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FEEDBACK & FEED-FORWARD

This special issue of the *Bulletin* focuses on two key concepts central to making assessment integral to learning, feedback and feed-forward. John Cowan, former Director of the Open University in Scotland, famously describes assessment as the engine that drives learning, to which I would add that feedback is the oil that lubricates the cogs of understanding.

Good feedback comprises not just commentary about what has been done, but suggestions for what can be done next. In particular, advice about how to improve the next element of work can be particularly helpful to students receiving feedback, especially when this advice is received during the progress of the work, so that adjustments can be made in an ongoing manner. It can be worth checking that enough such *feed-forward* is being given, rather than merely feedback on what has already been done and often dealt with. It is important to help students to distinguish between feedback and feed-forward, and to consciously build upon it as their next piece of work progresses.

Formative assessment is a highly contested term with no common understanding in the literature. A working definition could be:

"The process used .... to recognise, and respond to, student learning in order to enhance that learning, during learning." (Cowie and Bell, 1999).

The difference between formative and summative assessment is also contested. Sadler, suggests:

"Summative contrasts with formative assessment in that it is concerned with summing up or summarising the achievement status of a student, and is geared towards reporting at the end of a course of study especially for purposes of certification. It is essentially passive and does not normally have immediate impact on learning... The primary distinction between formative and summative assessment relates to purpose and effect, not to timing." (Sadler, 1989).

A key issue is how we can get students to make best use of formative feedback. Many students are poor at using feedback constructively. Often they are only interested in the mark and sometimes they do not even bother to read what we have written. When receiving feedback live, they frequently fail to retain what is said to them, apart from when their own views (or worst fears) of how they have performed are confirmed. We need to find ways to help students make good use of the hard work we put into giving them feedback, to interpret it appropriately, to see how the comments and advice they are given links to what they are doing, and to turn this into improvements in competence and knowledge. Sadler proposes that it is crucial that the student works with the feedback s/he receives in order to internalise the standards that are required:

"The indispensable conditions for improvement are that the student comes to hold a concept of quality roughly similar to that held by the teacher, is able to monitor continuously the quality of what is being produced during the act of production itself (Sadler, 1989).

I believe that concentrating on giving students detailed and developmental formative feedback is the single most useful thing we can do for our students, particularly those who have had a struggle to achieve entry to higher education. To do so may require considerable re-engineering not just of our assessment processes but also of curriculum design as a whole if we are to move from considering delivering content the most important thing we do. In this themed *Bulletin* bioscientists share their experiences and thoughts regarding feedback and feed-forward.

REFERENCES

Cowie, B and Bell, B. (1999) A Model for Formative Assessment. *Assessment in Education* **6** (1), 101-116

Sadler, D R. (1989) Formative Assessment and the Design of Instructional Systems, *Instructional Science* **18**, 119-144

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CONTENTS

NEW DIRECTOR

Welcome to David Adams who started on 1st October as the new Centre Director. David's time will be split equally between the Centre and his role as Senior Lecturer at the University of Leeds.

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2| CAN WE SET FAIR QUESTIONS?

Assessment problems can arise quite inadvertently when classes contain students from a variety of cultures with different experiences, attitudes and expectations of education. All students are different but the assessment for every student tends to be the same. It is difficult to devise assessments which are totally free from bias. Researchers have identified bias arising from cultural differences, gender difference, disability and other factors (see original paper for references). Here I give several examples of culturally loaded questions and suggest that all science and engineering assessments should be scrutinised from the cultural perspective.

I define a 'neutral' assessment item (e.g. exam question) as one that every student has an equal opportunity to demonstrate the extent to which they have met the intended learning outcome (ILO) being tested. In less pompous words, the question should be clearly understandable and relate to the appropriate curricular content. This is easier to specify than to achieve, particularly for classes which contain students for whom English is a second language or from different cultural backgrounds.

In higher education we expect to be assessing ILOs at all six levels of Bloom's taxonomy – simply expressed as knowledge, comprehension, application, analysis, synthesis, evaluation. Above level 2 (application, analysis, synthesis, evaluation) potential problems of bias abound. Words which might be used in assessment items could include analyse, compare, contrast, create, defend, discriminate, evaluate, interpret, justify, modify, predict, reconstruct, or relate. Each of these requires a sophisticated grasp of language as well as the required cognitive understanding. At levels 5 and 6 (synthesis and evaluation) a critical approach is essential and it would be impossible to demonstrate ILOs at these levels using words and phrases which had come from lecturer or book.

A clear question has two elements – vocabulary which is understandable and contextual examples which can be interpreted based on the student's prior experience.

Subtle examples can be found when teaching management topics. A module on Project Management at Liverpool is given to a large class drawn from every engineering discipline, computer studies and pure sciences. To assess at level 3 (application of knowledge in a new situation) it is necessary to select a number of 'new situations' which are accessible to all the students. This rules out using project scenarios based on dam-building (familiar to the Civil Engineers but to no-one else), or software engineering, or banking or in fact almost anything! A level 3 question such as 'devise a work breakdown structure for (some familiar process)' is very difficult to write in a neutral manner. What process is familiar enough to all students? No industrial process, certainly. The unfortunate result is that the remaining scenarios are mundane and lack complexity – the key aspect which makes a project worth undertaking.

Similar issues arise from a question designed to allow students to be creative in the context of a SWOT analysis. An obvious question is 'Analyse the Strengths, Weaknesses, Opportunities and Threats of the following proposition, and then make a recommendation whether it should be adopted.' It is very difficult to identify a neutral proposition. I used the real proposition (reported in The Times) 'An advertising company should rent advertising space on students' foreheads.' This appears to be totally neutral: surely every student understands advertising and certainly everyone has a forehead. However, on reading 220 answers (some very imaginative) it became clear that a minority of students did not understand the word 'forehead'. Therefore we cannot assume that the vocabulary used in assessment items can be universally understood, even when questions are couched in 'ordinary' English. A further example comes from a study looking at the technical and non-technical vocabularies available to A-level physics students. It revealed 96% of the students surveyed claimed to understand the word 'transmitted' whereas only 30% could explain or define it.

