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Conditions Under Which Assessment Supports Students' Learning

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Abstract

Much evaluation of teaching focuses on what teachers do in class. This article focuses on the evaluation of assessment arrangements and the way they affect student learning out of class. It is assumed that assessment has an overwhelming influence on what, how and how much students study. The article proposes a set of 'conditions under which assessment supports learning' and justifies these with reference to theory, empirical evidence and practical experience. These conditions are offered as a framework for teachers to review the effectiveness of their own assessment practice.

Introduction

When teaching in higher education hits the headlines it is nearly always about assessment: about examples of supposedly falling standards, about plagiarism, about unreliable marking or rogue external examiners, about errors in exam papers, and so on. The recent approach of the Quality Assurance Agency (QAA) to improve quality in higher education has been to focus on learning outcomes and their assessment, on the specification of standards and on the role of external examiners to assure these standards. Where institutional learning and teaching strategies focus on assessment they are nearly always about aligning learning outcomes with assessment and about specifying assessment criteria. All of this focus, of the media, of quality assurance and of institutions, is on assessment as measurement. This article is not about measurement at all — it is about learning. The most reliable, rigorous and cheat-proof assessment systems are often accompanied by dull and lifeless learning that has short lasting outcomes — indeed they often directly lead to such learning. We are not arguing for unreliable assessment but we are arguing that we should design assessment, first, to support worthwhile learning, and worry about reliability later. Standards will be raised by improving student learning rather than by better

measurement of limited learning. This article is about how to design assessment that supports worthwhile learning. The case studies elsewhere in this issue are about particular assessment methods — tactics if you like. Guidance on how to implement a wide range of assessment tactics can be found elsewhere (e.g. Gibbs, 1995). This article is about strategy — about the functions that assessment performs (Gibbs, 1999) that enable a teacher to select appropriate assessment tactics. We will argue that assessment works best to support learning when a series of conditions are met. The article will examine the nature of these conditions.

The dominant influence of assessment

In the early 1970s researchers on both sides of the Atlantic (Snyder, 1971; Miller & Parlett, 1974) were engaged in studies of student learning at prestigious universities. What they found was that, unexpectedly, what influenced students most was not the teaching but the assessment. Students described all aspects of their study — what they attended to, how much work they did and how they went about their studying — as being completely dominated by the way they perceived the demands of the assessment system. Derek Rowntree stated that 'if we wish to discover the truth about an educational system, we must first look to its assessment procedures' (Rowntree, 1987, p.1). The Snyder and Miller & Parlett studies went further and highlighted the way students respond to these assessment procedures. More recently, qualitative studies have emphasized the importance of understanding the way students respond to innovations in assessment (Sambell & McDowell, 1998).

Snyder's work gave birth to the notion of the 'hidden curriculum' — different from the formal curriculum written down in course documentation, but the one students had to discover and pay attention to if they wanted to succeed:

> 'From the beginning I found the whole thing to be a kind of exercise in time budgeting … . You had to filter out what was really important in each course … you couldn't physically do it all. I found out that if you did a good job of filtering out what was important you could do well enough to do well in every course.' (Snyder, 1971, pp.62-63)

Once students had worked out what this hidden curriculum consisted of they could allocate their effort with great efficiency:

> 'I just don't bother doing the homework now. I approach the courses so I can get an 'A' in the easiest manner, and it's amazing how little work you have to do if you really don't like the course.'
> (Snyder, *ibid.*, p.50)

Miller & Parlett focused on the extent to which students were oriented to cues about what was rewarded in the assessment system. They described different kinds of students: the 'cue seekers', who went out of their way to get out of the lecturer what was going to come up in the exam and what their personal preferences were; the 'cue conscious', who heard and paid attention to tips given out by their lecturers about what was important, and the 'cue deaf', for whom any such guidance passed straight over their heads. This 'cue seeking' student describes exam question-spotting:

> 'I am positive there is an examination game. You don't learn certain facts, for instance, you don't take the whole course, you go and look at the examination papers and you say 'looks as though there have been four questions on a certain theme this year, last year the professor said that the examination would be much the same as before', so you excise a good bit of the course immediately ...'
> (Miller & Parlett, 1974, p.60)

In contrast, these students were described as 'cue-deaf':

> 'I don't choose questions for revision — I don't feel confident if I only restrict myself to certain topics'

> 'I will try to revise everything ...'
> (Miller & Parlett, 1974, p.63)

Miller & Parlett were able to predict with great accuracy which students would get good degree results:

> '... people who were cue conscious tended to get upper seconds and those who were cue deaf got lower seconds.'
> (Miller & Parlett, 1974, p.55)

Many students are perfectly capable of distinguishing between what assessment requires them to pay attention to and what results in worthwhile learning, as this postgraduate Oceanography student explained:

'If you are under a lot of pressure then you will just concentrate on passing the course. I know that from bitter experience. One subject I wasn't very good at I tried to understand the subject and I failed the exam. When I re-took the exam I just concentrated on passing the exam. I got 96% and the guy couldn't understand why I failed the first time. I told him this time I just concentrated on passing the exam rather than understanding the subject. I still don't understand the subject so it defeated the object, in a way.' (Gibbs, 1992, p.101)

Whether or not what it is that assessment is trying to assess is clearly specified in documentation, students work out for themselves what counts — or at least what they think counts, and orient their effort accordingly. They are strategic in their use of time and 'selectively negligent' in avoiding content that they believe is not likely to be assessed. It has been claimed that students have become more strategic with their use of time and energies since the 1970s and more, rather than less, influenced by the perceived demands of the assessment system in the way they negotiate their way through their studies (MacFarlane, 1992).

