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The effects of programme assessment environments on student learning

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Executive summary

Background

Assessment is known to have a profound influence on what students study, how they study, how much they study and how effectively they study. In England there are currently wide institutional differences in the way assessment regimes function at programme level, despite all programmes operating under common Quality Assurance Agency guidelines. For example there are variations in the amount of formative assessment and summative assessment, the amount of feedback, the degree of specification of learning outcomes and the extent of 'systematic' course design with aligned learning outcomes, assessment methods and assessment criteria. This project examined the characteristics of assessment environments in three contrasting universities in each of three contrasting disciplines, and related these characteristics to a number of features of students' learning responses in order to inform quality assurance guidelines and course directors concerning the design of assessment regimes.

Aims

- To develop a methodology for characterising assessment environments at the programme level that is capable of distinguishing between programmes, between disciplines and between institutions
- To develop a version of the Assessment Experience Questionnaire (AEQ) that is capable of measuring students' learning response to programme-level assessment environments and distinguishing between programmes, between disciplines and between institutions
- To use these two methodologies to study undergraduate degree programmes in science, humanities and applied social science in each of three types of university: Oxbridge, Pre-1992 and Post-1992
- To characterise these disciplinary and institutional assessment environments
- To describe students' learning responses in these environments
- To examine the relationship between characteristics of these assessment environments and student learning responses
- To draw conclusions about features of assessment environments that appear to be associated with positive learning responses so as to inform quality assurance guidelines at the institutional and national level.

Methods

A methodology was developed for characterising programme-level assessment environments in terms of:

- The % of marks from summative examinations
- The number of times students were summatively assessed
- The number of different assessment methods used
- The number of times students experienced formative-only assessment
- The number of hours of oral feedback students experienced
- The number of words of written feedback students experienced
- The average timelines of feedback, in days from the time of submission
- The degree of explicitness of specification of criteria and standards
- The degree of alignment of goals and assessment methods.

Each of the nine degree programmes was then characterised in terms of these characteristics as High, Medium or Low, by examining course documentation and interviewing the course director and students.

The AEQ was modified and piloted with 223 students to develop a version that could be used to characterise students' experience of the assessment environments of programmes and which had a robust factor structure and coherent scales so that scale scores could be used to compare programmes. The final version of the AEQ used in this project contained the following scales, including two drawn from the Course Experience Questionnaire and deep and surface approach scales drawn from the Approaches to Studying Inventory:

- Quantity of effort
- Coverage of the syllabus
- Quantity and quality of feedback
- Use of feedback
- Appropriate assessment
- Clear goals and standards
- Deep approach
- Surface approach
- Learning from the examination
- ... and a single item concerning overall satisfaction.

The AEQ was administered to a total of 516 students across the nine programmes and student experience measured on each of the above scales for each programme.

Interviews were conducted with several students from each programme so as to illustrate the range of learning responses and full transcripts used to identify illustrative quotations for each of the above scales of the AEQ.

Scale scores on the AEQ were related to features of the assessment environments to identify patterns of relationships between the environment and students' experience.

Results

- The methodology for characterising assessment environments succeeded in distinguishing between programmes and identified very marked differences, and very distinctive patterns of assessment features.
- The three institutions were found to have markedly different assessment environments with clear patterns being visible across different disciplines. The Oxbridge environments were found to be a mirror image of post-1992 environments on almost every characteristic of assessment. The pre-1992 environments were mid-way between the two in terms of most variables. The range of volume of summative assessment and formative assessment was so wide that it raises questions about whether quality assurance systems can be operating effectively or are operating on the basis of common principles.
- The AEQ (V3.3) succeeded in distinguishing students' learning response in different assessment environments and identified markedly different patterns of response in different environments. Students' response was significantly positive on most scales of the AEQ when there was little summative assessment of a limited variety of kinds and a great deal of formative-only assessment and oral feedback. Students' experience was negative in most respects when there was a high volume of summative assessment of a wide variety of kinds and little formative-only assessment or oral feedback. Where

Conclusions

- There are very marked differences in patterns of assessment on degree programmes and these differences are more to do with institutional differences than disciplinary differences.
- These different patterns of assessment are associated with markedly different student learning responses and it is possible to identify which characteristics of assessment environments are associated with positive or negative learning responses. Commonly held assumptions about the benefits of frequency, variety, explicitness and alignment in summative assessment were found to be contradicted by the evidence. Rather, traditional assessment patterns, characterised by a limited diversity of frequent formative-only and oral assessment within weakly defined curricula, with very infrequent summative assessment, were found to be associated with a wide range of positive learning responses.
- The present study was undertaken on a relatively modest scale, involving only three institutions, one of which was quite distinctive. For the above conclusions to be accepted as applicable more widely it would be prudent to repeat the study using the same methodology in a wider variety of types of institution, disciplines and assessment environments.

Recommendations

- The methodology for characterising assessment environments is recommended for use in evaluation and research studies to give an overall picture of assessment environments and to compare environments, and to benchmark assessment design against other programmes.
- The AEQ (V3.3) is recommended for use in evaluation and research studies for measuring students' learning responses to different assessment environments and to benchmark students' learning responses compared with other programmes.
- To improve the quality of student learning experience, programmes should consider:
 - increasing the volume of formative assessment, reducing delays in providing feedback, and providing more oral feedback. Delays in providing feedback, and feedback of limited quantity and poor quality, are to some extent a function of variability between tutors and quality assurance could usefully focus on specifying and checking on quality standards for feedback. The time necessary to provide more formative feedback would require a reduction in time spent on summative assessment and this could also be beneficial in itself
 - avoiding use of coursework for summative assessment in a way that allows students to be highly selective in the components of the syllabus

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- limiting the variety of forms of assessment and the range of learning outcomes and criteria used, in order to reduce student confusion
- providing more time between the end of teaching and the examination in order to allow students to use revision for integration and consolidation rather than only last minute memorisation
- setting examination questions that clearly require understanding and making it clear that they require understanding rather than only regurgitation.