My own experiences recently revealed first year students who did not understand 'opaque' or 'inflammable'. The vocabulary used in my last three years' exam papers included the following words which were not defined in classes:

Assembly, auditor, batch, blizzard, client, deadline, deliverable, finishing, functional, machining, morale, polishing, rapid prototyping, resource, revenue, review, sandwich, script, stamping, standards, stock.

It is not clear whether all of these were understood by all students, although their inclusion was intended to give appropriate contextual colour to otherwise dry questions.

In the UK, examination papers – but not always other assessment items – are usually checked both by the setter and by a moderator. If the assessment is not supposed to be a test of language skills, then it should be checked for technical accuracy, for alignment to the ILOs and for grammatical accuracy. This review indicates that moderators should also be asked to check for unintentional bias.

This article is based on Goodhew P. (2007) Culturally neutral assessment questions in science and engineering. In *Proceedings of The Science Learning and Teaching Conference 2007, Keele University*, eds Chin, P., Clark, K., Doyle, S., Goodhew, P., Madden, T., Meskin, S., Overton, T., and Wilson, J., pp.40-45.

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AMENDMENT

Credit should also go to author V. Anne Smith for her contribution to the article *The scientific method: teaching the how of science and not just the what* which appeared in the Summer 2007 (No. 21) edition of the *Bulletin*.

A DEPARTMENTAL POLICY FOR PROVIDING FEEDBACK TO STUDENTS

It is well recognised that providing feedback to students on their assignments serves many purposes, providing the feedback is good (Gibbs and Simpson, 2004). Good feedback can encourage and motivate students, clear up misunderstandings and improve student performance. Good feedback is recognised as being prompt, is related to the learning outcomes of the assignment, individualised to the student, but manageable for the lecturer (Race, 2001). This can be difficult to achieve in these days of large classes and multiple demands on academic staff in higher education.

In the national surveys of level-three students, feedback was identified as an area which could be improved in clarity, timeliness and detail, though caution has been expressed in how these results are interpreted (Prosser, 2005). We can assume, however, that students would like to receive feedback on one assignment before they start work on the next, that this feedback should be expressed in words that they can understand, in sufficient detail to make it worthwhile reading and which, if the advice is followed, would improve their work.

The School of Biology, Chemistry and Health Science (BCHS) at the Manchester Metropolitan University (MMU) was formed in 2005 by the merger of the Departments of Biological Science and Chemistry. The four University Senior Learning and Teaching Fellows within the new School felt that developing and implementing a common policy for delivering student feedback was a priority and a successful application to the Centre for Bioscience for a teaching development grant has allowed them the resources to do so. The aim of our project is to 'develop, evaluate and embed a School procedure for delivering effective, relevant and high quality feedback on assignments'. The project is ongoing, and aims to be completed before April 2008.

Since all our modules have a WebCT area and our students are accustomed to visiting the relevant areas, we developed the project using our Virtual Learning Environment (VLE; WebCT Vista). We were also aware that a number of academic staff use bespoke proformas to provide feedback on assignments and we wanted to find out both their purpose in using the proformas and to see how they could be improved. One possibility is to make more use of Vista's grading form tool and we intend to test proformas which could be delivered via the VLE.

The objectives of our project are to:

- survey the extent of use and the primary purpose of feedback proformas within the School;
- devise, trial and evaluate the use of feedback proformas which would be explicitly linked to the learning outcomes for different types of assignment;
- transmit feedback proformas to students via the VLE; and
- embed the feedback proformas, if deemed successful, within all undergraduate modules in the School.

To date, we have identified over 30 different proformas being used within the School, though there is considerable overlap between them. This indicated staff enthusiasm for using proformas and suggested that there was scope for producing templates which could be adapted to suit individual staff. Structured interviews with eleven academic staff have revealed that the proformas were used to; make marking easier and more consistent; provide evidence for audit.

However, most staff agreed that the primary purpose of the proformas should be to provide useful feedback to students and that the proformas used were not necessarily good in this respect. For example, the language used on the proformas was aimed at academics rather than students and could be confusing for both groups.

The project team has spent time discussing the generic learning outcomes for different types of assignment at different levels and has produced guidelines for academic staff. We are currently developing proformas for different types of assignment using the Vista grading form tool which could be included in new unit templates. We have identified a range of assessments across the levels that will be used to trial the use of electronic proformas to deliver individual feedback through the VLE. Academic staff will be asked to confine their feedback to the learning outcomes that have been clearly identified in the assignment brief. Proformas will be used between September – December 2007 and evaluated between January and March 2008.

The authors acknowledge the contributions of Joyce Overfield, Carol Aintry and Alan Fielding to this work.

REFERENCES

Gibbs, G and Simpson, C (2004) Conditions under which assessment supports students' learning. *Learning and Teaching in Higher Education*, **1** (1), 3-31. Available at: *www.glos.ac.uk/shareddata/dms/2B70988BBCD42A03949CB4F3CB78A516.pdf* accessed August 2007

Race, P. (2001) Using feedback to help students learn. Available at: *www.heacademy.ac.uk/resources/detail/id432_using_feedback accessed August 2007*

Prosser, M. (2005) Why we shouldn't use student surveys of teaching as satisfaction ratings. Available at: *www.heacademy.ac.uk/resources/detail/ourwork/research/NSS_interpreting_student_surveys accessed August 2007*

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4 | USING FEEDBACK TO ENHANCE REFERENCING SKILLS

For several years, internal and external examiners from the Biomedical Sciences programme at Northumbria University raised the issue of poor student performance in citation and referencing within final year assignments and project reports. Such comments occurred despite the inclusion of detailed guidelines in course handbooks alongside online support (e.g. Pears and Shields, 2005).