The role of coursework assignments

Students tend to gain higher marks from coursework assignments than they do from examinations (*Eds: see James & Fleming, this issue, for a discussion on this topic*). Chansarkar & Raut-Roy (1987) studied the effects of combinations of various forms of coursework with examinations. They found that all combinations of coursework of varying types with examinations produced better average mark rates than did examinations alone — up to 12% higher average marks. Gibbs & Lucas (1997) reported an analysis of marks on 1,712 modules at Oxford Polytechnic. Modules with 100% coursework had an average mark 3.5% higher than modules with 100% examinations, and there were three times as many failed students on modules where there were only examinations. There was a significant positive correlation between the proportion of coursework on a module and average marks ($r = +0.36$, $p<.0001$). Bridges *et al*. (2002) studied the differences in coursework and exam marks in six subjects at four universities. They found coursework marks to be higher by one third of a degree classification in English and History (similar to the Oxford Polytechnic finding) and higher by two thirds of a degree classification in Biology, Business Studies, Computer Studies and Law.

Students also prefer coursework. Starr (1970) reported that 90% of students from four departments preferred half or more of their marks to come from coursework and 56% preferred all their marks to come from coursework. Students consider coursework to be fairer than exams, to measure a greater range of abilities than exams and to allow students to organize their own work patterns to a greater extent (Kniveton, 1996).

Higher average marks and student preference would not count for much if coursework were inherently less valid as an assessment — but it is not. First, examinations are very poor predictors of any subsequent performance, such as success at work. A review of 150 studies of the relationship between exam results and a wide range of adult achievement found the relationship to be, at best, slight (Baird, 1985). For example, first degree results explain less than 10% of the variance in postgraduate performance (Warren, 1971).

Second, coursework marks are a better predictor of long term learning of course content than are exams. Conway *et al*. (1992) reported a study of the performance of psychology students on a range of tests of their understanding and recall of content of a cognitive psychology course taken many years before. They found that student marks on coursework assignments undertaken up to 13 years before correlated with these test scores while students' original exam marks did not. Presumably the kind of learning that coursework involves has long term consequences while the kind of learning involved in revision for exams does not. Studies of surface and deep approaches to learning have shown similar results: that any positive impact on test results of students taking a surface approach in preparation for the test are very short-lasting (Marton & Wenestam, 1978).

Third, in experimental studies in which students have either studied exam-based or assignment-based courses, the quality of their learning has been shown to be higher in the assignment-based courses. For example Tynjala (1998) compared two student groups: the first group studied via conventional lectures, a text-book and an exam; the second group studied via assignments based on the text-book, discussion with other students about these assignments, and a course-work essay marked by the teacher. This second group then also took the exam so as to enable a comparison with the first group, even though they had not studied for the exam. The second group were found to place more emphasis on thinking and had developed more sophisticated conceptions of learning (see Säljö, 1982). In their exam answers they revealed more comparisons, more evaluations and more sophisticated structures to their answers

in terms of the SOLO taxonomy of learning outcomes (Biggs & Collis, 1982). These results (achieved with less teaching) were interpreted in terms of the assessment requirements for the second group being more constructivist.

It is a common observation of higher education teachers that if coursework is taken away from a module due to resource constraints, students simply do not do the associated studying; for example students will rarely write unassessed essays. It is argued that you have to assess everything that moves in order to capture students' time and energy. However, coursework does not have to be marked to generate the necessary learning. Forbes & Spence (1991) reported a study of assessment on an engineering course at Strathclyde University. When lecturers stopped marking weekly problem sheets because they were simply too busy, students did indeed stop tackling the problems, and their exam marks went down as a consequence. But when lecturers introduced periodic peer-assessment of the problem sheets — as a course requirement but without the marks contributing — students' exam marks increased dramatically to a level well above that achieved previously when lecturers did the marking. What achieved the learning was the quality of student engagement in learning tasks, not teachers doing lots of marking. The trick when designing assessment regimes is to generate engagement with learning tasks without generating piles of marking.

The decline in formative assessment

A traditional characteristic of teaching in higher education in the UK has been the frequent provision of detailed personalized feedback on assignments. The archetype has been that of Oxford or Cambridge University where students wrote an essay a week and read it out to their tutor in a one-to-one tutorial, gaining immediate and detailed oral feedback on their understanding as revealed in the essay. This was almost the only teaching many Oxbridge students experienced: teaching meant giving feedback on essays. This formative assessment was quite separate from marking and at Oxford and Cambridge the only summative assessment often consisted of final examinations at the end of three years of study that had involved weekly formative assessment.

