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Assessment

by Richard James

> One of the problems about assessment, which is rarely recognised, is that it markedly affects the type of learning that students undertake: it provides the currency in which they are rewarded for their efforts in studying. Students work out what 'pays off' and this affects the distribution of effort they put into different activities, and also the quality of their learning ... Lecturers are often unaware of the extreme way in which assessment requirements influence studying. What they say in lectures is being evaluated for its relevance and import in relation to what will 'pay off' in assessment terms. (Entwistle, Thompson & Tait, 1992, p.65)

Assessment contributes to establishing the framework in which students learn. It is a powerful tool with which to guide student learning. This booklet is an introduction to issues in assessment in higher education. It is not intended to be comprehensive – this would require a book or two – rather, it raises some important issues and offers some suggestions.

The many purposes of assessment

Assessment is a central component of good teaching and learning. In the end, the primary purpose of assessment is to gauge the extent of student learning. However, designing accurate and useful approaches to assessment (and recording the outcomes fairly) is difficult. Much of the confusion with assessment may be because it inevitably serves a number of 'secondary' purposes. We will examine these briefly.

Grading is the first thing that comes to mind when we think of assessment. We attach great importance to grading, yet it is simply the translation of measures of student learning into a point on an arbitrary scale. Grading will forever be a contentious issue because it is an attempt to produce a simple indicator of complex human performance. Grading should be

seen as a necessary outcome from assessment, but it should not determine approaches to assessment.

Assessment is used for selection and readiness purposes.
It may be used in the competitive sense, such as when the number of applicants exceeds the number of course places, or in the developmental sense to determine whether a student is ready to enter a particular course or the next stage of study.

If used correctly, assessment is a motivating factor. Awareness of a coming assessment task may make students work harder – but not necessarily more appropriately. Undue emphasis on assessment can cause unreasonable anxiety, attention only to the 'examinable' and a loss of interest in deeper learning in the subject area. However, when used successfully, assessment will focus learning**.** Judicious design and timing of assessment can help define the curriculum and guide students through it – well-crafted assessment procedures will signal to students the learning and the learning strategies to be rewarded.

The best assessment tasks will be those that are part of the learning process. Assessment, as well as probing student learning, should also contribute to this learning. On-going assessment during a subject, rather than a single end of subject examination, will help students to learn and relearn the subject matter.

Finally, assessment is important for feedback; to students on the quality of their learning, and to teachers on the quality of their teaching. Careful attention to the outcomes of student assessment is one means of monitoring and improving your teaching.

The principles of good assessment

When planning the assessment of students, the following basic principles should be kept in mind:

- Communicate assessment requirements accurately, clearly and early. Make sure your assessment has been designed to cover all aspects of the course adequately; otherwise, there is a possibility that announcing the assessment requirements will limit student learning to the 'examinable'. Students will also benefit from details of marking criteria and examples of assessment tasks.
  A brief handout, distributed early in the course, can cover these matters.

- Ensure that the assessment adequately reflects and rewards the learning goals that are most important. Don't let the assessment direct students towards relatively unimportant goals – even though they may, at times, be easier to measure.

- Be considerate of student workloads and the timing of assessments. Students overloaded by both volume and time pressures will take shortcuts and lose motivation. The capacity of teaching staff to evaluate the assessments promptly should also be considered.

- Recognise that most courses have 'essentials' and 'optionals'. You may need to ensure that all students are assessed on essentials. Optionals, on the other hand, are likely to be developmental and more difficult to assess. They can often be 'sampled' by a number of assessment instruments and student performance aggregated.

- Try to create reliable and valid assessments; that is, use assessments instruments that achieve consistent results and that assess the right things. This requires close consideration of the understanding and skills you expect of students and the criteria you are using for determining student performance. Regular review of your assessment procedures is important. To gain additional insight into your assessment methods it may be helpful to ask an experienced colleague or a CSHE staff member for assistance.

- Remember that assessment is part of the learning process, not the termination of it. Give feedback to students that is timely and informative. Your feedback should identify means of improvement, if necessary, and be delivered in a manner that is sensitive to students' feelings. An 'examiner's report' may communicate the general strengths and weaknesses of the class, and may include model answers where appropriate. This is usually very useful for students. For personal feedback, one simple idea is to prepare an assessment sheet listing your criteria, on which you may quickly indicate, by ticking or circling, each student's achievement. The following is a simplified example of this approach:

Assessment of Literature Review

CRITERION	RATING

Choice of topic	*Poor*	*Satisfactory*	*Good*	*Excellent*
Focus of review	*Poor*	*Satisfactory*	*Good*	*Excellent*
Scope of lit. review	*Poor*	*Satisfactory*	*Good*	*Excellent*
General expression	*Poor*	*Satisfactory*	*Good*	*Excellent*
Citations	*Poor*	*Satisfactory*	*Good*	*Excellent*
General presentation	*Poor*	*Satisfactory*	*Good*	*Excellent*

Comments:

Confidential written feedback is very important to students. Where possible, it is also useful to meet privately with students to discuss matters that are difficult to deal with in writing.