Evidence from student feedback also indicated that provision of course guidelines was ineffective, since students did not appreciate that these guidelines should be used within all assignments, despite statements to this effect within course documents. In addition, students also commented that it was not always straightforward to translate the 'dry' written rules of the handbook into the correct response for all of the different types of sources encountered (one example being the problems of citing 'online early' publications). As a consequence, during the revision of the programme in Summer 2004, this was addressed through changes to several activities within first year modules, to provide students with enhanced guidance in the early stages of their course and thereby encourage the development of appropriate referencing skills from the outset.

Co-ordination of new assignment tasks was required, in order to introduce, develop and strengthen appropriate referencing skills at an earlier stage. The first change was in semester 1 of year 1. One of the earliest learning tasks within the Cell Biology module required each student to post details of a relevant website within the 'Discussion Board' feature of the Blackboard e-learning platform for this module. In addition to providing a collection of websites for class use, this also enabled the module tutor to check that each source had been referenced in full (Author, year, title, URL, date visited) and to supply feedback to individual students through the 'send email' function within Blackboard. Assigning a small proportion of the overall marks for the module to this task (10%) avoided the problems that can be encountered with lack of student engagement in formative-only assessments (Taras, 2003), and enabled the tutor to highlight deficiencies in referencing style, with the intention that such advice would feedforward into the subsequent coursework assignments within this module, and beyond.

The second change was in semester 2 of year 1. Citation and referencing were the focus of a major component of the Professional Skills module, delivered through a series of worksheets and class-based activities on practical aspects of scientific communication, culminating in a peer-review exercise (Reed, 2005). This activity enabled students to comment on each other's referencing skills, with follow-up feedback provided by the lecturer on both the original material provided by the author and the ability of the peer reviewer to identify and correct specific errors within citations. Moving this exercise forward into year 1 also addressed feedback from students from the pre-2004 version of the programme, where a forerunner of this exercise was delivered in semester 2 of year 2, and many students had commented that this would have been useful at an earlier stage. This exercise also demonstrates the value of peer feedback in providing an additional dimension to the assessment process.

Knowledge of appropriate referencing styles and conventions has led to an overall improvement in performance in this aspect of the curriculum within the revised programme in Biomedical Sciences. Lessons learned include:

- Providing specific, detailed feedback on the corrections required within individual citations can be time-consuming for teaching staff, but has proved to be worthwhile in terms of improved student performance;
- Utilising peer-assessment to provide feedback can help to reduce the assessment tasks of staff, as well as making a valuable contribution to student learning;
- Requiring students to give full citation of sources, in a style and standard equivalent to that of the professional scientific literature, from the outset avoids the potential confusion created by the earlier 'gradualist' approach, where the aim was to begin with basic principles in year 1, aiming only for the professional standard by the final year; and
- Addressing this aspect of the curriculum within the first year programme has also provided an opportunity to raise related issues in the context of written assignment work, including: plagiarism, attribution and acknowledgement of the ideas of others; the peer review process in science; and layout/ structure of scientific reports.

REFERENCES

Pears, R. & Shields, G. (2005) Cite them Right. Northumbria University Press

Reed, R. (2005) Writing and reviewing an article for a scientific magazine – a peer/self-assessment exercise. In *Self and Peer Assessment: Guidance on Practice in the Biosciences*, ed Orsmond, P. pp 41-43. Higher Education Academy Centre for Bioscience

Taras, M. (2003) To feedback or not to feedback in student self-assessment. *Assessment and Evaluation in Higher Education* **28**, 549-565

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FEEDBACK VIA MP3 AUDIO FILES

Providing feedback to students is time consuming for academics. However, despite the time invested in it, the feedback academics provide may not be effectively used by all students (Higgins, *et al.*, 2002). Shriver (1992) has shown that hearing 'think-aloud reading' can help writers appreciate the needs of readers of their work, leading to improvements in writing performance. Spoken feedback from tutors as mp3 audio files is analogous to the *'think aloud reading'* investigated by Shriver.

Fifteen student volunteers submitted samples of their work for formative feedback. The work included essays, parts of dissertations and written reflections. After reading students' work, feedback was recorded on a desktop PC using Audacity (*audacity.sourceforge.net*) with file conversion to mp3 format using Switch (www.*nch.com.au/switch/index.html*). Both of these packages are available as freeware. The mp3 files were then sent to the students as email attachments. Semi-structured interviews with the students took place within 3 weeks of them receiving this feedback.

Overall, the students responded very positively to this type of feedback. Reasons cited included: it was easier to understand because handwriting is often illegible; it had more depth because possible strategies for solving problems were included rather than just stating what the problems were; and it seemed 'more genuine', indicating that speech is received in a more personal way than writing.

'The spoken word meant more than words on a piece of paper'

Thirteen of the 15 students listened to the feedback more than once with some doing so while they were doing other things such as walking to work. They also appreciated the ability to pause, rewind and play sections again.

All students stated that they listened to the feedback with a copy of their submitted work in front of them at least once and 12 of the 15 students made notes on the written work as they listened to the feedback. They seemed to be able to understand the feedback to a greater extent compared to written comments.

'Tone of voice conveyed information as to whether the changes [needed] were minor or major'

Many students also stated that they would use the audio feedback they had received to improve their work for other tutors.

'It seems like written feedback just goes with one essay, but the audio feedback could go with other essays as well'

This preliminary study indicates that students perceive and implement mp3 audio feedback in more meaningful ways than written feedback. Audio feedback may be more understandable to students because they are more used to information being conveyed as sound than as written words possibly reflecting their increasing use of multimedia technology. In this context it is also interesting to note that participants gave the ability to pause and replay audio feedback as an advantage. It did not seem to have occurred to the students making these comments that they could also pause and then reread written feedback.

Students also commented that the audio feedback was more detailed than written comments and this theme was also picked up by the tutors who found themselves naturally providing examples in their audio feedback of how the work might be changed. They felt this would not have happened to the same extent in written feedback because of either time or space constraints. Additionally there was an appreciation that subtleties of thought that indicate merely possibilities for change (rather than direct instructions to change) are more easily conveyed using the spoken word than in writing. Finally it is worth noting that 4 of the 15 students interviewed reported that they often did not read written feedback because they found tutors handwriting difficult to read. Audio feedback overcomes this illegibility.