Few institutions have been able to match the quantity or quality of feedback provided by Oxford or Cambridge but the assumption for most has been that frequent assignments and detailed (written) feedback are central to student learning. Until quite recently, for example, many

science courses involved weekly problem sheets and laboratory reports, all of which were marked by teachers and returned to students within the week. In most forms of distance education, feedback on frequent assignments is the main interactive component of teaching and the Open University has placed great emphasis on frequent assignments, training and paying tutors to provide comprehensive feedback, and monitoring the quality of this feedback. For some Open University students this is their only contact with their tutor. They can cope without much, or even any, face-to-face teaching, but they cannot cope without regular feedback on assignments.

Resource constraints in conventional universities have led to a reduction in the frequency of assignments, in the quantity and quality of feedback and in the timeliness of this feedback. Modularisation has tended to shorten courses and has reduced the timescale within which it is possible to set assignments and provide feedback, while increasing the number of examinations. Some courses have abandoned formative assignments altogether. Others may involve just one assignment but with feedback not being provided until very late in the course, or even after the exam. At the same time the diversity of students has increased enormously, so that previous assumptions of the level of sophistication of knowledge background, study skills, conception of learning (Säljö, 1982), or conception of knowledge (Perry, 1970) of students are now likely to be very wide of the mark. Far more guidance is likely to be required by these students who need more practice at tackling assignments and more feedback on their learning, not less. Because regular assignments and comprehensive feedback is understood to be central to distance education, it has in contrast largely been retained; as a result today's Open University students may receive fifty times as much feedback on assignments over the course of an entire degree programme as do students at conventional universities.

The effectiveness of feedback

In a comprehensive review of 87 meta-analyses of studies of what makes a difference to student achievement, Hattie (1987) reports that the most powerful single influence is feedback. Similarly, Black & Wiliam's (1998) comprehensive review of formative assessment emphasizes the extraordinarily large and consistent positive effects that feedback has on learning compared with other aspects of teaching. There have been many attempts both to understand the nature of this impact and to harness its power through innovation, at least in schools, as a consequence of this incontrovertible evidence.

In higher education, feedback to individual students in class must have declined significantly as class sizes have increased, though we have no evidence about this. Writing comments on assignments, however, remains a major component of teachers' workload in higher education. As class sizes have increased there have been some economies of scale in teaching (simply by packing more students into classrooms), but economies of scale are difficult to achieve for assessment: most assessment costs go up in direct proportion to the number of students. As a result, assessment costs can overtake teaching costs and teachers can find themselves spending much of their time marking. Is all this effort worthwhile?

In the Course Experience Questionnaire (Ramsden, 1991), used extensively in Australia and elsewhere to evaluate the quality of courses, the questionnaire item that most clearly distinguishes the best and worst courses is 'Teaching staff here normally give helpful feedback on how you are going' (Ramsden, 1992, p.107). This does not mean that higher education teachers in fact give helpful feedback — it means that whether or not they give helpful feedback makes more difference than anything else they do. How well does feedback actually work?

Maclellen (2001) surveyed 130 students and 80 lecturers at the University of Strathclyde about their perceptions concerning assessment. Amongst the 40 questions asked, four were about feedback and these revealed wide discrepancies between students and lecturers. While most teachers responded that feedback is frequently helpful in detail, frequently helps students to understand and frequently helps learning, most students responded that feedback was only sometimes helpful in these ways. 30% of students reported that feedback never helps them to understand. While 63% of lecturers responded that feedback frequently prompts discussion with a tutor, only 2% of students responded the same way and 50% of students responded that feedback never prompted discussion.

There may be a problem here with the quantity and quality of feedback such that it is not actually helpful to students — after all, teachers are under enormous time pressure and it is difficult to provide comprehensive and useful feedback under such circumstances. But there are other problems. Studies of what students do with feedback makes for depressing reading. Feedback is often not read at all (Hounsell, 1987) or not understood (Lea & Street, 1998). Wotjas (1998) reported:

> 'Some students threw away the feedback if they disliked the grade, while others seemed concerned only with the final result and did not collect the marked work.'

There is also a problem associated with both marks and feedback being provided. A grade is likely to be perceived by the student as indicating their personal ability or worth as a person as it is usually 'norm-referenced' and tells you, primarily, where you stand in relation to others. A poor grade may damage a student's 'self-efficacy', or sense of ability to be effective. Yorke (2001) elaborates on the positive or negative ways in which formative assessment can affect student retention and emphasizes its role in 'academic integration' (Tinto, 1993). In contrast, feedback on its own is more likely to be perceived as a comment on what has been learnt. In the absence of marks it has been reported that students read feedback much more carefully (Black & Wiliam, 1998) and use it to guide their learning. In the light of this (school-based) research evidence, some schools have adopted policies that all assignments should only have feedback and that no marks should be provided. The Alverno College 'assessment as learning' system is probably the best known higher education example of 'grade-less' assessment.

This is not a pretty picture. Assessment sometimes appears to be, at one and the same time, enormously expensive, disliked by both students and teachers, and largely ineffective in supporting learning. In the light of these problems the remainder of this article sets out and attempts to justify a set of 'conditions under which assessment can support learning'. The evidence is rarely conclusive enough to argue that if your assessment fulfils these conditions then learning will inevitably be more effective. They are offered as a plausible set of guidelines.