Background

It is widely accepted that the nature of the assessment in a course has a profound effect on the way that students learn (Black and William 1998; Elton and Laurillard 1979; Elton and Johnston, 2002). In-depth qualitative studies such as Becker et al (1968) and Snyder (1973) in the US and Miller and Parlett (1974) in the UK, have illuminated students' learning responses to degree-wide assessment environments. There have been no similar studies since the late 1960's and since then both assessment environments and students have changed in important ways:

- Curricula are less 'hidden' and goals, assessment tasks and criteria are often explicit, detailed and openly discussed.
- Learning activity has become more aligned with summative assessment, especially where learning outcome-driven curricula are taken seriously and where coursework is a major contributor to degree classifications.
- Many curricula have become modularized, each module with its own discrete assessment environment, and with a consequent reduction in integrative terminal assessment.
- Formative-only assessment has almost disappeared in some contexts, and the volume and frequency of feedback on learning has declined.
- Students are more strategic and focused on achieving good results in time-efficient ways.

Different institutional contexts embody these features to different extents. Gibbs et al (2003) reported a large study of students' learning responses to a range of science courses at two universities, using the Assessment Experience Questionnaire (AEQ) (Gibbs and Simpson, 2003). It was found that while students' learning responses varied between courses within institutions, the institution contributed more to variance in student response than did the course, suggesting that there are global features of assessment environments, probably resulting from institutional cultures embodied in the operation of course approval mechanisms and institutional quality assurance norms or regulations. For example the frequency of coursework and the volume of feedback on this coursework were specified by the quality assurance system at one of the institutions and were not a matter of individual choice by course leaders. Assessment regimes with widely different implicit assumptions about what quality in learning derives from are tolerated by the QAA.

The QAA, and much recent literature and advice, are together changing assessment systems towards more explicit systems in which individual learning outcomes are explicitly mapped onto assignments and assessed tasks, and assessed within many individual assignments, spread throughout a programme, rather than the traditional approach of integrated and implicit assessment of weakly defined outcomes in terminal summative assessment, quite separate from the preceding, frequent, formative assessment. The overall impact of these programme-wide changes and differences on student learning processes and outcomes has not been studied. Almost all studies of the impact of assessment on student performance have been at the level of the individual module. A critical review of assessment research (Elton and Johnston, *ibid*) raised questions about a number of widespread assumptions and practices in higher education assessment.

Aims

- To develop a methodology for characterising assessment environments at the programme level that is capable of distinguishing between programmes, between disciplines and between institutions.
- To develop a version of the Assessment Experience Questionnaire (AEQ) that is capable of measuring students' learning response to programme-level assessment environments and distinguishing between programmes, between disciplines and between institutions.
- To use these two methodologies to study nine undergraduate degree programmes in science, humanities and applied social science in each of three types of university: Oxbridge, Pre-1992 and Post-1992.
- To characterise these disciplinary and institutional assessment environments.
- To describe students' learning responses in these environments.
- To examine the relationship between characteristics of these assessment environments and student learning responses.
- To draw conclusions about features of assessment environments that appear to be associated with positive learning responses so as to inform quality assurance guidelines at the institutional and national level.

Methods

The project examined the characteristics of assessment environments in three contrasting universities, in each of three contrasting disciplines, and related these characteristics to a number of features of students' learning responses in order to inform quality assurance guidelines concerning the design of assessment regimes. The methodology is described here in three sections:

- 1 Development of a methodology for characterising programme-level assessment environments.
- 2 Development of the Assessment Experience Questionnaire for use in evaluating programme level learning environments.
- 3 Relating characteristics of assessment environments to students' learning responses as revealed by the AEQ.

Methods 1: Development of a methodology for characterising programme-level assessment environments

Each degree programme was visited to elicit the co-operation of the Director of Studies (or their equivalent) and to obtain course documentation that outlined the assessment system. Documents describing both the degree as a whole and individual course units were obtained and analysed. An initial interview was undertaken with the Director of Study to explain the rationale of the assessment system and the meaning of assessment terminology and conventions evident in the course documentation. Follow-up contacts were made to clarify assessment regulations, to understand variations between course units and to understand what a typical pattern of study of course units would consist of for a student within the degree programme. Typical samples of marked coursework were obtained from a range of course units (in each year of the programme, and both compulsory and optional) and studied in order to estimate the average volume of written feedback. The volume of oral feedback was estimated from course descriptions and information about class sizes – for example a scheduled feedback session of one hour in which

four students took part would be estimated as 15 minutes oral feedback per student. Informal oral feedback that might take place in a laboratory or on a field trip was excluded from the analysis as its volume was too difficult to estimate with any accuracy. Finally a complete description of the assessment environment for the degree programme was checked with the Director of Studies for accuracy.

Coding categories

Once full quantitative and qualitative descriptions of all nine programmes were checked as accurate, and the range of variation established, coding categories (High, Medium or Low, on each variable) and their boundaries were devised with the goal of distinguishing between the programmes so that there was at least one example of a programme that was coded as high medium or low for each variable. For example the number of times student work was marked (with the mark contributing to the degree classification) ranged between 11 and 61. By setting the coding boundaries appropriately the nine programmes could be categorised as in Table 1. The coding boundaries are arbitrary except in that they succeed in distinguishing between the programmes. The qualitative categories were similarly defined in order to distinguish between programmes. Once defined, the qualitative categories descriptions were tested by independent judges to ensure that they could make the same coding decisions, given the course documentation. Category definitions were re-defined to lessen ambiguity if there were discrepancies between judges. No controlled trial of inter-rater reliability was conducted. The full definitions of the coding categories can be seen in Table 1.

Table 1 Definitions of High', 'Medium' and 'Low' for each characteristic of assessment environments

Characteristic of assessment environment	Low	Medium	High
% marks from examinations	below 40%	between 40 and 70%	more than 70%
Variety of assessment methods	1-3 different methods	4-6 methods	6+ methods
Volume of summative assessment	mark allocated less than 15 times	15-40 times	more than 40 times
Volume of formative only assessment	less than 15 times	15-40 times	more than 40 times
Volume of (formal) oral feedback	less than 15 hours	15-40 hours	more than 40 hours
Volume of written feedback	less than 3000 words	3000-6000 words	more than 6000 words
Timeliness: average days after submission before feedback provided	more than 20 days	10-20 days	less than 10 days
Explicitness of criteria and standards	explicit criteria and standards rare and/or nebulous; marks or grades arrived at through global judgment in tacit way; no effort to enable students to internalise criteria and standards	criteria for some assignments and exams; weak link to marks or grades; little effort to enable students to internalise criteria and standards	clear criteria for most or all assignments and exams; link made to grades; effort made to enable students to internalise criteria and standards
Alignment of goals and assessment	Learning outcomes rarely or weakly specified at either programme level or course level; very weak or rare link between learning outcomes and choice of assessment methods; no explicit link between learning outcomes and allocation of proportions of marks; only overall grades recorded	Learning outcomes specified at programme level but weakly specified at course level; no explicit link between learning outcomes and allocation of proportions of marks; only overall grades recorded	Learning outcomes specified at programme level and for most or all courses; documentation shows how each assessment links to each learning outcome at the course level; some link to marking procedures; student performance recorded in relation to outcomes