Some practical tips for creating assessments

How do you begin to design effective assessment? The starting point should be the learning aims and objectives that have been specified for your course or subject (see the CSHE paper, *Writing aims and objectives*). The aims and objectives should clearly state the knowledge and skills expected of a student upon completion of the learning. Assessment should be designed to reveal whether or not students have developed these required understandings and skills.

Bloom (1956) defined a taxonomy of educational objectives based around three domains: cognitive (thinking and knowing), psychomotor ('practical' skills), and affective (attitudes and values). Cognitive skills are often emphasised in traditional exams, essays and practical reports. Bloom suggested a hierarchy of cognitive activity: knowledge, comprehension, application, analysis, synthesis, and evaluation. Students' progression can be assessed by asking them to *recall* or *recognise* information, *comprehend* and *apply* information and principles and, finally, *critically analyse* or *problem solve* in new situations. It is generally easier to design assessments which test lower order intellectual activity. Assessment

techniques should be evaluated to determine which intellectual skills they investigate. One technique is to use a matrix for summing the percentage of attention or marks given to particular topics and the range of intellectual skills examined:

TOPIC	Recall/ Recognise	Comprehend/ Apply	Problem Solve/ Critically analyse	TOTAL
Proteins	*5*	*10*	*5*	*20*
Fatty acids	*10*	*0*	*5*	*25*
Carbohydrates	*15*	*15*	*10*	*40*
Vitamins	*5*	*5*	*5*	*15*
TOTAL	*35*	*40*	*25*	*100*

Column and row totals provide an indication of whether the assessment appropriately covers the stated goals for the course.

Practical skills should be assessed by direct observation of student performance in a laboratory or practical class, or by inspection of the 'products' students create. It is also possible to gain insight into student understanding by written assessment (such as, “Explain the steps you would undertake in order to...”).

It is necessary to have a systematic means of recording your observation of students’ skills. This may be done as a simple yes/no checklist of the required skills. Students are rated with a 'yes' when their performance is beyond a threshold level. A slightly more sophisticated approach is to use a broader rating scale with a number of achievement points, perhaps three, four or five, such as:

Needs much assistance	*Needs some assistance*	*Performs without assistance*

The descriptions attached to the scale can be modified to suit particular learning goals. It may also be useful to have space available for open-ended comments.

Attitudes and values are more difficult to assess. Evaluation may take the form of direct observation of students, data collected from written tests or student self-reports. The

following table is a simple illustration of the use of a self-report, Likert-type scale to gather data on student attitudes:

*Please circle one response for each statement (**S**trongly **A**gree, **A**gree, **U**ndecided, **D**isagree, **S**trongly **D**isagree)*

SA	*A*	*U*	*D*	*SD*	*I find the subject interesting*
SA	*A*	*U*	*D*	*SD*	*I enjoy the set readings*
SA	*A*	*U*	*D*	*SD*	*Group work has been useful*
SA	*A*	*U*	*D*	*SD*	*Some activities are boring*
SA	*A*	*U*	*D*	*SD*	*It is fun in the laboratory*

This example focuses on attitudes toward the subject; assessing the development of desired values can be approached in a similar way. For direct observation of students' attitudes and values, it is probably best simply to note a student's apparent progress towards the desired outcome.

The following table illustrates an approach that may be taken:

Objective: Shows appreciation of the importance of professional ethics

No observable appreciation	*Some observable appreciation*	*Well developed appreciation*

Types of assessment

There are many different approaches to assessment and abundant literature offering advice on the use of particular approaches. Because no single assessment can hope to evaluate a student's learning fully, it is usually necessary to use a set of assessments. Depending upon the requirements of a particular course or subject, assessment types may include:

- Exams or tests
  - Multiple-choice exams
  - Short answer exams
  - Take-home exams
  - Open-book exams

- Essays, class papers
  Class presentations

- Practical work
  Practical reports
  Laboratory notes
  Observation of student performance
  Assessment of material created
  Practical examinations

- Observation of student attitudes

- Group projects

- Self-review questionnaires.

Multiple-choice and short-answer tests

Teachers are often attracted to this style of testing because it appears quicker to mark. Be careful; multiple-choice and short-answer tests can only assess certain types of learning and considerable experience (and time) is required to generate items that are valid and reliable.

