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ABSTRACT

Changes in the United Kingdom higher education system have resulted in a lack of formative (i.e., student feedback) assessment: increased student numbers and reduced funding resulting in bigger classes with less tutor contact, as well as a more diverse set of student entrants with a wider set of skills resulting in a greater need for formative assessment. It has become increasingly difficult in the information systems/information technology field to monitor individual student performance and give individual feedback and direction. This paper examines one mechanism to address this difficulty, a skills audit approach. The use of a skills audit approach is described for three units at the Southampton Business School (England); the units are Information Systems and Business Skills, both core level 1 units, and Computer Auditing, an optional level 3 unit. The pedagogic value of the skills audit approach for different levels of study is discussed. A self audit approach seems particularly relevant for meeting the formative assessment needs of students and encouraging self study and ownership. There are clear indications of the suitability of such an approach for distance learning. (Author/MES)

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THE SKILLS AUDIT APPROACH TO FACILITATE UNDERGRADUATE LEARNING

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TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

Changes in the UK education system have resulted in a lack of formative (i.e., student feedback) assessment: increased student numbers and reduced funding resulting in bigger student classes with less tutor contact; also, a more diverse set of student entrants with a wider set of skills, resulting in a bigger need formative assessment. It has become increasingly difficult in the IS/IT field to monitor individual student performance and give individual feedback and direction. This paper examines one mechanism to address this difficulty, a skills audit approach. The use of a skills audit approach is described for three units, two at level 1 and one at level 3 of undergraduate study. Discussion is given on the pedagogic value of the skills audit approach for different level of study. A self audit approach seems particularly relevant for meeting the formative assessment needs of students and encouraging self study and ownership. There are clear indications of the suitability of such an approach for distance learning.

INTRODUCTION AND BACKGROUND

The expansion of Higher Education (HE) in the UK over the last decade, coupled with the reduction in funding per student, has had many effects on the teaching and learning process. Notably, larger class sizes, increased competition for books and study resources, reduced access to tutorial support from faculty and less detailed or frequent feedback on progress and course-work (Gibbs, Lucas and Simonite 1996, p261). These changes have been further exasperated by the increased variety of entry routes, including NVQs (National Vocational Qualifications), GNVQs (General National Vocational Qualifications), mature students as well as the traditional A' levels (Hyland 1994; Burke 1995), with each of these routes fostering and developing different skill sets in students. This greater variety of entrant skills to HE increases the need for individual feedback and support to students, however, as already highlighted, increased student numbers and reduced funds per student have resulted in less detailed and frequent feedback and faculty support.

The need for individual feedback on student progress is probably more pronounced in Information Systems/ Information Technology (IS/IT) related courses and units where further influences have taken place. The topic areas are in a continual state of flux with the depth and breadth

of technology related issues increasing. The skill base of entrants to HE are changing with greater computer literacy for some students and more to learn for the non computer literate. The destination of graduates, the business environment, is also in a state of flux with new IT related business practices and further reliance on IT. Additionally there has been a wider integration of technology into the teaching and learning process (Grandgenett et al 1997; Kapur and Stillman 1997).

From a teaching perspective it has become increasingly difficult in the IS/IT field to monitor individual student performance and give individual feedback and direction.

This paper examines one mechanism to address this inconsistency by using a Skills Audit to provide individual feedback and monitoring. In addition the Skills Audit techniques promote independent learning skills. Student learning requirements change over levels of study, for instance level 3 students are typically more self reliant in their studies (Adams and King 1994). This paper describes the use of a Skills Audit on three units offered on Business courses, two of the units being core level 1 units, while the other is an elective unit.

The rest of this paper is structure as follows. First the

individual cases of using skills audit are described. The paper then discusses the pedagogic justification of such an approach with discussion of how it may be applied at different levels of study and different modes of study, including distance learning. Finally, the salient points of skills audit for each level of study are summarised along with a discussion of its use as a distance learning tool.

SKILLS AUDIT: THREE CASES

Skills Audit has been used on three units at the Southampton Business School. The units are *Information Systems* and *Business Skills*, both core level 1 units, and *Computer Auditing*, a optional level 3 unit. All the students on the units are studying business related degrees. For each of these units a 15 week semester system is used, consisting of 12 weeks taught classes with revision and exams in the final weeks.

A skills audit approach has been used differently in each of these three cases. The differences apply to who are the main recipients of the audit and what they do with the results. The differences also relate to the level of study and the associated learning requires, e.g. level 3 students are typically more independent learners.

The following is a description of each of the cases.

Level 1 Unit: Business Skills

On the Business Schools Undergraduate Programme (BSUP), all students take the Business Skills unit which incorporates maths, IT and literacy. A skills audit was used on the maths element of the unit and comprised of new entrants taking a computer marked diagnostic maths test in induction week.

The background of the unit and the move towards a skills audit approach, centre on the main problems encountered due to the wide variety of skills for new entrants. For business related degrees, a wide variety of entry qualifications were accepted. So typically tutorial groups would include students with maths skills ranging from good Advanced (A') Level mathematics to mature students with little or no formal qualifications in maths. This resulted in tutorial material being not relevant to many students: the students with good maths skills found the sessions too easy, while students with poor maths skills found the sessions too difficult.