Methods 2: Development of the Assessment Experience Questionnaire for use in evaluating programme level learning environments

Gibbs and Simpson (2004) provide a conceptual framework for understanding the impact of assessment on student learning in the form of a set of 'conditions under which assessment supports student learning'. These conditions concern quantity and distribution of student effort; quality and level of student effort; quantity and timing of feedback; quality of feedback and students' response to feedback. The way these characteristics of assessment systems operate in practice has been explored through interviews with students on a series of science courses at the Open University. A research tool, the Assessment Experience Questionnaire (AEQ) (Gibbs and Simpson, 2003) was then developed to measure the extent to which these conditions are experienced by students to be present in their learning environment. The AEQ has been used widely to measure the extent to which students experience these conditions to be met at a module level. For example the AEQ has been administered to 776 students on fifteen Physics, Chemistry, Astronomy and Bioscience courses at two contrasting universities, each with different patterns of assessment (Gibbs et al 2003). The AEQ has been adapted for use in South Africa and Belgium and translated into Chinese and Spanish.

This version of the questionnaire successfully distinguished the impact on student learning of contrasting features of both institutional and course assessment environments. However, factor analysis revealed a factor structure that did not align especially well with the research-informed and theoretically derived scales of the AEQ. This project undertook a second cycle of development of the AEQ with the goals of improving its psychometric characteristics (in particular improving scale coherence so that scale scores can be used to measure students' learning response) and making it appropriate to measure students' experience of assessment environments of entire programmes, rather than only individual course units. This section of the report is concerned with the development and characteristics of this revised form of the AEQ (V3.3).

Prior development of the AEQ had involved removal of several items that did not load adequately on their associated scale, removal of one scale that was not sufficiently coherent, combination of two scales that could not be distinguished and some re-wording of items to remove ambiguity. The revised programme-level version of the AEQ contained five scales: 'quantity of effort', 'coverage of syllabus', 'quantity and quality of feedback', 'use of feedback' and 'learning from the examination'. In addition the version used for the current research project incorporated the 'appropriate assessment' and 'clear goals and standards' scales from the Course Experience Questionnaire (Ramsden, 1991), six items asking about how students go about their learning on the course (deep and surface approaches to study) and an overall satisfaction item. The revised AEQ (V3.3) was administered to a total of 516 students (out of a possible 1,237, with a 42% return rate overall) in three different, highly contrasting, university contexts in three contrasting subject areas. Factor analysis was undertaken to establish the coherence of scales, and further reductions made to the number of items so as to produce the shortest questionnaire that retained a coherent factor structure. Factor analysis for the final version of the AEQ (V3.3) can be seen in Table 2. The analysis excludes CEQ and ASI scales which have previously been established as coherent. It can be seen that all the items load on the appropriate scales, no items load on inappropriate scales (with factor loadings above 0.5) and Cronbach Alpha scores for the scales are adequate. A factor analysis that included the CEQ and ASI items showed that the CEQ and ASI scales were not as coherent as previously reported when they are used independently, but did not disrupt the coherence of the AEQ scales.

Table 2 AEQ (V3.3) Factor analysis [1]

Item [2]	Quantity of effort	Coverage of syllabus	Quant/Qual of feedback	Use of feedback	Learning from exam
6	0.79				
13	0.85				
4		0.82			
5 (R)		0.84			
11 (R)		0.81			
17		0.82			
3 (R)			0.68		
15 (R)			0.69		
16 (R)			0.81		
1				0.87	
2				0.76	
8				0.65	
25					0.85
26					0.79
27					0.86
Cronbach Alpha	0.69	0.85	0.61	0.70	0.78

[1] Only items with factor loadings above 0.5 have been included

[2] (R) = Reversed scoring

For the purpose of this study it was crucial that the AEQ was capable of distinguishing between programmes, despite any variations in response by students within programmes. The data presented in Table 3 below presents the programme with the highest and the lowest scale score on each of the scales of the AEQ, together with standard deviations. It can be seen that the range of programme means are wide, usually more than one standard deviation apart.

**Table 3
Range of mean scale scores (and standard deviations) for programmes**

Scale	Lowest programme mean scale score	Highest programme mean scale score
Quantity of effort	3.14 (0.87)	3.91 (0.88)
Coverage of syllabus	2.21 (0.59)	4.05 (0.60)
Quantity and quality of feedback	2.68 (0.77)	3.76 (0.61)
Use of feedback	3.21 (0.82)	3.90 (0.76)
Learning from the exam	3.02 (0.94)	3.91 (0.75)

All of these differences, between the programmes with the highest and lowest mean scale scores, are statistically significant (analysis of variance, $p < 0.01$ in each case).

Pair-wise comparison of mean scale scores between disciplines showed statistically significant differences between disciplines on most scales (analysis of variance, $p < 0.05$ in each case). Similarly, pair-wise comparison of mean scale scores of institutions showed statistically significant differences between institutions for most scales (analysis of variance, $p < 0.05$ in each case).

The AEQ scales are therefore coherent, with wide ranges of mean scores for individual programmes, and mean scale scores can be used to distinguish between both disciplines and institutions.

The finally revised AEQ (V3.3) scales and items are listed below, together with extracts from interviews with students to illustrate the meaning of the scales. The questionnaire itself can be found in Annexe 1.

Illustrations of AEQ Scales

Quantity of effort

AEQ items

- The way the assessment worked you had to put the hours in regularly every week
- On this course it was necessary to work consistently hard to meet the assessment requirements

Examples from interviews

Courses assessed by examination only, without any formative assessment, were perceived by this student to lead to very uneven effort:

S I guess the fact that everything was assessed right at the end - I didn't do all my seminar reading and everything ... the fact that nothing is assessed throughout the year, and everything is assessed right at the end might foster some sort of a more relaxed attitude during the year, and then a scramble for it at the end.

In contrast for the following student, although summative assessment was by final examination, regular essay writing was felt to be required:

S ...you have to do eight essays, or ... eight pieces of work throughout the term. You have to do something every week, so you need roughly the same amount of time to do something, so I would say yes, a consistent effort throughout.

