anscombe (trans.), Oxford: Blackwell.

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