provided by tutors. In our hands the outcome of using student-derived marking criteria was that students, although having ownership of marking criteria they had constructed themselves, were less able to discriminate between their own individual marking criteria than between those provided by tutors. Student groups either over-marked or under-marked all their marking criteria compared to tutors such that overall agreement between students' and tutors' marks was not enhanced. It may be that the act of constructing their own marking criteria caused students to view their posters in a more holistic fashion. An alternative interpretation of the finding is that students were able to interpret their marking criteria, but had a poor conception of the subject standards, i.e. both students and tutors knew what, for example, the marking criterion "self-explanatory" meant, but, despite the dialogue, they retained different conceptions of how self-explanatory the poster should be to achieve a particular grade.

Our final published study (Orsmond *et al.,* 2002) indicated that the use of exemplars was able to largely overcome discrepancies between grades awarded by students and tutors for student-derived marking criteria. The exemplars were posters produced by a previous cohort of students and served as a focus for discussion and application of the marking criteria. In addition to improving accuracy of marking for individual criteria, feedback from students indicated that the use of exemplars can help students' learning such that higher quality learning outcomes, including reflection, are achieved; although exemplars may not necessarily help students in the process of poster construction. A recent study (Orsmond *et al.,* 2004) has revealed that peer-assessing students were less able than tutors to write constructive feedback comments to the poster authors. Students' feedback comments concerned primarily the quality of the presentation of material with little actual mention as to whether the discussed marking criteria had been met. Tutors' comments, alternatively, concerned primarily the nature and use of the scientific content of the poster in the context of the marking criteria. A possible explanation for this is that students may focus, when constructing a poster, on the poster itself (i.e. the product of their work) whereas tutors may regard the poster simply as a means to enable students to demonstrate the understanding of science they have developed (i.e. to show the process that they have developed).

In summary, the strengths of the approach are that it causes students to reflect more on their work and their learning, but for this to happen, careful planning is required together with the allocation of class time for the activities.

FURTHER DEVELOPMENTS

The authors are currently investigating: How students' perceptions of marking criteria change during the course of the six week poster design and construction exercise; the type of distractions (i.e. student self-derived individual criteria that are distinct from the agreed marking criteria) which influence students' poster design and construction as well as how students use the feedback provided by tutors to enhance their learning.

2

Online calibrated peer-assessment — student learning by marking assignments

VICTOR KURI

BACKGROUND AND RATIONALE

One of the first things that markers have to do to evaluate work is to agree a set of standards. Somehow lecturers have to develop an understanding of what is a good assignment, what is average and what is poor. When I collect a pile of assignments for marking in an area that I have not set before, the first thing that I do is to try to find some of the extremes, and 'calibrate' my marking scheme.

The use of 'calibrated' exemplars can help students become competent at peer review and understand what makes a good (and bad) assignment. I use the web-based Calibrated Peer Review (CPR) system which was developed on a science-based model of peer review (http://cpr.molsci.ucla.edu/). The system is anonymous and could be used on-line or with printouts during a timed session.

'HOW TO DO IT'

Prepare an assignment brief, which ideally contains guidelines to set the criteria to which the work is going to be marked. It is best suited for text-based

assignments, short and well structured.

Following preparation and submission of the text the student proceeds through calibration, peer-assessment, self-assessment and feedback, and results.

Calibration

Each student is presented with an assessment questionnaire and one script at the time. They have to use the questionnaire (assessment schedule) to evaluate and mark the script. At some points, they are encouraged to provide feedback. They do this for three scripts in a random order, which were prepared by the instructor and are standardised to be of low, medium and high quality. Feedback is provided to the students to verify how close they matched the calibration scripts. There is the facility for students to re-take the calibration to improve their marking proficiency.

Review

Each student is presented with a script from one of their peers, randomly selected and coded to keep it anonymous. They have to evaluate it and mark it following the questionnaire, where they also provide feedback. This is done for three students (the work of this assessor will be correspondingly marked by three randomly selected reviewers)

Self-assessment

Each student is given the opportunity to mark their own script following the same criteria. This mark will be part of the overall mark.

Feedback and results

The feedback information is made available to each student (keeping the markers anonymous) and a composite mark is computed to reflect the effort of the participants, considering that marking could be time consuming and challenging.

By the time the students finish they should have understood what was required in the assignment, marked seven scripts and have received feedback on their understanding of the assessment system, the requirements and their own compliance. This is a formative exercise which allows students the opportunity to understand and explore the peer-assessment process.