For the following student, courses with only one or two summatively assessed pieces of coursework were perceived to lead to peaks and troughs in study effort:

S ...well most people will have two (peaks) in week six and in week 12.
I So do you think that over the course ... you put in very regular hours, or are there some weeks that need more hours or less hours?
S It's probably always that fortnight before either essays are due in or you've got an exam where you really go for it.

Coverage of syllabus

AEQ items

- You had to study the entire syllabus to do well in the assessment
- The assessment system made it possible to be quite selective about what parts of courses you studied (Negative scoring)
- It was possible to be quite strategic about which topics you could afford not to study (Negative scoring)
- The way the assessment worked on this course you had to study every topic

Examples from interviews

The extent to which students felt they needed to study every topic or could be highly selective in what they studied was influenced both by whether assessment was only of one or two pieces of coursework and also by the form of the exam and of exam questions:

I ...it seems that you don't have to study the entire syllabus for every topic to do well in the assessment.

S I think that's true particularly when it's two assignments, I think not so easily true when it's an exam.

.....

S For the exam, you definitely have to be selective, and the lecturers even suggest that. They even say it's hard to learn so much and then get it all down for an exam. So they would say 'we're going to ask you five topics. There are seven, so only learn maybe four or something'.

.....

S ...you know roughly that this topic's going to come up, and this topic is going to come up and you choose which topics you like, and prefer and you know more about...I didn't always explicitly revise last year's paper, but you looked at last year's paper and you knew which questions were going to come up, and then you revised the topics that you preferred out of that. ... would normally have eight topics, so you've got eight topics for that. Now, in the exam we've got to answer four questions, so you revise five, maybe six if you've got the time, five or six topics. Again, you're limiting yourself because you're revising a few topics...

.....

S I had a module that we did, we had three questions to answer and two of them were on specific thinkers. And we had maybe ten thinkers that we could look at, but you only had to answer a question on two and those, and for that I only did three thinkers for it, knowing that if I did three really well I'd be able to answer a question on two of them. I did another option ... and for that we had to answer three questions in three hours, and there was ten topics, you would only be asked on three of them so I did four topics. So I learnt four topics really well, and then didn't really revise six topics at all.

In contrast the following student felt that the form of questions in the exam required fairly full coverage of the syllabus:

- S *I think to do really well in the papers, or most of the papers, knowing all the syllabus would be very helpful. Actually it's necessary to a certain degree because, I know that in certain papers ... what they do is ask a question on a particular topic, but it's linked into another topic, which means that if you've revised one of the topics but not the other, you can maybe half answer or the question, or not answer it fully.... sometimes it's linked in with something else. And if you don't know the other topic then it's problematic. So definitely knowing more would be helpful, and it often helps everything fit into place because when you go through it in the eight weeks when you're doing the tutorials it all seems a bit distinct and isolated, but when you come back to revising it, it's like 'oh, this all fits together'. So I think knowing everything is very helpful.*

Quantity and quality of feedback

AEQ items

- I received hardly any feedback on my work (Negative scoring)
- I didn't understand some of the feedback on my work (Negative scoring)
- Whatever feedback I received on my work came too late to be useful (Negative scoring)

Examples from interviews

The three students below all described contexts in which oral and written feedback was very limited or varied considerably between tutors:

I *What sort of feedback do you get?*

S *We only get ten minutes tutorial per module.*

I *And that's oral feedback?*

S *Yes. They do now have the cover sheets, which don't have a lot of information on...*

.....

S *...if you ever hear back from them you are quite lucky, or if you do get it back from them, it's usually got tick marks with no comment. So you're not quite sure.*

.....

S: *I think the feedback varied considerably from tutor to tutor. I've had a tutor where the only feedback I received was my grade. Having gone back to the tutor and asked for further feedback it was like 'oh, you've got a 60-something, so you should be happy'. And in comparison to some other tutors, especially in my final year, where the feedback was so comprehensive in terms of where my essays were lacking in argument or coherence, and that definitely helped me to pick up my grade. Just from the feedback that I received in week 6, I was able to try and work on that for the essay that I wrote for week 12. But the feedback - I felt that was a big thing, for me especially. I think it was a lot of mature students, we all found that there is a significant difference in the way tutors would provide feedback, and we just felt that it was one of the things where it's pretty cruel when you're paying for*

higher education, and it was frustrating not to receive the feedback where we would use the feedback positively to try and perform better in the next essay, or the next exam.

.....

In contrast the students below described receiving ample feedback from helpful tutors, including oral feedback in addition to written feedback:

S: I found actually teachers were quite happy for you to go and have fifteen minute tutorials with them, so it was always quite easy to find out where I'd gone wrong basically. The verbal feedback was also quite helpful as well; I think it helped explain what they were saying in their written feedback.

.....

S ...whenever I have an essay back, then I'll just say 'can I come in tomorrow', often they have a sign up sheet, pretty much always, all tutors have a sign up sheet and then they are happy to talk at length with you about it, and I find the feedback really useful. And I think I get a good amount of it.

I Is it just oral feedback, or do you also get written feedback?

S You get oral feedback and you also get the actual essay back, which gets ticked on and written all over, and one of my tutors - I think I wrote a six-page essay, and he wrote something like four pages of comments, which was brilliant. So yes, we get both really.

.....

Use of feedback

AEQ items

- I used the feedback I received to go back over what I had done in my work
- The feedback I received prompted me to go back over material covered in the course
- I paid careful attention to feedback on my work and tried to understand what it was saying

Examples from interviews

The following students reveal very contrasted approaches to the use of the feedback they had been given, linked to the way it was given and its timing. The first two students below did not make much use of feedback while the third clearly did:

S At the time when you get the essay back, it's about a week after and you've got next week's work to do, and it's like 'I'll look at this later' and that's what everyone thinks 'I'll put this to one side, I'll look at this later'. And then you come back to it a year later, and then you think I should have looked at it then. Most of the time I did put the things to one side and thought I can think about this later. Sometimes, there were a couple of occasions where I thought I'd like to know what that is, or I'd like to get my head around this, so then I did go back. But normally, not that we don't have that much time, we do, but

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I'd just put it to one side and say I'll come back to it later, and then that day never came.

.....

I ..what did you do with (the essays) once you got them back?

S Usually just put them to one side, and kept them in a folder somewhere.

I And did you do anything further with them?

S No, not really. I'd read through them and put them to one side. I didn't tend to look at them after that.

I So in your revision process did you go back to that feedback at all?