There are some simple rules for creating multiple-choice questions:

1. Each item should address one major learning objective.

2. Formulate the problem in the 'stem', not in the alternatives. Make the statements in the alternatives as short as possible – the stem should have the detail, in very clear terms. If the statements in the alternatives are long and complex, students will have difficulty remembering and comparing them.

3. It is best to have at least four alternatives, otherwise guessing the correct alternative is too easy. Vary the position of the correct alternative. For clarity, always have the alternatives listed, as is done in the example below.

4. State the 'stem' in positive, rather than negative, form. It is better to use, "Which one of the following is ... ", rather than, "Which one of the following is NOT ... ". Creating the former is more difficult because the author must invent a number of good 'distracters'; that is, plausible, yet incorrect, alternatives. If negative wording must be used, ensure it is emphasised either by uppercase, bold or italic typeface.

5. The standard of 'distracters' must be high, otherwise students can eliminate obvious distracters, allowing a guess that has better prospects! Distracters should be attractive to the ill-informed.

6. Make sure that all alternatives are grammatically consistent with the stem. If the correct answer is the most carefully phrased and consistent, this can provide a clue to students. In the following example of **poor** construction, the stem calls for a plural response, which can only be alternative *b*:

   Minor differences among organisms of the same kind are known as
   a. heredity
   b. variations
   c. adaptation
   d. natural selection

   Similarly, avoid verbal clues that might enable students to guess the correct answer; for example, a word repeated in the stem and in the correct alternative.

7. Avoid using "all of the above" and "none of the above".

8. Make sure that information given in the stem of one question does not assist students to correctly answer another question.

Sometimes, multiple-choice questions would be better replaced by short-answer questions (unless the test is to be machine-marked). For example:

.... What would be the pH of the solution?
   a. 4
   b. 5
   c. 6
   d. 7

Asking students to write the pH they have calculated would reduce the opportunity to guess the right response.

Short-answer questions invite students to supply a correct word, number or symbol, or to "fill in the blank". They are useful only when you require students to recall information or perform computations. They are sometimes difficult to construct so that only one correct response is appropriate.

With "fill in the blank" questions, it is best if there is a single blank per question and the blank is at the end of the sentence. If a numerical answer is required, make sure that the unit and the accuracy required are specified.

Take-home and open-book exams

There are alternative approaches to exams that try to limit some of the undesirable features of traditional exams. One approach is the take-home exam, where students are given a period of time, such as a week, to complete the exam. Students are able to use whatever resources they can muster to do the exam, just as one would in a work situation. This approach can be criticised on the grounds that cheating may occur and that students are placed under undue pressure during the take-home period.

Another approach is to show the content of exams to students before they sit them. This can be done at the start of the course. Indicative sections of the exam can be shown to students in order to focus their learning. Alternatively, a similar procedure can be done shortly before the exam is undertaken. Concerns similar to those for take-home exams apply.

An 'open-book' exam permits students to bring along whatever resources they feel they require or, alternatively, resources specified by the teacher.

This approach helps avoid the exam testing merely rote learning – and can encourage students to become very familiar with texts. Unless the questions are well prepared, however, there is the danger that students will believe they can bring in prepared responses.

Oral exams

Oral exams are a means of testing, amongst other things, fluency of communication. Oral exams allow issues to be explored in depth, and responsive, probing questions can be asked. They are very demanding for both student and examiner. The student can be unsettled by the stressful situation and may fail to recall material; the examiner, on the other hand, must strive to ask impartial, challenging questions in fairness to all students. Oral exams are useful, but they are time-consuming and should be used in conjunction with other forms of assessment.

Essays

There are a variety of ways in which essay questions can be formulated and used. Essays can be of the standard question type, which commence with Discuss, Comment, Write, Describe, Explain, Evaluate, and so on. The nature of the verb chosen will determine whether the student is required simply to reproduce information or to use higher order interpretive and analytical skills.

Alternatively, an essay may be based around a case study – a scenario is developed within a few paragraphs and the student is required to interpret and analyse the situation. For example, "Consider the case of the State versus O'Riley in which O'Riley was ... ". The student may even be required to participate in a role play in which they adopt the character of one participant, as in, "You have been chosen as a consultant to report on .... ".

An essay may be structured to the extent that it is actually a series of questions, specifying the content of the paper to be written.

Essays are, of course, a common means of assessment.
They are widely used in course-work and final exams, but they are not without their problems. Different examiners will often award quite different grades, even if the criteria for marking are clearly specified. The skills being tested can also be challenged: Is the act of essay writing relevant to the student's future career? Similarly: Is the ability to recall large amounts of information within a limited period of time in an exam essay relevant?