As feedback is integral to all learning this project has wide applicability across the disciplines.

ACKNOWLEDGEMENTS

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REFERENCES

Higgins, R., Hartley, P. and Skelton, A. (2002) The conscientious consumer: reconsidering the role of assessment feedback in student learning. *Studies in Higher Education*, **27** (1), 53-64

Shriver, K.A. (1992) Teaching writers to anticipate readers' needs. *Written Communication*, **9** (2), 179-208. A longer version of this paper will be submitted for publication to the *Bioscience Education e-Journal*.

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A TO Z, FAQS AND MUCH MORE...

In September we launched our new website. Along with a more intuitive navigation is the inclusion of 2 new sections: FAQs about the Centre *(www.bioscience.heacademy.ac.uk/news/information/FAQ.aspx)* and a listing of Centre resources *(www.bioscience.heacademy.ac.uk/resources/az.aspx)*

If you have any comments on the new site please send them to heabioscience@leeds.ac.uk

6 | FORMATIVE ASSESSMENT – LESSONS LEARNED FROM FAST

Building on the work by Gibbs and Simpson (2003) as part of the Formative Assessment in Science Teaching (FAST) project, the course team for the level 1 course Discovering Science (S103) decided to include a completely formative assignment as part of the assessment policy for the course.

Another project undertaken by FAST, Improving the Effectiveness of Formative Assessment in Science, was a joint venture between the Science Faculty of the Open University and Sheffield Hallam University. Partially funded by HEFCE, the purpose of the project was to identify how assessment supports student learning. The term formative assessment refers to constructive feedback offered to students in an attempt to develop their learning skills. Hence, formative assessment refers to the feedback offered on all assignments and is separate from any (summative) marks that students receive.

The initial assignment (or Tutor Marked Assignment, TMA) is the first piece of assessed work in S103 and is designed to be skills-based including setting out calculations; the inclusion of and conversion to the correct units; graphical interpretation; writing good English and even basic layout. Questions vary in length and complexity from simple calculations, to more complex questions that rely on graphical data and written answers (120 words in length).

Within the first three weeks of the course, the students complete the assignment, sending it to their Associate Lecturer, normally known as their tutor. Submission rates vary between 87% and 91% despite the fact that the *'score'* will not contribute to the overall assessment.

Tutors see this formative assignment as particularly useful because it helps to identify *'gaps'* in the student's knowledge, understanding and skills set. They identify four ways in which this particular assignment benefits student learning:

1. It identifies problems with skills (especially mathematics) at an early stage;
2. It offers some indication of other problems that may appear at a later date, not the least of these being time management skills;
3. It offers the student an early indication of what is involved in the assessment process; and
4. It offers an indication of the types of ways that a student can lose marks such as: not including units, inappropriate numbers of significant figures and decimal places, poor labelling and layout of graphs.

By removing reliance on grades the students are free to concentrate on the feedback and instructions to help them improve their specific skills.

The assignment also contains a much more learning-focused question designed to activate the student's self reliance. For example:

Spend a few minutes thinking about how your study techniques have changed as a result of your experience of studying Block 1. Also, think about any further changes that you plan to implement when you study Block 2. Then make a list of these changes and for one or two of the changes that you regard as most important, explain the reasons why you made (or will make) the changes.

This question is reflective and solicits a gentler and more personal response from the tutor.

Associate lecturers work part time for the Open University. They often also work within other educational institutions. Hence their experiences with the fully formative first assignment on Discovering Science has been compared and disseminated outside the Open University. Many declare themselves to be *"...great fan(s) of formative assessment"*. Qualitative responses suggest that it is seen as *"...a positive experience by students"*.

One quantitative study of submission rates of this purely formative assignment, carried out after the 2005 October presentation of S103 (ending in June 2006) determined that of the 2,181 students who began the course, only 5.7% (307) did not submit the first (formative) assignment. Of these 307 students only 7.2% went on to pass the course (PILS, 2007).

The popularity of this first, formative assignment with associate lecturers and students is evident from statistical, completion rates and the fond remarks of the markers. However, the S103 Discovering Science course is due to be replaced by S104 Exploring Science in early 2008. The S104 course team has decided to forgo a fully formative assignment in favour of interactive online assessment. To an MTV generation of students the benefits of instant feedback are tempting.

REFERENCES:

Formative Assessment in Science Teaching (FAST) project *www.open.ac.uk/fast/FASTProject/Outcomes.htm*

Gibbs, G. & Simpson, C. (2003) Measuring the response of students to assessment: the Assessment Experience Questionnaire. 11th International Improving Student Learning Symposium, Hinkley.

PILS (Personalised Integrated Learning Support CETL) (2007). Draft report on Completion rates, pass rates and progression

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VIDEO CLIPS

Video clips highlighting student views on assessment and feedback are available from *www.engsc.ac.uk/heinfe/Assessfeedbackvideo.asp and www.heacademy.ac.uk/ourwork/learning/assessment/senlef*

FEEDBACK TO LARGE PRACTICAL CLASSES

Literature emphasises the importance of providing rapid, effective feedback to students, allowing engagement which facilitates learning and improves subsequent performance. However with large practical classes this can be problematic. Marking is time consuming so rapid return of scripts is not always possible, and staff often find that they are correcting the same mistakes and writing the same comments many times. When the class is shortly before an examination or other assessment timely feedback is particularly important.