S Usually I don't.

.....

S .. you did go back and read an extra article or read an extra book, because you would go to the tutorial and then sometimes your tutor would suggest a different reading, not on the reading list, which would help make things clearer. That was often a good thing to go back to, and so that was beneficial.

In some courses formative feedback was offered, through 'practice' essays or through meeting a tutor face to face, but while in some programmes students tended to take up such opportunities, in others, as in this case, they did not:

S A couple of tutors said you can write an essay that's not for assessment and hand it in and I'll mark it, and give you feedback, but I don't think I know anybody who did that. Yes, definitely all the ones I wrote were all for assessment.

Clear goals and standards

AEQ items

- It was always easy to know the standard of work expected
- The teachers made it clear from the start what they expected from students
- It was often hard to discover what was expected of me in this course (Negative scoring)

Examples from interviews

Many students were unclear what was expected on them, often in courses that made new or 'non-standard' demands:

S I had some (modules) where the topic was really open-ended, and everyone in my lectures were thinking 'what are we writing this on', everyone I spoke to was just going off on a different topic, and we had no idea - it was just so open, and whenever we tried to ask the tutors, they kept saying that it's your own interpretation, and we were like 'well, what do we do'. By the end of it, some people did really well, and other people did really badly because it was just so open.

.....

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S *..on a couple of occasions ... it was a bit unclear what was required of us from the coursework. That was on a module where there was something a bit different from what we were used to.*
.....

S *And also, what was really annoying with the assessments in the third year, was suddenly they gave us presentations to do, and we'd never ever done it. So you're suddenly on a honours module and you're being assessed for something that they have given you no training in previously, which really made me cross.*
.....

I *Did they assess you on your presentation skills?*

S *Some did, some didn't...writing up a presentation is different from writing an essay, and that's what (the teacher) said, before Christmas, he said 'you fell in to that mistake that people do of writing a rather tight little essay' and I thought it would have been nice to know that before that people fall into that trap, and I thought I'd never done it before, I didn't know what I was doing.*

In contrast others found both the teachers and documentations very helpful in explaining what was required, as in this example:

S *Teachers, as well as historian tutors, they teach you about the skills that you need to pass the exam, which is good.*

I *And do they always let you know where about you are in terms of a standard of work?*

S *Yes, in terms of the fact that you get feedback - very interesting, you get a mark, like a 2:1 or 2:2 or you get a 64 or 68, you get the actual number back so you can keep a tab on your own progress. Also, during exam time ... I emailed maybe three practice papers to my tutors each, and they were more than happy to mark that, and they did that it very quickly.*

I *And did they in any way say what you could do to go up from a 2:2 to a 2:1? Did they give you that kind of information that would help you improve your standard?*

S *Yes, absolutely, definitely. Also, in our handbook we were given the actual criteria, so what is a good 2:1, a good 2:2, all that sort of thing, and if my tutors know that, then they would say that you've got a good 2:1 but if you want to push it up just a little extra bit then look at that, look at that, and look and that, and then you should be alright. Which was always really helpful.*

However explicit statements about criteria and how marks were allocated did not always lead to clarity:

I *We mentioned the criteria sheet for the coursework. Did the feedback that they wrote on it relate to the criteria that they had set for the coursework?*

S *I suppose I did get a bit confused about that, because we'd have a topic, and maybe there were three questions. And then they'd show a percent weighting on each question. But then we'd have this criteria sheet, that would be*

assessing knowledge, content, references and how it was written, and that would have the same sort of percent. Sometimes I never knew which side they were marking from, whether I should focus more on question 1, or should I be focusing on my content overall.

Students also sometimes experienced variation between tutors, even when there were explicit criteria, and this could lead to confusion:

S ...tutors would sound different, in their standards of marking.... I did go back to one of the tutors to try and ascertain what was what really, and it was for them I guess, 'you have the criteria in the handbook, so that's what we're looking for'. And then by the second and third year, I'd given up trying to figure out what they wanted and just tried to work as hard as I could.

Appropriate assessment

AEQ items

- The staff seemed more interested in testing what I had memorised than what I understood (Negative scoring)
- Too often the staff asked me questions just about facts (Negative scoring)
- To do well on this course all you really needed was a good memory (Negative scoring)

Illustrations of students experiencing appropriate and inappropriate assessment are combined with illustrations of students learning, or not learning much, from the revision process and from the examination itself, below.

Learning from the examination

AEQ items

- Doing the exams brings things together for me
- I learn new things while preparing for the exams
- I understand things better as a result of the exams

Examples from interviews

There were many examples of students responding to perceived assessment demands by taking a surface approach:

S You just go back to the lecture notes, decide on which topics, which ones would work well together and then just try and remember as much as I can....just looking at lecture notes and trying to remember stuff.

.....

S ...we were talking about it, and we just thought 'we're going to get there, we're going to try and remember as much as we can on whatever topic we can see. We're not going to write particularly about the topic, we're just going to go 'blah, this is all I can remember from that' and see how much you can write on it.

.....

- S *I'm not sure for the exams whether it can test your understanding; I think that is more about memorising. I find that myself, that actually the exam is about memorising, because you have to memorise the theory and you have to memorise the text.*

For some students a surface approach was a clear preference, as in the following example:

- S *I'm a big fan of parrot learning to be honest, I prefer modules when, like the Latin American one this year, that has quite factual learning. I'm a big fan of parrot learning because I find it quite easy.*

The amount of time available for revision appeared to have an impact on the extent to which students took a deep approach to exam preparation and whether revision was a learning experience or not. The response of the first student, below, is in marked contrast to the following two students:

- I *...did you feel that you learnt new things whilst you were preparing for the exams? Or was it more just about memorising the points that you've already learnt?*

- S *Didn't really learn new things, no.*

- I *And did exams bring it together for you?*

- S *Sometimes, and others just confuse me more. The thing with exams is - like in my first semester they had only had three days for exams ... it was really busy. Only learning the minimum, and then moving onto the next one.*
.....

- S *I did find the exam actually quite beneficial to my learning. I didn't have so many exams in my other subjects ...and I just felt that after 12 weeks I had enough ... to go into the exam, and actually performed better in the exam because I'd had that 12 week period to learn.*

- I *So what was beneficial about it was the fact that you'd had 12 weeks?*

- S *Yes. By week 12 we'd had 11 teaching weeks, and so you actually had time to - I think there was also an element of being able to go back and consolidate everything by revising for the exam.*
.....