This is not the first attempt to identify such 'conditions' but is the first attempt in the context of higher education. School-based research has identified lists of effects of formative assessment such as the one below, based on Gagne (1977):

1. Reactivating or consolidating prerequisite skills or knowledge prior to introducing the new material

2. Focusing attention on important aspects of the subject

3. Encouraging active learning strategies

4. Giving students opportunities to practise skills and consolidate learning

5. Providing knowledge of results and corrective feedback

6. Helping students to monitor their own progress and develop skills of self-evaluation

7. Guiding the choice of further instructional or learning activities to increase mastery

8. Helping students to feel a sense of accomplishment.

(Crooks, 1988)

The conditions outlined here refer to two relatively distinct categories of influence:

- the influence of the design of assessment systems and assignments on how much students study, what they study and on the quality of their engagement

- the influence of feedback on learning.

Influences of assessment on the volume, focus and quality of studying

Condition 1

Sufficient assessed tasks are provided for students to capture sufficient study time

This issue concerns how much time and effort students allocate — the 'time on task' principle (Chickering & Gamson, 1987) that if students don't spend enough time on something they won't learn it. Berliner (1984), summarising research in the 'time on task' principle, concluded that there was strong empirical evidence of a direct relationship between time allocation by courses, student time management and actual student time on task, on the one hand, and student achievement on the other.

The relationship between effort and marks is not always straightforward. Kember *et al*. (1996) found that students' perceptions of their effort depended on their motivation more than on the number of hours they actually allocated, and that it was possible for students to put in many hours unproductively, especially if they adopted a surface approach to their studies. Some kinds of assessment can generate long hours of ineffective memorization.

Courses in UK higher education are designed to involve a specified number of learning hours relating to the number of credits for the course. Students are normally expected to spend between about one and four hours out of class for each hour in class (depending largely on the discipline involved). Innis (1996) found students at Leeds Metropolitan University spend between 1.4 and 3.0 hours out of class for each hour in class. How much of this 'out of class' time is actually allocated to studying may be determined largely by assessment demands. In the USA, higher education students on average spend less than half as many hours out of class for each hour in class as teachers expect: between 0.3 and 1.0 hours out of class when teachers, on average, expect 2.1 hours out of class for each hour in class (Moffat, 1989; Hutchings *et al*., 1991; Gardiner, 1997; Brittingham, 1998). The emphasis in the USA on attempts to improve student performance through assessment is on 'classroom assessment' — activities undertaken in class to test students and use this assessment information to guide both students and teaching (Angelo & Cross, 1993). This focus on the classroom could be interpreted as a recognition of the failure to generate much out of class learning through the type of assessment they use. Diary studies (e.g. Innis, 1996) show how students in the UK allocate their time largely to assessed tasks and that this becomes a more narrow focus over time as they become more experienced students, allocating as little as 5% of their time to unassessed study tasks by year three.

Subject areas with less frequent assessed tasks (e.g. text-based subjects) have students who study fewer hours (Vos, 1991). Science and technology subjects that generate greater total study effort tend to have more frequent (though smaller) assessed tasks, such as problem sheets and laboratory reports.

Studies of the impact of students undertaking paid employment in parallel to full time study show that such students study fewer hours (Curtis & Shami, 2002) and perform significantly less well (Paton-Salzberg & Lindsay, 1993). Studies show that up to three quarters of full time students work during term time and they are likely to allocate their reduced study hours especially strategically in relation to assessment requirements. They report reduced reading and other out of class study activity.

Assignments are not the only way to capture student time and effort through assessment. The conventional way to do this is by having unpredictable sampling of course content in unseen examinations so that for a student to ignore anything is a high risk activity. The quality, quantity and distribution of the study effort captured in this way is somewhat unpredictable and probably varies with student perceptions of the likely exam demands and the risks involved.

Time and effort can also be captured through social pressure, for example:

- the potential embarrassment of the poor quality of your work being seen by colleagues, as when a seminar presentation is assessed, or when a laboratory report is written and displayed publicly in the form of a poster

- the potential censure from colleagues if a student were to fail to complete their component of an assessed group assignment.

Condition 2

These tasks are engaged with by students, orienting them to allocate appropriate amounts of time and effort to the most important aspects of the course.

This condition concerns what the effort is oriented towards and what quality of effort is involved. Students usually distribute their time unevenly across courses, often focusing on topics associated with assessment and nothing else. If they drew a graph of weekly study effort for all the weeks of an individual course involving a sequence of assignments, it might look more like the Alps than like Holland. Exams can have the effect of concentrating study into a short intense period at the end of the course with little study of, for example, lecture notes, until many weeks after the lecture. Frequent assignments (such as short problem sheets) or tests (such as computer-based assessment) can distribute student effort across the course, often on a weekly basis, while infrequent assignments (such as extended essays) may result in intensive studying for a week or two immediately prior to the assignment deadline, while topics not covered by the assignment can be largely ignored.