For some years I ran a laboratory class on two modules with a total number of about 300 students per year. Each student produced a write up of 2 sides A4 plus graph, addressing 10 specific questions requiring reporting, analysis, interpretation and significance of results. To decrease turnaround time, marking was shared between two or three people so a detailed marking scheme was employed. Once sure that this provided sufficient information to understand what was and was not expected in the answers it was adapted to provide a comment sheet for students, providing the 'right' answers as appropriate and identifying common errors. Slightly different versions were produced to recognise the different emphases of the two modules. This comment sheet was photocopied and a copy included with each returned script (Harland 2002). This reduced marking time because it was possible to omit the common comments from the student script, thus concentrating on personalised feedback. It encouraged students to analyse their own work for good points and bad points and had the added advantages of providing all students who had submitted work with a set of notes for use in revision.

As the values and identities of the 'unknowns' in the experiments varied from year to year the comment sheet needed to be adapted to take this into account, otherwise very little change was necessary. The hard copy was replaced by emailing the comment sheet to all registered students on the two modules as soon as the hand-in deadline had passed. This meant that students did not need to get their own work back before looking at the feedback. Informal evaluation suggested some students were engaging with the feedback in order to predict their own mark; again this supports other research that feedback without marks can be beneficial. It also provided the notes to all students including those who had not attended. This may be seen as 'unfair' to the students who had taken the class. This is a delicate balance which is not unique to this situation; however here at least when the participating students received their marked work they received individual feedback as well as the generic sheet.

Feedback from students was generally very good. Several commented that they would like something similar in other classes. There has been no evidence of plagiarism from cohort to cohort; as the experiment changed slightly every year this would in fact be easy to detect. The risk could be reduced if there was a bank of interpretation questions which could be reused on a 4-5 year cycle. Word processing would allow easy production of a comment sheet for the year by cutting and pasting questions and comments from the bank.

Although I am not currently running this practical class, I have used the principle in modules with fewer students and with essays and similar assignments. Comments sheets are now made available on Blackboard, our VLE; this has the advantage that availability can be time limited if desired or potentially made available only to a sub-group of the student body. Also personalised electronic feedback can be provided, using freeware developed by Dr Phil Denton (2007) in the School of Pharmacy and Chemistry at LJMU. Briefly this system allows the user to develop a bank of comment statements which can be reused from assignment to assignment, a set of statements which can be specific to the particular assignment and a set of personalising comments which can be applied to individual cases. Choosing from these allows the production of a unique feedback sheet for each individual student with minimal effort once the system is set up; this can be printed and included with the returned work or automatically emailed through the University network. The main disadvantage is that you need to do your marking whilst sitting by a computer!

For further information and software download visit: *www.tinyurl.com/36oem5*

An earlier version of this paper was published in JMU Learning and Teaching Press and is available online at: *www.ljmu.ac.uk/lid/lid_docs/ISSUE_03.pdf*

REFERENCES

Denton, P, Madden, J, Roberts, M, and Rowe P. (2007) Students' response to traditional and computer-assisted formative feedback: A comparative case study, *British Journal of Educational Technology, (In Press)*

Harland J. (Winter 2001/2002) Feedback to large practical classes and feedback on exams. *JMU Learning and Teaching Press* **2** (1), 15-16

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FINAL YEAR PROJECT CASE STUDIES

The Centre's next learning and teaching guide will be 'Student Research in the Biosciences: "Why" and "How"?' The Guide (largely based on final year project work) will contain evidence-based practical advice, supported by case studies and other additional materials. Expressions of interest for providing a case study should be submitted to j.j.wilson@leeds.ac.uk by **Friday 23rd November 2007**. For more information please see: *www.bioscience.heacademy.ac.uk/resources/guides/cscall.aspx*

8 | SELF-ASSESSMENT– MORE EFFECTIVE THAN TUTOR FEEDBACK?

If you want to improve you need to be able to judge for yourself the quality of what you are doing. But most students rely on their teachers to assess their work and give them feedback. Sadler (1989) argued that a key goal in higher education should be to move students from depending on feedback from their tutors to judging the quality of what they are doing themselves.

Self-assessment involves students, guided by their tutor, in deciding what the appropriate assessment criteria are, and then in seeing how well they have met these criteria. Black & Wiliam (1998) assert that handing over responsibility for assessment to the students is the *sine qua non* of effective feedback.

There are a number of reasons why self-assessment is particularly useful for large bioscience courses:

- Bioscience is a very broad subject area. Students are encouraged to think about how standards and criteria differ in relation to different content material and contexts;
- Students are not just passive recipients of advice but take a more active role identifying where they need to improve. They can monitor their own progress, and this improves the continuity of feedback throughout a course; and
- Feedback is faster, and it can be clearer than tutor assessment. It can take time for an overloaded tutor to mark a stack of student work and the feedback can be so cryptic that the student finds it difficult to decode.

To test the benefits, I have been asking my second year biology students to take a tutorial in which they assess their own work. The two objectives of the tutorial are to review the arguments for and against the use of strictly protected areas in developing countries as a means of conserving biodiversity; and to develop the students' skills in the critical review of scientific publications. In particular I want to encourage them to challenge the findings of a recently published paper by high-profile authors and to learn what valid criticisms of this type of research are.

The students are given the following instructions:

1. Read the following article:
   Bruner, A G, Gullison, R E, Rice, R E, & da Fonseca, G A B. (2001) Effectiveness of parks in protecting tropical biodiversity. *Science* **291**, 125-128
2. Write a 300 word critique of this paper in a format suitable for publication as a letter in *Science* paying particular attention to the methods used in the research. Are the conclusions justified by the results?
3. Email your critique to me. I will then email you two 300 word critiques of this paper prepared by other (imaginary) students. I would like you to read these and provide helpful feedback on their work.
4. We will discuss your critiques and those of the other two imaginary students in the tutorial.

The two imaginary student critiques are caricatures of good and bad written work, designed to focus attention on key assessment criteria.

In the tutorial the students are asked first about the evidence for the effectiveness of protected areas for biodiversity conservation (a subject which I had already discussed in a lecture). The *Science* article contradicts perceived wisdom that protected areas are often ineffective. In our discussion I check that they have understood the research methods used and some of the potential problems. I then ask each student to read out their feedback to the two imaginary students. As a group, we draw up a list of criteria that we would use to characterise a high quality critique. There is usually consensus on the criteria but a lot of debate over their relative importance. Finally I ask the students to re-read their own reviews and make written notes on how well their work meets the criteria we have agreed.