- I: *...is the revision process a sort of learning process as well?*

- S: *Yes, actually that two weeks of revision brings together the weeks of learning that you've done. So revising is more helpful than the actual exam, I found.*

Some students felt that the examinations definitely did not encourage a surface approach but rather required understanding, and this changed the way they revised, as in the example below:

- S: *...memorising is not necessary – it's testing your understanding, but understanding is based in different viewpoints ... so you need to know what this author said, the different viewpoints... you're not memorising what he'd written, but that is your understanding of the article...I think your own*

viewpoint is highly valued... We have revision classes... it was definitely very useful in bringing things together because by that point you'd done the reading, you had a general understanding, but if there were one or two things that you still didn't understand, or a particular point that you couldn't get your head around, you could raise that...

Methodology 3: Relating characteristics of assessment environments to students' learning responses revealed by the AEQ.

Mean scale scores on each scale of the AEQ were compared for each feature of assessment environments characterised as High and Low respectively, to identify if any features of assessment environments were related to learning responses.

Results

Characteristics of programme-level assessment environments

The range of characteristics of assessment environments was found to be wide. Table 4 summarises the minimum and maximum for each of the assessment characteristics that it was possible to measure quantitatively. There was found to be six times the proportion of marks for coursework in one programme than another, eight times as many pieces of work marked, 67 times as much formative-only assessment, four times as much written feedback, twenty three times as much oral feedback, and 28 times the delay in receiving feedback. The first conclusion of this study is that quality assurance does not seem to have constrained variation in assessment regimes, ensured that quality assurance requirements are met (such as variety of assessment methods aligned to goals) or ensured that characteristics known to support learning (such as formative assessment and frequent, prompt, feedback) are evident.

Table 4 Range of characteristics of assessment environments between degree programmes

Characteristic of assessment environment	Minimum	Maximum
Percentage of degree marks derived from examinations	17%	100%
Percentage of degree marks derived from coursework	17%	100%
Total number of times work marked per student	11	95
Total number of different assessment methods	2	18
Total number of formative-only assessments per student	2	134
Total number of words of written feedback per student	2,700	10,350
Total number of hours of oral feedback per student	3	68
Average number of days between submission of assignment and feedback	1	28

Table 5 shows how each of the nine degree programmes was categorised. The three types of university can be seen to have quite distinctive assessment environments.

Oxbridge is relatively high in terms of the percentage of marks from examination, volume of formative assessment, and volume of oral feedback, and relatively low in terms of variety of assessment, volume of summative assessment, explicitness of standards, and alignment of goals and assessment. In contrast the pattern of assessment features at the post-1992 university is a mirror image on all these features. The pre-1992 university is, for each of these discriminating features, somewhere between these two extremes. Only in terms of the volume of written feedback do the Oxbridge and post-1992 assessment environments not differ markedly.

Table 5 Characteristics of the Humanities (H) Science (S) and Applied Social Science (SS) assessment environments at the three university types in terms of nine assessment variables

Feature of assessment environment	Oxbridge			Pre-92			Post 92		
	H	S	SS	H	S	SS	H	S	SS
% marks from examinations	Hi	Hi	Hi	Med	Med	Lo	Lo	Lo	Lo
Variety of assessment methods	Lo	Lo	Med	Lo	Hi	Hi	Med	Hi	Hi
Volume of summative assessment	Lo	Lo	Lo	Med	Hi	Med	Med	Hi	Hi
Volume of formative assessment	Hi	Hi	Hi	Med	Med	Lo	Med	Lo	Lo
Volume of (formal) oral feedback	Hi	Hi	Hi	Lo	Med	Lo	Med	Hi	Med
Volume of written feedback	Med	Hi	Med	Lo	Med	Med	Med	Hi	Med
Timeliness of feedback	Hi	Hi	Hi	Med	Lo	Lo	Med	Lo	Med
Explicitness of standards	Lo	Med	Med	Hi	Hi	Med	Hi	Med	Hi
Alignment of assessment	Lo	Lo	Med	Med	Med	Med	Med	Hi	Hi

The contrasting institutional assessment environments can be clearly seen in Table 6, in which the characteristics of the three disciplines in each institution have been averaged to produce a single institutional characterisation.

Table 6 Characteristics of the assessment environments at the three university types in terms of nine assessment variables

Feature of assessment environment	Oxbridge	Pre-92	Post 92
% marks from examinations	Hi	Med	Lo
Variety of assessment methods	Lo	Med	Hi
Volume of summative assessment	Lo	Med	Hi
Volume of formative assessment	Hi	Med	Lo
Volume of (formal) oral feedback	Hi	Lo	Med
Volume of written feedback	Med	Med	Med
Timeliness of feedback	Hi	Lo	Med
Explicitness of standards	Med	Hi	Hi
Alignment of assessment	Lo	Med	Hi

Patterns in assessment characteristics

A number of patterns of assessment characteristics were displayed:

- The extent of alignment of assessment with goals is inversely related to the percentage of marks from examinations.
- Where there is a greater percentage of marks from examinations there is less variety of assessment methods.
- Where the percentage of marks from examinations is high, there is less summative assessment and more formative assessment.
- Where the volume of summative assessment is low, the volume of formative assessment is high. There are no examples of an assessment system high on both formative and summative assessment or low on both formative and summative assessment. It is possibly the case that a programme can afford one or the other, but not both.
- Assessment that is high on alignment with goals was only found where there is a greater variety of assessment methods and a lower percentage of marks from examinations.
- A high level of explicitness of standards and a high volume of oral feedback are mutually exclusive. These may in practice be alternative ways to make standards clear to students

The relationship between assessment environments and students' learning experience

A number of characteristics of assessment environments were found to be associated with a range of **positive student learning responses**. (All pair-wise comparisons reported here used t-tests with p between 0.0001 and 0.05, and degrees of freedom between 284 and 453)

A **high** percentage of marks derived from examinations is associated with significantly **higher** scores on the following scales:

- Quantity of effort
- Quantity and quality of feedback
- Use of feedback
- Learning from the examination

A **low** volume of summative assessment is associated with significantly **higher** scores on the following scales:

- Quantity and quality of feedback
- Use of feedback
- Appropriate assessment
- Clear goals and standards
- Deep approach
- Learning from the examination

A **high** volume of formative-only assessment is associated with significantly **higher** scores on the following scales:

- Coverage of the syllabus
 - Quantity and quality of feedback
 - Use of feedback
 - Appropriate assessment
 - Clear goals and standards
 - Deep approach
 - Learning from the examination
 - Satisfaction
- ...and significantly lower scores for Surface approach.