We know very little about the distribution of student effort and higher education teachers also tend to know little about what their students do with their time and when.

Condition 3

Tackling the assessed task engages students in productive learning activity of an appropriate kind

This issue concerns the kinds of study and learning activity involved in tackling the assignment or in preparing for tests. Some assessment generates unhelpful and inappropriate learning activity, even if it produces reliable marks. Studying for multiple choice question

(MCQ) tests can orient students to a surface approach (Scouler & Prosser, 1994; Tang, 1994; Scouler, 1998), as can exams, though the approach to learning of students may have as much impact as the form of test. Students may take a deep approach to preparing for MCQ tests and adopting effective study strategies even when the test only makes low level demands, and Macdonald (2002) has reported that at least some students adopted a deep approach to examination revision and learning effectively as a result of the integration of material that their revision involved.

Much assessment simply fails to engage students with appropriate types of learning. Submitting a laboratory report of a teacher-designed procedure is unlikely to help students to learn how to design experiments. Probably the only way to learn how to solve problems is to solve lots of problems. Probably the only way to gain facility with the discourse of a discipline is to undertake plenty of practice in using that discourse, for example through writing. Assignments are the main way in which such practice is generated. Students are unlikely to engage seriously with such demanding practice unless it is assessed, or at least required, by the assessment regulations. It seems unlikely that this student would write essays, and acquire the learning that resulted, without being required to:

> 'It's just work, in a way. Just all these essays, and reading's the worst part, it's just labouring really.' (History student)
> (Hounsell, 1987)

Some assessment can mis-orient student effort. Snyder (1971) described how students encouraged to be creative at Massachusetts Institute of Technology abandoned any such aspiration on discovering that most of the marks were derived from rote memorization of material for multiple choice tests. Some assignments create appropriate learning activity as a by-product. For example, setting essays can generate 'reading around' and can support the working up of coherent arguments in a way that simply asking students to read what is on the reading list does not. If you were to take the essay away, the appropriate form of studying would not occur even in the unlikely event of a similar volume of reading of similar material taking place. The product, the essay, and the marks associated with it, may be less important to the learning than the framework the assignment provides for the learning activities of 'reading around' and of 'constructing arguments'. Similarly, with laboratory reports or design briefs, the product may be less important than details of the studying required to fulfil the assignment requirements. Group projects can engage students in much discussion and confront individuals with

alternative views and different standards of work. The quality of the group product (such as a report) that is marked may be less important than the qualities of the learning process that created it.

Students can tackle assignments that are intended as learning activities so as to maximize the marks they obtain rather than maximising the learning achieved from engaging with the assignment. This may involve 'faking good' and pretending to be competent or knowledgeable, deliberately covering up misunderstanding and ignorance, telling teachers what they want to hear rather than what they as students believe, and so on. To some extent this is a consequence of the student's orientation, but assessment tasks, marking regimes and the way feedback functions can override such individual orientations and even encourage student behaviour that reduces learning. In the example below an intrinsically oriented student describes, in a learning log, the means he used to tackle assignments in Engineering in a way designed to obtain marks at the expense of learning:

> 'The average lecturer likes to see the right result squared in red at the bottom of the test sheet, if possible with as few lines of calculation as possible — above all else don't put any comments. He hates that. He thinks that you are trying to fill the page with words to make the work look bigger. Don't leave your mistakes, either, even corrected. If you've done it wrong, bin the lot. He likes to believe that you've found the right solution at the first time. If you're still making mistakes, that means you didn't study enough. There's no way you can re-do an exercise a few months after because you've only got the plain results without comments. If you have a go, you may well make the same mistakes you've done before because you've got no record of your previous errors.' (Gibbs, 1992)

The influence of feedback on learning

> 'Knowing what you know and don't know focuses learning. Students need appropriate feedback on performance to benefit from courses. In getting started, students need help in assessing existing knowledge and competence. In classes, students need frequent opportunities to perform and receive suggestions for improvement. At various points during college, and at the end, students need chances to reflect on what they have learnt, what they still have to learn, and how to assess themselves.' (Chickering & Gamson, 1987)

Conventionally, feedback is conceptualized as an issue of 'correction of errors' (Bruner, 1974) or 'knowledge of results' in relation to learning itself; if a student is informed that she is accurate then she will learn. In this article we are concerned with how the provision of feedback affects student learning behaviour — with how feedback results in students taking action that involves, or does not involve, further learning.

Condition 4

Sufficient feedback is provided, both often enough and in enough detail

This issue concerns what is conventionally defined as formative assessment: the impact on learning of feedback on progress, usually provided after a 'performance' on an assignment. The volume and thoroughness of feedback varies enormously between courses — we suspect far more than the variation in quantity or quality of teaching.

This feedback may need to be quite regular, and on relatively small chunks of course content, to be useful. One piece of detailed feedback on an extended essay or design task after ten weeks of study is unlikely to support learning across a whole course very well. There has been very widespread adoption of computer-based testing to provide at least some feedback on progress, and in some assessment software it is possible to provide 'remedial feedback' when incorrect answers are selected. Cook (2001) has reported that students' final exam marks were closely related to the number (and therefore frequency) of computer marked assignments students had tackled. The frequency and speed of response of such feedback, which is possible to provide reasonably economically, may compensate for its relatively poor quality and lack of individualization.