Their comments are very revealing. I had anticipated that they would be lenient on themselves – but quite the contrary. Their self-assessments are typically perceptive and surprisingly honest. It is unusual for me to need to point out issues that the student has failed to notice in their own work. Nevertheless, they rarely trust their own judgement and want me to confirm that their self-assessments are correct. Perhaps this indicates that I still have some way to go in getting them to take full responsibility for assessing the quality of what they are doing.

REFERENCES

Black, P & Wiliam, D. (1998) Assessment and classroom learning. *Assessment in Education* **5**, 7-74

Sadler, D R. (1989) Formative assessment and the design of instructional systems. *Instructional Science* **18**, 119-144

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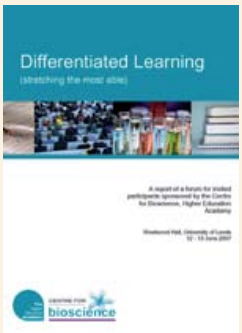
STRETCHING THE MOST ABLE



Developed following a Differentiated Learning Forum held in June 2007, this report is available to download from:

www.bioscience.heacademy.ac.uk/resources/difflearn.aspx#report

SHOULD WE BE GIVING LESS WRITTEN FEEDBACK?

All teachers see the benefit of feedback in the learning process and dedicated teachers carefully consider and craft feedback to their students. Yet there is strong evidence that it fails to stimulate students learning effectively (for example, Maclellan, 2001). So what more can be done to increase the effectiveness of feedback? Much of the work carried out to investigate feedback problems has either focused on staff technique or student attitude but feedback brings the two parties together and must be considered together. Essentially it is a communication process where a clear message must be sent, received, understood and, ideally, confirmation of understanding conveyed back to the sender. However within that apparently simple process there are many points for the communication to flounder not least, because the communication takes place in environments that are 'noisy' with, for example, marks awarded and emotional responses.

First, the problem of clarity of purpose of the feedback. Are we always sure what feedback is for? Correcting errors, providing guidance for future work, justifying the mark, satisfying quality assurance processes, diagnosing difficulties, the list goes on. Feedback cannot address all these purposes all of the time. If we are not always clear about the purpose of the feedback, how can the receiver (the student) begin to understand the message?

In sending the message we have to encode our thoughts, we usually put it into words to be delivered on paper or orally. It is at this point that the process becomes particularly liable to failure. There are numerous studies (including Higgins *et al*, 2002) that show students find feedback difficult to understand because it is vague, ambiguous, full of jargon or just a series of ?? or !!! in the margin. Even if the feedback is comprehensive and carefully-considered, it may not 'speak' to the student if pitched at an inappropriate level, or does not take account of the student's prior knowledge and experiences. However before we berate ourselves for poor technique or the students for wanting things on a plate let us examine the nature of the message.

We know that knowledge has both explicit and tacit elements, consequently some knowledge can be easily articulated but tacit knowledge must be communicated in other ways such as through example, observation and imitation. It is important to acknowledge that the feedback message about the standard of students' work is held partly as tacit knowledge "I know a 2.1 when I see one" (but cannot always fully explain why). Yet we are using a communication medium only suited to the transfer of explicit knowledge i.e. written feedback. No wonder we cannot fully explain and students cannot understand.

While staff can and do provide feedback in several ways and at several points in the learning process the focus on written feedback seems to have increased with many students only recognising written forms of feedback as *'feedback'*. The trend towards a reliance on written feedback is a cause for concern because as Baumard (1999) suggests this important tacit dimension can be *'crushed or stubbed out by an over-emphasis on explicit knowledge'*.

If we acknowledge the limitations of written feedback we may begin to understand some of the problems a little better and find some solutions. For example it is relatively easy to diagnose problems with written feedback, it is far more challenging to clearly explain exactly what must be done to improve the work, phrases such as 'deeper analysis required' often mean very little to students and are, in fact, open to misinterpretation. Lack of clarity or misinterpretation when students are trying to come to grips with the academic literacy and discourse of their discipline often leads them to dismiss or even distrust feedback. Such experience of 'poor' feedback is almost a guarantee that they will be less likely to engage with feedback in the future.

So if written feedback has the potential to mislead or alienate due to its reliance on explicit knowledge perhaps we should be looking to reduce the emphasis on written feedback, despite it producing straightforward evidence for QA processes? We need to look at other processes, such as use of exemplars, to transfer that important tacit element to students. Less may be more!

This article draws on the work of the FDTL project 'Engaging students with feedback' and Aske CETL and a modified version will appear in Assessment Perspectives on the Aske website *www.business.brookes.ac.uk/aske.html*

REFERENCES

Baumard, P. (1999) Tacit Knowledge in Organizations, London, Sage Publications p.194

Higgins, R., Hartley, P. & Skelton, A. (2002) The conscientious consumer: reconsidering the role of assessment feedback in student learning. *Studies in Higher Education* **27** (1) pp. 53-64

Maclellan, E. (2001) Assessment for learning, the different perceptions of tutors and students. *Assessment and Evaluation in Higher Education* **26** (4) pp. 307-318

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CONGRATULATIONS!

To the four bioscientists Andrew Booth (University of Leeds), Tim Cable (Liverpool John Moores University), Stephen McHanwell (Newcastle University) and Elizabeth Warr (Writtle College) who are 2007 recipients of a National Teaching Fellowship award. To learn more about the scheme or see past bioscience winners visit www.bioscience.heacademy.ac.uk/funding/recognition/ntf.aspx

10 | FEED-FORWARD TO IMPROVE ACADEMIC WRITING

During the past 10 years, working with large cohorts of 1000 – 1500 students, and up to 50 laboratory demonstrators, we have focused on finding ways to make feedback more effective, and have also developed a series of action research projects to determine how students learn while writing (Ellis *et al.*, 2005).