A **high** volume of formal oral feedback is associated with significantly **higher** scores on the following scales:

- Quantity of effort
- Coverage of the syllabus
- Quantity and quality of feedback
- Use of feedback
- Appropriate assessment
- Clear goals and standards
- Deep approach
- Learning from the examination

A **high** volume of written feedback is associated with significantly **higher** scores on the following scales:

- Quantity of effort
- Coverage of the syllabus

A **high** level of timeliness of feedback is associated with significantly **higher** scores on the following scales:

The effects of programme assessment environments on student learning

- Quantity of effort
- Coverage of the syllabus
- Quantity and quality of feedback
- Use of feedback
- Appropriate assessment
- Clear goals and standards
- Learning from the examination

A number of characteristics of assessment environments were found to be associated with a range of **negative student learning responses**:

A **high** level of variety of assessment methods is associated with significantly **lower** scores on the following scales:

- Quantity and quality of feedback
 - Use of feedback
 - Appropriate assessment
 - Clear goals and standards
 - Deep approach
 - Learning from the examination
 - Satisfaction
- ... and a higher score on Surface approach.

A **high** level of explicitness of goals and standards is associated with significantly **lower** scores on the following scales:

- Coverage of the syllabus
- Quantity and quality of feedback
- Use of feedback
- Appropriate assessment
- Deep approach
- Learning from the examination

A **high** level of alignment of goals and assessment is associated with significantly **lower** scores on the following scales:

- Coverage of the syllabus
- Use of feedback
- Appropriate assessment
- Clear goals and standards
- Deep approach
- Learning from the examination

In summary, those characteristics of assessment systems emphasised in quality assurance (explicit goals and standards and alignment of goals and assessment, often through a greater variety of assessment methods and more summative assessment) are all associated with negative student learning responses. In interviews it was clear that explicit criteria and attempts to specify different criteria for different courses and link them to varied goals in a variety of forms of assessment were experienced simply as confusing. Far from the explicitness leading to greater clarity of goals and standards it did the reverse. Students in these assessment environments narrowed their attention and their effort to those things that they were told would be assessed, put in less effort, covered less of the syllabus, adopted less

of a deep approach and gained less satisfaction from their studies. This is not what systematically designed curricula were meant to deliver.

It is traditional assessment methods, that emphasised learning about goals and standards through frequent formative assessment and especially through oral feedback and prompt feedback, rather than through explicitness, and that had little summative assessment of a limited variety of kinds, that were associated with positive student learning responses and even with greater clarity of goals and standards.

Conclusions

Assessment environments were found to differ very widely in their defining characteristics, despite national quality assurance guidelines that privilege certain characteristics. While differences were found to exist between disciplines, much greater differences were found to exist between universities. Institutions appear to have distinctive assessment cultures that create very strong emphases on particular functions of assessment at the expense of others, and in particular on summative assessment and systematic and aligned assessment, closely linked to learning outcomes, at the expense of formative assessment and oral feedback.

The volume of formative-only assessment is known to have a significant positive impact on the quality of learning outcomes (Black and Wiliam, 1998). This study showed that a degree programme at one university provided 67 times as much formative-only assessment as a programme at another university. Quality assurance does not seem to have prevented the reduction in formative assessment from happening in many contexts. Crucial aspects of higher education pedagogy have been allowed to almost disappear while others, concerned more with standards than with learning, have multiplied. It seems clear that quality assurance, at national and institutional level, has often been watching the wrong ball.

Contrary to widely held assumptions, explicitness of goals and standards was not found to be associated with greater clarity about goals and standards on the part of students. Rather a variety of assessment was experienced as confusing and the specification of criteria and goals was often not understood. In contrast assessment environments with weakly specified goals and standards nevertheless led to reasonable levels of student clarity about goals and standards, provided that there was frequent formative-only assessment and oral feedback. Clarity was achieved implicitly as a by-product of many cycles of experience of the same kind of 'performance of understanding', within a community of practice, rather than by explicitness. As no assessment environments were found to have both explicit goals and standards and plentiful feedback, it is not known if a combination of the two could lead to higher levels of student clarity about goals and standards.

Overall, three distinct assessment environments could be distinguished:

- a 'traditional' environment, characterised by infrequent summative assessment of a narrow range of forms, frequent formative-only assessment and oral assessment, and weak specification of goals and standards
- a 'modern' assessment environment in a teaching-oriented institution, characterised by frequent summative assessment of a wide variety of forms, very low levels of formative-only assessment and oral feedback, with clear specification of goals and standards and aligned curricula

- a 'modern' assessment environment in a research-oriented institution, in which there were modest levels of both summative and formative assessment, and modest levels of specification of goals and standards.

In summary, the 'traditional' assessment environment was found to be associated with a wide range of positive learning responses, the modern teaching environment was found to be associated with a wide range of negative learning responses, and the modern research environment was found to be associated with low levels of student effort and coverage of the syllabus. A recent large scale questionnaire based study has also reported a low level of student learning effort in pre-1992 universities, with the notable exception of Oxbridge where student learning effort was highest (Bekhradnia et al, 2006).

The present study was undertaken on a relatively modest scale, involving only three institutions, one of which was quite distinctive. There is a possibility that differences in student ability in the three institutions could be a confounding factor, although the differences in A-level scores between the pre-1992 context and the Oxbridge context were not great. For the above conclusions to be accepted as applicable more widely it would be prudent to repeat the study using the same methodology in a wider variety of types of institution, disciplines and assessment environments and with some control for student ability.

Recommendations

The methodology described here for characterising assessment environments is recommended for use in evaluation and research studies to give an overall picture of assessment environments and to compare environments, and to benchmark assessment design against other programmes.

The AEQ (V3.3) is recommended for use in evaluation and research studies for measuring students' learning responses to different assessment environments and to benchmark students' learning responses compared with other programmes. Scale scores can be used that readily distinguish students' experience of different assessment environments. Course evaluation might usefully focus more on the assessment system rather than focussing exclusively on the teaching, and in particular the frequency, timing and adequacy of formative assessment and feedback deserves more attention.