Feedback has to be quite specific to be useful. The Open University trains its 7,500 part time tutors to give quite detailed and extensive feedback. Cole *et al*. (1986) list the characteristics of effective feedback in distance learning and Roberts (1996) found that students' preferences for feedback closely match this list. The specific forms of feedback that are effective vary from discipline to discipline. Evidence about the most effective forms of feedback in language learning, for example, is summarized in Hyland (2001). In both Psychology (Stephenson *et al*., 1996) and Mathematics (Rice *et al*., 1994) students have been reported as wanting specific, detailed facilitative feedback. Greer (2001) reports a study that illuminates exactly what kind of impact feedback was achieving on the learning of Accountancy.

Much of the feedback to students provided in the rest of higher education would be picked up by the Open University's Staff Tutors (who monitor tutors' marking) as being totally inadequate and would lead to quality assurance and staff development interventions.

Condition 5

The feedback focuses on students' performance, on their learning and on actions under the students' control, rather than on the students themselves and on their characteristics

Literature on formative assessment distinguishes between feedback which tells students they are hopeless, or amongst the bottom 10% of students (a grade D, for example), and feedback which tells students exactly where they have gone wrong and what they can do about it. Grades without feedback may be particularly damaging. A focus of critical feedback on personal characteristics can be demotivating and can negatively affect students' 'self-efficacy' or sense of competence. This is important because self-efficacy is strongly related to effort and persistence with tasks (Schunk, 1984; 1985), predicts academic achievement well and is associated with adopting a deep approach to learning (Thomas *et al*., 1987). In contrast, feedback concerning content provides the student with options for action and is less closely associated with their ego — it is about their action rather than about themselves. Wootton (2002) has written passionately about the negative impact of assessment on 'at risk' students and asks whether the system exists 'to encourage learning or to measure failure'.

Condition 6

The feedback is timely in that it is received by students while it still matters to them and in time for them to pay attention to further learning or receive further assistance

This issue was highlighted in the 'seven principles of good practice in undergraduate education' (Chickering & Gamson, 1987; 1991). It is based on a range of studies of the timing of feedback (for summaries, see Dunkin, 1986; McKeachie *et al*., 1986). A teaching method which places great emphasis on immediate feedback at each stage of a student's progress through course units, the Personalised System of Instruction (PSI), has been demonstrated in many studies to improve student performance (Kulik *et al*., 1980).

If students do not receive feedback fast enough then they will have moved on to new content and the feedback is irrelevant to their ongoing studies and is extremely unlikely to result in additional appropriate learning activity, directed by the feedback. Due to resource pressures feedback is being provided more slowly and as courses in the UK are now shorter, this may mean that feedback on coursework is not provided until after the course has finished. Much such expensively provided feedback is likely to be wasted. There may be a trade off between the rapidity and quality of feedback so that, for example, imperfect feedback from a fellow student provided almost immediately may have much more impact than more perfect feedback from a tutor four weeks later.

Carroll (1995) described 'formative assessment workshops' for classes of 300 medical students which consisted of multiple choice question test items followed immediately by a short remedial tutorial on the question. There was no individualized feedback in this system but the feedback was very immediate and the workshop sessions were scheduled to allow students time to study more material before moving on to the next section of the course. 85% of students reported wanting more such sessions. Sly (1999) reported the impact of 'practice tests' on subsequent exam performance. Students had the option of taking a practice test, with computer-based feedback, sufficiently in advance of an exam to enable them to use the feedback to undertake some more studying to address their weaknesses. 197 weaker students chose to take these practice tests and these students improved their exam scores so much that they outperformed 417 stronger students. The benefits were still evident in a subsequent exam.

Condition 7

Feedback is appropriate to the purpose of the assignment and to its criteria for success

This issue concerns the relationship of feedback to what an assignment has been set for and what counts as a successful attempt at the assignment. Feedback can perform several functions. For example it can be used primarily to:

- correct errors

- develop understanding through explanations

- generate more learning by suggesting further specific study tasks

- promote the development of generic skills by focusing on evidence of the use of skills rather than on the content

- promote meta-cognition by encouraging students' reflection and awareness of learning processes involved in the assignment

- encourage students to continue studying.

Which of these is appropriate depends on why the particular assignment was set in the first place. For example, was the intention to provide a single opportunity to practise the use of a procedure or algorithm in an accurate way, to provide one of many opportunities to practise in the use of a transferable skill, to offer a rich opportunity to reflect on learning, or to provide an easy first hurdle in a course that it would be motivating for a student to complete?

A recent study at the Open University suggested that maintaining motivation was the most important and influential issue for new students for their first assignment in a course (Gibbs & Simpson, 2002). If a student is looking for encouragement and only receives corrections of errors this may not support their learning in the most effective way.