The writing program involves a cycle of learning and feedback, based in lab classes, and running through the one semester course (*bugs.bio.usyd.edu.au/BiologyLiteracy/ and www.bio.usyd.edu.au/staff/taylor/Webteach%20POSTER.pdf*). Because we have such large cohorts all activities have to be designed to encourage students to be independent, to develop self appraisal skills and discuss feedback with their peers.

Based on previous evaluations (Taylor and Drury, 2004), we revised the curriculum to use one lab class for a feedback session, so that students could submit a draft report and act on suggestions before the final report was submitted. The session involves a mixture of self appraisal by students, using a standardised feedback sheet, and one-on-one discussion with a demonstrator. Demonstrators find these sessions very difficult, we therefore offer training workshops on how to provide meaningful feedback. However, learning how to give feedback has to occur 'on the job', with demonstrators enhancing their approach over time. When giving feedback, there is a tendency to dwell on more trivial aspects of the report, such as grammar and structure, which are easier to discuss, rather than focusing on more sophisticated areas such as integration of information in the discussion section. Students commented on this aspect of the process, and many asked for more 'in depth' comments. Given that time per student is very limited, we have to rationalise our approaches so that we give most effective help to each student. For many students, at the first year level, working with more technical aspects such as structuring and citation, and listing of references may be most appropriate, and we would then focus on developing higher order writing skills in subsequent courses.

Students value the exercise, and most make changes to their draft as a result of the session. In particular, students agree that they have a better understanding of what is expected, understand the feedback and make use of it to improve their draft report. However, preliminary analysis matching draft and final reports shows that there is no clear relationship between the extent of changes and the final mark awarded. The most positive outcome seems to be related to students' increased awareness of, and confidence in their writing, and their apparent readiness to apply feedback to new situations when writing future reports.

Students also report that there are differences in the quality and quantity of feedback received from different demonstrators, and that they can be disadvantaged if they follow suggestions made by the demonstrator and find that the marker (always a different member of staff) interprets the criteria differently. We are addressing this problem with more sessions for staff, to model our priorities in giving feedback. Despite such problems, students are overwhelmingly positive about the feedback sessions, and have made requests for similar activities to be incorporated into other courses. We see this as an encouraging outcome in terms of developing a culture of writing within the science degree program, and engaging students in the discussion, and use, of feedback as part of the writing process.

Figure 1. *The writing in biology learning cycle in first-year biology at Sydney University (Taylor and Drury, 2004)*

REFERENCES

Ellis, R, Taylor, CE and Drury, H (2005). Evaluating writing instruction through an investigation of students' experiences of learning through writing *Instructional Science* **33** (1) 49-71

Taylor, C.E. and Drury, H. (2004). The effect of student prior experience, attitudes and expectations on performance in an undergraduate science writing program In: G Rijlaarsdam, (Series Editor) and G Rijlaarsdam, H van der Beerg, & M Cousijns (Eds) *Studies in Writing, 14, Effective Teaching and Learning of Writing: a handbook of writing in education* pp 561-574. Amsterdam: Kluwer Academic Publishers

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IS ASSESSMENT REALLY FOR LEARNING?

Ask staff to reflect on a nightmare assessment scenario from their past and the words will just 'pour out'. So why is it that assessment causes so much stress for both staff and students? We know that assessment has a major influence on what and how students learn, so we need to get it right.

Much of our time can be spent grading, moderating and attending exam boards. Should we rethink what is being done in assessment and spend more time preparing and supporting learners so that assessment is for learning and sustainability? The future directions and careers of our students depend on effective assessment. Look at the statements your university makes on assessment and most will emphasise quality assurance and confirming learning outcomes, rather than having a focus on student learning.

Carless *et al.* (2006) talk about 'Learning-orientated assessment' and state that there are three essential components. Firstly, "(the assessment) tasks we set should promote the kind of learning needed for the workplace of the twenty-first century." Could your assessment tasks be made more relevant to the workplace? Secondly, they suggest that "Assessment processes should involve student activity". If we believe in lifelong learning, students need experience of setting criteria and marking against those criteria. Could you actively involve students in getting this experience? With permission could you use students' previous work, suitably anonymised that includes examples of different levels of attainment for students to benchmark against? Feedback sheets could include a space for students to self assess against the criteria. Thirdly, Carless stresses the need for feedback to feed-forward. A quick scrutiny of previous written feedback to students demonstrates that the majority of feedback focuses on incorrect bibliography, spelling errors and what the student failed to do or omitted.

If assessment is for learning, then feedback needs to focus on what the student could do differently and how to apply that learning to future work. As Sadler (1998) has pointed out, feedback in education is only worthy of the description if the feedback loop is completed: that is, if teachers can detect in the work of students that the information they have provided has made a difference to what students do. Boud and Falchikov (2007) states that "Most comments on student work, even if students read them, occur at times that are least propitious in terms of influencing subsequent learning – such as the end of a unit of study when they are moving on to do something different." We have only to look at the results of the National Student Survey (NSS *www.hefce.ac.uk/pubs/rdreports/2007/rd14_07*) to see that students see feedback as the least effective part of the assessment process. Approximately 70% of students in 05/06 agreed that, 'the criteria used in marking have been made clear in advance' and 'assessment arrangements and marking have been fair'. Sixty percent of students agreed that 'I have received detailed comments on my work'. However only just above 50% of students agreed that 'feedback on my work has been prompt' and 'feedback on my work has helped me clarify things I did not understand'.

A key issue with feedback is that students may only perceive it as feedback if it is written down. We need to explore the perceptions of both staff and students in relation to what constitutes feedback. An effective way of getting this discussion going is to use a card sort. An Academy copy of one can be downloaded at: *www.heacademy.ac.uk/ourwork/learning/assessment/links*

Cut the cards up and separate out the 'Header cards' from 'Strongly Agree' through to 'Strongly Disagree', then ask each person in turn to pick up a card and place it under the Header card that they think is most appropriate. This always leads to a great deal of discussion, especially when staff and students are in the same group.