Quality assurance guidelines and course approval processes should pay attention to the balance of summative and formative assessment on courses. It seems unlikely that the volume of summative assessment used in some contexts is necessary to assure standards, and if a high volume of summative assessment costs so much that formative assessment cannot be afforded, then it seems likely that the quality of learning will be limited. Quality assessment should ask tough questions about proposed assessment systems that involve widely diverse forms of assessment and criteria, unless there are adequate opportunities for cycles of formative experience through which students can come to understand what the criteria mean and what standard is required. Requiring detailed specification of learning outcomes and criteria is clearly not enough, in itself, for students to be clear about what they are being asked to do or to what standard.

To improve the quality of student learning experience, programmes should consider:

- increasing the volume of formative assessment, reducing delays in providing feedback, and providing more oral feedback. Delays in providing feedback, and feedback of limited quantity and poor quality, are to some extent a function of variability between tutors and quality assurance could usefully focus on specifying and checking on quality standards for feedback. The time necessary to provide more formative feedback would require a reduction in summative assessment and this could also be beneficial in itself
- avoiding use of coursework for summative assessment in a way that allows students to be highly selective in the components of the syllabus that they actually study, and highly selective about what they put their time into
- limiting the variety of forms of assessment and the range of learning outcomes and criteria used, in order to reduce student confusion
- providing more time between the end of teaching and the examination in order to allow students to use revision for integration and consolidation rather than only for last minute memorisation
- setting examination questions that clearly require understanding and making it clear that they require understanding rather than only regurgitation.

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Annexe 1 Assessment Experience Questionnaire (V3.3)

By filling out this questionnaire I understand that I am agreeing to participate in a research study

Please respond to every statement by circling sa, a, ?, d or sd to indicate the strength of your agreement or disagreement

Gender, please tick ☒ the appropriate box: ☐ female ☐ male

Degree course:

Please respond with respect to your experience so far of the entire degree course named above, including all its assessment components

strongly disagree
disagree
?
agree
strongly agree

1	I used the feedback I received to go back over what I had done in my work	sa	a	?	d	sd
2	The feedback I received prompted me to go back over material covered in the course	sa	a	?	d	sd
3	I received hardly any feedback on my work	sa	a	?	d	sd
4	You had to study the entire syllabus to do well in the assessment	sa	a	?	d	sd
5	The assessment system made it possible to be quite selective about what parts of courses you studied	sa	a	?	d	sd
6	The way the assessment worked you had to put the hours in regularly every week	sa	a	?	d	sd
7	It was always easy to know the standard of work expected	sa	a	?	d	sd
8	I paid careful attention to feedback on my work and tried to understand what it was saying	sa	a	?	d	sd
9	The teachers made it clear from the start what they expected from students	sa	a	?	d	sd
10	The staff seemed more interested in testing what I had memorised than what I understood	sa	a	?	d	sd
11	It was possible to be quite strategic about which topics you could afford not to study	sa	a	?	d	sd
12	It was often hard to discover what was expected of me in this course	sa	a	?	d	sd
13	On this course it was necessary to work consistently hard to meet the assessment requirements	sa	a	?	d	sd
14	Too often the staff asked me questions just about facts	sa	a	?	d	sd
15	I didn't understand some of the feedback on my work	sa	a	?	d	sd
16	Whatever feedback I received on my work came too late to be useful	sa	a	?	d	sd
17	The way the assessment worked on this course you had to study every topic	sa	a	?	d	sd
18	To do well on this course all you really needed was a good memory	sa	a	?	d	sd
These questions are about the way you go about your learning on the course						
19	When I'm reading I try to memorise important facts which may come in useful later	sa	a	?	d	sd
20	I usually set out to understand thoroughly the meaning of what I am asked to read	sa	a	?	d	sd
21	I generally put a lot of effort into trying to understand things which initially seem difficult	sa	a	?	d	sd
22	I often found myself questioning things that I heard in classes or read in books	sa	a	?	d	sd
23	I find I have to concentrate on memorising a good deal of what we have to learn	sa	a	?	d	sd
24	Often I found I had to study things without having a chance to really understand them	sa	a	?	d	sd
Learning from the exam (only to be completed if there were exams on the course)						
25	Doing exams brought things together for me	sa	a	?	d	sd
26	I learnt new things while preparing for the exams	sa	a	?	d	sd
27	I understood things better as a result of the exams	sa	a	?	d	sd
Overall satisfaction						
28	Overall I was satisfied with the quality of this course	sa	a	?	d	sd

Scales

Quantity of effort (alpha=0.69)

- 6 The way the assessment worked you had to put the hours in regularly every week
- 13 On this course it was necessary to work consistently hard to meet the assessment requirements

Coverage of syllabus (alpha=0.85)

- 4 You had to study the entire syllabus to do well in the assessment
- 5 The assessment system made it possible to be quite selective about what parts of courses you studied (Negative scoring)
- 11 It was possible to be quite strategic about which topics you could afford not to study (Negative scoring)
- 17 The way the assessment worked on this course you had to study every topic

Quantity and quality of feedback (alpha=0.61)

- 3 I received hardly any feedback on my work (Negative scoring)
- 15 I didn't understand some of the feedback on my work (Negative scoring)
- 16 Whatever feedback I received on my work came too late to be useful (Negative scoring)

Use of feedback (alpha=0.70)

- 1 I used the feedback I received to go back over what I had done in my work
- 2 The feedback I received prompted me to go back over material covered in the course
- 8 I paid careful attention to feedback on my work and tried to understand what it was saying

Appropriate assessment

- 10 The staff seemed more interested in testing what I had memorised than what I understood (Negative scoring)
- 14 Too often the staff asked me questions just about facts (Negative scoring)
- 18 To do well on this course all you really needed was a good memory (Negative scoring)

Clear goals and standards

- 7 It was always easy to know the standard of work expected
- 9 The teachers made it clear from the start what they expected from students
- 12 It was often hard to discover what was expected of me in this course (Negative scoring)

Surface Approach

- 19 When I'm reading I try to memorise important facts which may come in useful later
- 23 I find I have to concentrate on memorising a good deal of what we have to learn
- 24 Often I found I had to study things without having a chance to really understand them

Deep Approach

- 20 I usually set out to understand thoroughly the meaning of what I am asked to read.
- 21 I generally put a lot of effort into trying to understand things which initially seem difficult
- 22 I often found myself questioning things that I heard in classes or read in books

Learning from the examination (alpha=0.78)

- 25 Doing the exams brings things together for me
- 26 I learn new things while preparing for the exams
- 27 I understand things better as a result of the exams

Satisfaction

- 28 Overall I am satisfied with the teaching on this course