Students need to understand why they have got the grade or mark they have and why they have not got a higher (or lower) grade. Criteria need to be explicit and understood by students, and demonstrably used in forming grades. Often criteria are not accompanied by standards and it is difficult for a student to tell what standard is expected or would be considered inadequate. Much of the literature on the use of self- and peer-assessment is about the reliability of such marking, and assumes that self- and peer-assessment is primarily a labour-saving device. But the real value may lie in students internalising the standards expected so that they can supervise themselves and improve the quality of their own assignments prior to submitting them.

Students need to understand criteria in order to orient themselves appropriately to the assignment ask. Penny & Grover (1996) have reported the extent to which students misunderstood the criteria to be used to assess their final year research project. The students expected criteria to be concerned with low-level goals such as style and presentation while their teachers emphasized high level goals such as theoretical and conceptual understanding. Opportunities to provide feedback at multiple stages during an ongoing project can re-orient student effort in appropriate ways (Carless, 2002).

Assessment also performs a role in conveying the standard that students have to aspire to. Conveying high expectations is one of the 'seven principles of good practice in undergraduate education' (Chickering & Gamson, 1987). Feedback, model answers and especially exemplars (Orsmond *et al*., 2002) help to establish these expectations and self-assessment helps students to internalize them.

Condition 8

Feedback is appropriate, in relation to students' understanding of what they are supposed to be doing

Students' conceptions of the task

Students have to make sense of what kind of a task they have been set when they tackle an assignment and what would count as a 'good' attempt at it. They can misunderstand and be confused by whatever briefing and feedback they have been given in the past, as in this example:

> 'What do you think the tutor was looking for in this essay?
>
> Ah … well!, this is confusing me. I know the tutor likes concise work, but doesn't like generalisations, and doesn't like too much detail, although on the whole I think he'd like more detail than generalisations. And because it was such a general question, I though 'oh help!', I don't know what he's looking for.'
> (Hounsell, 1987)

Whatever feedback this student's tutor gives will be interpreted in the light of this student's conceptions of what the tutor really wants or what the task really consists of. Students can have a great deal of difficulty understanding what form of communication an essay is (when the only audience knows more than they do about the topic), or what a laboratory report is for (when it has already been written hundreds of times before in exactly the same format), or what a design task has been set for (when only the product is assessed and not the learning that was involved in creating it). Many academic tasks make little sense to students. This inevitably causes problems when they come to read feedback about whether they have tackled this incomprehensible task appropriately.

Students' conceptions of learning

Underlying the above students' confusion about what the tutor really wants could be an unsophisticated conception of learning. Säljö (1982) describes students as having one of five conceptions of learning:

1. Learning as passive receipt of information

2. Learning as active memorization of information

3. Learning as active memorization of information or procedures, to be used at some time in the future

4. Learning as understanding

5. Learning as a change in personal reality: seeing the world differently.

A student with conceptions of learning 1, 2 or 3 might have trouble interpreting feedback that stated: 'Not enough discussion' if they had accurately provided the tutor with information they had diligently collected. Feedback needs to be sensitive to the unsophisticated conceptions of learning that may be revealed in students' work.

Students' conception of knowledge

Perry's 'scheme of intellectual and ethical development' describes how students develop over time, and through academic experience, their understanding of what knowledge itself is (Perry, 1970). He describes students as starting off thinking that there are an enormous number of right answers and that their job is to learn these and give them back to the teacher correctly. Perry describes this learning process with the memorable phrase 'quantitative accretion of discrete rightness'. He describes students as moving through a number of stages of increased understanding of the nature of knowledge involving, for example, extreme relativism, in which all answers are seen as equally right. A student who does not draw a conclusion to an essay may be leaving it up to the reader to decide, given that all conclusions are seen as equally valid. Feedback that simply read 'No conclusion' might not help such a student to progress! Teachers' feedback is often (though not always) generated from a more sophisticated epistemological stance than that of the student and this offers plenty of scope for misunderstanding of feedback or blank incomprehension.

Students' conception of the discourse of the discipline

Lea & Street (1998) describe a student who, after submitting an essay on a History course, received the feedback 'I like your conclusions to what is a carefully argued and relevant essay.' At the same time the student received feedback on an essay submitted on a parallel Anthropology course which was so critical of the student's ability to write a clear argument or produce a justified conclusion that they were advised to seek study skills counselling. Lea & Street interpret this as a consequence of Anthropology involving a very different form of discourse involving different forms of argumentation and use of evidence, as it was clearly not a case of generalized essay writing inadequacies. If the student did not understand the discourse of Anthropology and was unpractised in using it, then generalized essay writing advice was unlikely to be helpful, whether from the lecturer or from a study skills counsellor. Feedback needs to be sensitive to what kind of writing is expected and what students are likely to understand about it. In modular course structures it is common for students to cross disciplinary boundaries and have to cope with such differences in discourse. Science and Technology students often have particular difficulties with social science-type essays even if they can write in an articulate way in their own discipline, but there are also profound differences in discourse within the social sciences, for example between Sociology and Psychology, and within the Humanities, for example between History and Literature.

Similarly, Higgins *et al*. (2001) discuss the failures of communication that take place in feedback. They describe a case in which the tutor's entire feedback consisted of: 'A satisfactory effort. More critical analysis of key issues would have helped.' The student, who wanted to be better than 'satisfactory', was left frustrated by the poor quality of critical analysis by the tutor.