Practical reports

Practical reports can be a means of students recording the procedures, observations, calculations and results from practical sessions. They are of limited value if they are merely reproductions of 'recipes' and the jotting of data. In some circumstances, students can reasonably be expected to hand in reports at the end of the practical session. This may reduce the apparent quality of the report, but might encourage good practices. It is a good idea for the reports to be highly structured, at least until students are capable of reporting in a suitable, individual style.

It may be useful to issue students with pro-formas into which they insert their findings. Examples of what you consider to be good reports will be helpful for students.

Group work

Sometimes students work co-operatively on projects or in labs. Teamwork and leadership skills can be learnt in these situations. Assessing the work of groups will reduce your assessment workload. However, there are problems associated with grading individuals – and, in the end, individuals must be graded. A shared group mark does not acknowledge differences in contribution. There are some ways around this. At the outset, students can be asked to identify and allocate tasks for which individuals will be responsible and for which they will be assessed – a contract, if you like. Peer assessment can also be used. Students are in the best position to determine the extent of each individual's contribution, though managing a process of group assessment can be awkward. Third, an individual oral exam can help gain an impression of an individual's contribution and their understanding of a group's work. Finally, in a similar vein, exam questions can probe individuals, by using questions such as, "How did the group approach the problem of ... ?"

Evaluating assessment methods

You may wish to ask these questions about the assessment procedures you are using:

- Do I assess all the stated aims and objectives for the subject or course?
- What influence does the assessment have on the approaches to learning adopted?
- Are assessment workloads for students (and staff) appropriate?

- Are the assessment requirements clearly stated to students?
- Do I give appropriate feedback to students on their achievement?

Fourteen rules for better assessment in higher education (from Ramsden, 1992)

1. Link assessment to learning: focus first on learning, second on encouraging effort, and third on grading; assess during the experience of learning as well as at the end of it; set tasks that mimic realistic problems whenever possible; reward integration and application.

2. Never assess without giving comments to students about how they might improve.

3. Learn from your students' mistakes. Use assessment to discover their misunderstandings, then modify your teaching to address them.

4. Deploy a variety of assessment methods.

5. Try to get students participating in the assessment process, through:

   - discussions of appropriate methods and how the methods relate to the course goals,
   - joint staff-student design of assessment questions and negotiation of criteria for success and failure,
   - self and peer assessment activities, and
   - offering students responsible choice among different methods.

6. Give lucid and frequent messages, both in the assessment questions you set and in your course goals, that memorisation, reproduction, and imitation will be penalised and that success in your courses will only be achieved through decisive demonstrations of understanding.

7. Think about the relation between reporting and feedback; justify on educational grounds either the separation or the combination of the diagnostic and summative functions of a particular test, rather than blindly applying an algorithm such as 'No assessment for feedback should count for a mark' or 'Every assessment should count or students won't bother with it.'

8. Use multiple-choice and other 'objective' tests very cautiously, preferably in combination with other methods. When numbers of students and time permit alternative techniques (see 6 above), use these.

9. In subjects involving quantitative manipulations, always include questions requiring explanations in prose (such as, "What does it mean in this case to say that the standard deviation is 1.8?") as well as numerical examples.

10. Focus on validity (is what you are measuring important?) before reliability (is your test consistent?). Try to avoid the temptation to test trifling aspects because they are easier to measure than important ones.

11. Do everything in your power to lessen the anxiety raised by assessments.

12. "Examinations are formidable even to the best prepared, for the greatest fool may ask more than the wisest man can answer" (Colton). Never set an assignment or examination question you are not ready to answer yourself. Practise the habit of writing model answers to your questions and using them to help students appreciate what you want.

13. Reduce the between-student competitive aspects of assessment while simultaneously providing inducements to succeed against a standard (through using assessments of group products and deriving standards from several cohorts of students, for example).

14. Be suspicious of the objectivity and accuracy of all measures of student ability and conscious that human judgment is the most important element in every indicator of achievement.

Assessment and grading: Rules and regulations

Academic staff should be familiar with University policy on assessment and grading. Policy statements are not reproduced here because of their volume and changing nature. Assistant Registrars or Heads of Department should be able to provide new staff with University, Faculty and Departmental policy on assessment and grading. You should seek out and make yourself familiar with such information.

University rules on assessment can be found in the Statutes. *Statute 12* relates to the conduct of assessment. Sections of *Statute 12* are published in the student diary issued to all students upon enrolment. The Academic Board may periodically issue policy statements on assessment matters.

Summary

This booklet raises a number of issues surrounding assessment in higher education and points to some useful practices. There is much good literature on the topic of assessment, available from the library or the Centre for the Study of Higher Education. You may also contact CSHE staff if you wish to discuss specific concerns with assessment.

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