For those of you that think students are satisfied with their feedback you might like to view some video clips of students talking about their actual experiences: *www.heacademy.ac.uk/ourwork/learning/assessment/senlef*

Finally, a key issue to remember is that assessment is a very emotional experience. Give the same feedback to a group of students and they will all react in a very different way. A strong confident student may well internalise the feedback as being really helpful. A weaker student who may lack confidence, may retreat into themselves and want to give up. We need to be aware of, and support these differently perceived emotional experiences.

REFERENCES

Boud, D and Falchikov, N Eds. (2007) Rethinking Assessment in Higher Education Learning for the longer term. Routledge Taylor and Francis Group, London. 18

Carless, D Joughin, G and Mok, M. (2006) Learning-orientated assessment: principles and practice. *Assessment and Evaluation in Higher Education.* **31** (4), 396

Sadler, D R. (1998) Formative assessment: revisiting the territory. *Assessment in Education* **5** (1), 77-84

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APPLY FOR UP TO £15K FOR YOUR DEPARTMENT

Our Departmental Teaching Enhancement Scheme provides bioscience schools and departments with the opportunity to bid for additional funds (up to £15,000) to develop and implement some aspect of practice that will lead to an improved learning experience for students in their department. Collaborative projects across departments/institutions are very welcome. Project funds must be used to effect change across entire department(s) rather than within a single module or one individual's teaching practice. Application is a two staged process: Expressions of Interest due by **15th January 2008**. Further details: *www.bioscience.heacademy.ac.uk/funding/dtes*

THE END OF THE AFFAIR

At some time in 1999 an offer was made by HEFCE to bid for the establishment of learning and teaching centres, called 'Support Networks', in the UK, in 24 subject disciplines, of which one was bioscience. Andrew Booth and I, of the School of Biochemistry, University of Leeds, decided to make a bid. Between us we had a great deal of direct experience teaching biochemistry and had been involved in various teaching enhancement innovations. At that time I was the chairman of the Biochemical Society's Education Group and was the Editor in Chief of the journal Biochemical Education. We also had links with Peter Miller at Liverpool who had a teaching resource bank called 'Knowledgebase', and Simon Heath in Aberdeen who could bring expertise of the more biological end of the biosciences. We won the bid although at that stage Andrew Booth decided to drop out and pharmacologist Ian Hughes was co-opted instead.

The Learning and Teaching Support Network (LTSN) started up in Autumn 2000, with the Centre for bioscience based at the University of Leeds. The aim was to improve the quality of undergraduate teaching by whatever means seemed to be appropriate. We had been given funds to set up the Centre – to pay for premises and appoint staff – but there was little direction as to how we should proceed. Credit should be given in the early days to dedicated staff, especially our first Centre Manager, Trish Walker, and our first two 'subject specialists', Heather Sears and Yolie Knight. Their personal interactions with our constituency were extremely important in founding a wide network of contacts in the departments.

We were able to tap into an extensive list of contacts in university departments to ask them what they wanted and what they thought might help their teaching. The responses helped us to decide what we would do and we aimed to have a 'representative' in each bioscience department who would keep us informed of the wishes and needs of their colleagues. This was done informally via email and telephone calls and also through annual 'reps' forum meetings.

I should stress we never thought of ourselves as the fount of all knowledge about teaching practices but as a network. We believed in bringing together people with innovative ideas about teaching either through physical 'events' or in the virtual environment. If there was a request for an event on a particular topic, we could find a person to run the session and give advice.

Of course we did develop and accumulate resources, originally in the form of a database that people could access through our website. Over the years we developed other resources, accessible from the website, including the ImageBank of biological images (presently over 5000) free from copyright constraints for educational use, the journal, *Bioscience Education*, a number of Audit tools, our series of Teaching Bioscience – Enhancing Learning Guides and our newsletter, the *Bulletin*.

During the first five years of our existence as an LTSN, there were changes in the extent to which we were 'directed', one of which was to add to our portfolio things related to government priorities in undergraduate education.

The 'direction' sensibly was not all that strong because such priorities affect different subject disciplines in different ways. Recruitment to bioscience courses (and drop-out rates) was nowhere near as important to our clientele as in some other science subjects for example. Initiatives appropriate to our constituency on which we provided resources include entrepreneurialism, ethics, assessment, and e-learning.

Five years in the Higher Education Academy (HEA) formed, and this required us to re-brand from LTSN Bioscience to the Centre for Bioscience, HEA. The transition was achieved with minimal affect on the Centre. I am about to leave the very successful Centre as Co-Director. We have over 2500 contacts in the bioscience departments across the UK, and have generated a large number of resources. We also hold professional development events which are bioscience focused and based around an aspect of teaching and learning (and have been doing for 7 years now!). These offer important possibilities not only for meeting our constituents but also for putting our constituents face to face so they can share ideas about teaching.

I am happy to leave the Centre for Bioscience in a very strong position. I have always believed that teaching the next generation of bioscientists is important. Therefore enhancing the teaching abilities of academic staff is also important and I am very pleased that the Centre has been able to play a significant role in this process. I am also happy to welcome the new Director of the Centre, David Adams.
I believe that Ian Hughes and I can pass on to him a thriving Centre which is valued around the UK, and we both wish him continued success in this venture.

FORTHCOMING EVENTS

Opportunities to discuss aspects of learning and teaching with like-minded colleagues from across the UK.

- e-Learning: Developments in the Biosciences
  Tuesday 11 Dec 2007, London
- Improving the Student Work Placement Year
  Tuesday 18 Dec 2007, Leeds
- Learning Through Assessment
  Tuesday 8 Jan 2008, Southampton

Further details and free online registration at:
www.bioscience.heacademy.ac.uk/events/bioevents.aspx

Missed a past event? No worries, just visit our well resourced event reports at *www.bioscience.heacademy.ac.uk/events/reportlist.aspx* to catch up!