Condition 9

Feedback is received and attended to

A number of studies have described students receiving their assignment back, glancing at the mark at the bottom, and then simply throwing it in the bin, including all the feedback.

> 'Sometimes I do read the comments but I find that I'll never write the same essay again anyway … . I tend to ignore them in some ways, unless there is something very startling.'
> (Hounsell, 1987)

Crooks (1988) has summarized a range of research on this issue; where marks on intermediate tests or coursework assignments count significantly towards final marks, students pay less attention to accompanying feedback. Jackson (1995) found that third year students were particularly likely only to look at the grade rather than at feedback on essays. He reported that students like to see the feedback, but more to assure them that their essay had been read carefully and marked fairly.

It is not inevitable that students will read and pay attention to feedback even when that feedback is lovingly crafted and provided promptly. Special steps may need to be taken to engage students with feedback, such as:

- asking students to specify, on their assignment, what they would like feedback on, and giving feedback on nothing else

- providing feedback but no marks, so that students have to read the feedback to get any idea how they are progressing

- requiring assignments to be self-assessed (without any marks being involved) so that students pay attention to whether teachers' views correspond to their own. In a review of literature on self- and peer-assessment, Dochy *et al*. have reported that overt self-assessment has been shown to increase student performance (compared with a control group, in controlled studies) and increase students' control over their learning strategies (Dochy *et al*., 1999)

- using two-stage assignments with feedback on the first stage, intended to enable the student to improve the quality of work for a second stage submission, which is only graded. Cooper (2000) has reported how such a system can improve almost all students' performance, particularly the performance of some of the weaker students

- providing a grade only after self-assessment and tutor feedback has been completed. Taras (2001) reports the successful use of such a sequence as a component of summative assessments.

Condition 10

Feedback is acted upon by the student

This issue concerns the impact of feedback on future learning. Feedback may accurately correct errors but still lead to no change in the way a student goes about the next assignment or tackles any future learning task. This may occur for a variety of reasons:

- feedback may come too late to be acted on by students

- feedback may be backward looking — addressing issues associated with material that will not be studied again, rather than forward-looking and addressing the next study activities or assignments the student will engage with

- feedback may be unrealistic or unspecific in its aspirations for student effort (e.g. 'read the literature' rather than 'for the opposite view, see Smith Chapter 2 pages 24-29')

- feedback may ask the student to do something they do not know how to do (e.g. 'be more Sociological' or 'express yourself more clearly')

- feedback may be context-specific and only apply to the particular assignment rather than concerning generic issues such as study skills or approaches that generalize across assignments

- feedback may be discouraging and lead to less study effort rather than more

- there may be no follow-up to check if students have taken any action, so students can ignore feedback with impunity.

Ding (1998) suggests that even if students read feedback comments, they do little with them. In contrast Brookhart (2001) found that successful students use both marks and feedback and actively self-assess, both to learn and to direct their future studying. The most important variables here may be, as so often, to do with the student rather than with the teacher. Teaching students to monitor their own performance is, in Sadler's theoretical analysis of the role of feedback, the ultimate goal of feedback (Sadler, 1989). Research on the impact of the use of 'classroom assessment' in college in the USA again and again stresses the impact not on the learning of specific content but on the development in students of 'meta-cognition' and the ability to gain control over their own learning (see Steadman, 1998, for a summary). Students are likely to need to be taught how to use feedback to develop meta-cognitive control (Sadler, 1998). Improved ability to learn may not have the effects hoped for, however. Ramsden *et al*. (1987), studying the impact of a 'study skills' programme designed to increase the extent to which students adopted a deep approach, found it actually achieved the opposite. Students' increased awareness enabled them to adopt a surface approach to a greater extent in order to meet the perceived low level demands of their courses' assessment! Again this illustrates the way students' perceptions of assessment influence their learning.

Conclusion

These 'conditions under which assessment supports learning' are in the process of being tested out in practice in the context of a large scale project starting with a study of assessment in science courses at two universities. Teachers of courses with a wide range of assessment practices are collecting evidence from their students about, for example, how they distribute their effort in relation to assessment demands, and how they respond to feedback. They are using this evidence to diagnose potential problems with their courses, making changes to the assessment to address these problems, and then evaluating whether the changes have had positive impacts on the ways their students go about their learning. This is much like any action research process involving the improvement of teaching, but with one major difference: the focus is not on teaching but on assessment. The starting assumption is that there is more leverage to improve teaching through changing aspects of assessment than there is in changing anything else and, at the same time, the teachers know less about how students respond to assessment than about anything else. As this project progresses, teachers' insights and evidence of effective changes to courses will lead to these 'conditions' being developed further. It is a large scale collaborative venture in the 'scholarship of assessment' that will lead both to case studies of changes that turned out to be effective but also to an elaborated conceptual framework that helps to explain why they were effective. The intention is that these conditions can be used as a checklist by any teacher wishing to review and make sense of the effectiveness of their own course's assessment system to support student learning.

Acknowledgements

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