This system had been used with final year BSc and MSc students for a range of assignments, including a case study, short practical reports, discussion and conclusions of practicals, virtual poster displays and a reflective assignment exploring issues of food ethics. The briefing may involve instructions for the students to carry out an activity using a range of software, calculations, virtual (or laboratory) experiments, etc. Students have subsequently to write the outcome as a text report.

ADVICE ON USING THIS APPROACH

Setting up the method can be time consuming, but once the assignments are designed, the system is easy to manage and the assignments can be administered to large groups with minimum effort. The on-line system does not work with files of web pages by itself, but it is possible to set up a repository of files or webpages (i.e student portal in the university intranet, or internet) and ask the students to input only the weblink to their work or a code to the file previously up-loaded by the instructor.

TROUBLESHOOTING

The idea that the lecturer was not marking the assignment was alien to some of the students who felt uneasy because their peers were going to mark them. Others felt that they were not capable of marking assignments. A briefing session was introduced to manage students expectations and to motivate positive participation. Detailed instructions and a tutorial were set up to help students with limited IT skills.

One potential problem with the on-line CPR system is that the students obtain marks in ranges atypical for the group or university marking scheme. The marks can easily be normalised or the system re-set to provide different weighting for the text and each one of the tasks. Also, the threshold levels to give marks after successful completion of each task could be modified; i.e. if the self-assessment is less than 1.5 points from the reviewer's average mark (in a scale from 0–10), then 10 points are awarded, if it is >1.5 and >=2.5, 5 points but if it differs more that 2.5 points, then no points are awarded).

DOES IT WORK?

The overall impact on students can be summarised as:

- Students realise that there are marking schemes and that these can help in achieving higher marks. Marking schemes also help them to focus their effort in further coursework.
- Students experience marking their peers and providing and receiving feedback to and from their peers.
- Some students enjoy being empowered to assess coursework and find it interesting and the responsibility challenging.

- The students learn by marking their peers work.
- Once students were reassured about the mechanics of the calibrated peer-assessment they understood the relevance of peer review.
- Some students welcomed the change, but most perceived the calibration and reviewing process just as extra work.

Aside from the improved student learning, one of the key benefits for staff is reduced workload in providing adequate and timely feedback to students.

3

Peer-assessment of scientific posters — the league fixture approach

BRIAN RUSHTON

BACKGROUND AND RATIONALE

Within the Biology degree at the University of Ulster, posters are used in many modules and training is provided in a Year One Transferable Skills module on the elements that go to make up a successful poster. One of the learning outcomes of the Transferable Skills module is to develop the students' critical abilities and peer-assessment of the posters was the vehicle used for this. Essentially, each student is asked to assess each poster independently using marking criteria that had been discussed with the class beforehand and the marks amalgamated and overall marks awarded that included an element from the tutor.

However, this did not prove entirely satisfactory. The workload for an individual student was high (typically between 10 and 18 posters) and also the students found it difficult marking to an absolute scale. The instructions required that the elements of the assessment be scored on a 0–10 scale with 4 being a pass mark. The concept of what constituted a fail was difficult and even the worst posters were given good pass marks.

It was important that the students saw, reviewed and criticised the work of their peers and therefore an alternative assessment strategy was introduced six years ago and has remained little changed. It is now used in two other modules as well, another Year One module, Biodiversity and a Year Two module, Biological Techniques and Analysis.

'HOW TO DO IT'

The method currently used in the Transferable Skills module can be summarised as follows:

1. The Year One cohort usually consists of approximately 30 students but this number has been as high as 60+ in recent years. In week five of semester one, the students receive two sessions on the construction of posters — these focus on presentation and content. At the same time they are given the poster titles together with a few starter references. In previous years these have largely been related to popular issues in biology but this year, in anticipation of the introduction of Personal Development Planning, the emphasis was switched to careers and placements. Students form groups of three or four and work on their posters over the next few weeks and these are then displayed outside the main teaching laboratories during week eleven.

2. The poster in the Transferable Skills module is worth 10%. In other modules it may be higher (for example, in the Biodiversity module it is worth 15% with an associated seminar and log book of the process being worth a further 10%). A small number of marks are allocated for how conscientiously students have marked the posters.

3. Bearing in mind the difficulties outlined above when all students marked all posters, the process now involves:

a. Each student is given a number of marking sheets. The number of sheets depends on the number of groups and the number of students but is usually two or three.

b. Each marking sheet bears the titles (or numbers) of two of the posters on display but not including the poster of the group to which the student belongs.

c. The rest of the marking sheet has a series of criteria divided into two categories, presentation and content; the student is expected to view the two posters and to make positive and