What was needed was a mechanism to identify the maths

skills of individual students, give individual feedback to students and to enable further guidance to be given to the less able students. The result was developing a computer marked maths diagnostic test which each student took in induction week. Individual feedback was then given to students within a week of the test. The feedback consisted of an overall mark, and more importantly, an indication of how well they performed in four key areas of maths, these being Arithmetic Skills, Estimating Skills, Averaging Skills and Algebraic Skills. In addition, it was indicated where students were particularly weak and should seek further support from the Study Assistance who deal with remedial work. A self study learning pack was developed covering the numeracy items being tested. Students that performed sufficiently well on the diagnostic test were APL'ed from the numeracy element of the Business Skills unit, enabling them to devote more attention on the other elements of the skills unit.

The overall result of the approach was more efficient use of staff and student resources. Students had better feedback on where their strengths and weaknesses lie, and on where to direct their study. Staff were able to identify weaker students earlier and direct them to Study Assistance. Also staff in the tutorial sessions were able to concentrate on problem areas since the self study material enabled students to work at their own pace.

The approach has developed over the last three years with some minor modifications each year. The skills team are currently fairly happy with the existing structure, in addition all the student performance is recorded in a database in which staff can monitor the overall skill-set of new entrants from year to year.

Level 1 Unit: Information Systems

The Information Systems unit covered current technology, organisational aspects, and systems theory. The original assessment for this unit was a written report assignment, usually towards the end of the semester, with an end of semester exam. This proved inappropriate for identifying weaker students early on, and feedback to students was typically too late. As with the skills unit another main problem was the wide variety of knowledge and skills of the new entrants, typically, with some student having high level of practical (though selective) IT skills gained in a working environment, along students with very low IT skills.

A different approach to skills audit was taken on this unit. The audit consisted of two short tests during the semester,

one in week 5 the other in week 8. The tests entailed a bank of multi-choice questions and an essay question. The first test covered mainly technology issues, while the second test covered mainly organisational issues. The test scripts were handed back to students with appropriate comments and correct answers. Typically the scripts were handed back in the week following the test. The use of multi-choice questions facilitated quicker marking, though more effort was needed in developing the bank of questions. This was an audit *after* students had studied a topic area, so effectively auditing the effectiveness of students studying in a topic area. The results were monitored by the unit leader. This enabled the identification of weaker students earlier on and, enabling further direction to be given in preparation for the following test and the final end of semester exam. Also, it enabled overall areas of weakness to be identified, which could then be addressed in the following lectures and be given greater attention in the following year. The multi-choice questions we used as an indication of the breadth of background reading done by the students, where as the essay was used to show the depth of study undertaken.

Overall the students were fairly positive to the assessment method, liking particularly the quick feedback and the mix of multi-choice and essay questions.

Level 3 Unit, Computer Auditing

The Computer Auditing unit covers security, management, legal and financial auditing issues of using technology in business. The students were from different courses including Accountancy, Business Studies and direct entrants into level 3 from HND courses. Effectively, the students taking the unit had a variety of different skills sets. The problem I faced here was *"how do I give individual feedback covering understanding in a wide set of issues, to 40 students, which I see only a few hours a week, and who will be at different levels in each of the topics?"*.

A skills audit approach was adopted to meet the formative assessment needs of these students. The approach differed to that used with level one students, by incorporating more self assessment and peer review. At the start of each topic area a list of items to be covered was produced, an example is shown in figure 1, which covers the legal aspects. Students were then asked to go through the list, individually, and identify how much they knew about each item. Students then worked in small groups going through the list and discussing each item. The discussion included items such as: what constitutes "Very low",

"Medium" and "High" levels of understanding/knowledge?; and where to find information about the topic. Each group generated a list of three items that the group knew most about and the three items that the group knew least about. These were then fed back to the other students and tutor. The only feedback to the tutor from these lists were the three most and least known about topic areas. This enabled some modification to the delivery and content of the topic material (particularly references) to meet the needs of a particular cohort.

Students kept their own lists so they could see where to concentrate their efforts and monitor their own progress. If students had problems with a particular topic, their list could be used as a focus to identify where they are in their studies and what they need to concentrate attention on.

The students were given guidelines of the attainment level expected from them by the end of the unit. This differed for each topic, an example would be "achieve all items in the Medium category and a third of the items in the High category". So providing students cover all the items to the required minimum level (i.e., Medium), they could select which items to concentrate on for in-depth study. Further refinement in the guidance could be given, for instance stipulating core items that students are expected to achieve a high level of knowledge in, however, this was not used on this unit, the intention being to get the students to have responsibility for their own study which included identifying which topics to focus on.

The unit assessment was designed to recognise and complement this self selection of topics. The assessment consisted of students researching into their own selected topic area (within the confines of the unit), and involved producing a written report and a presentation to the rest of the class. In addition, a case study assessment was used at the end of the unit in which a range of issues from each topic would be relevant, enabling students to demonstrate and apply their in-depth learning in their selected items.

Students were encouraged to review their own progress by examining their own list at the end of the topic. This way they could see the 'value addedness' of their study.

Feedback from students on the use of this technique was generally very positive. Some of the comments include "it helps to know what to read about" and "helps to concentrate study". It also seemed to help to reduce the alienation of students with some topic areas. For instance, in topics where many students recorded their knowledge as very low for most of the items, it proved useful to see that their knowledge profiles for the topic was not too

**FIGURE 1
SKILLS AUDIT FOR LEGAL ASPECTS**

Item (please add your own description)	Level of Knowledge/ understanding		
	Very low	Medium	High
Data Protection Act (general details of)			
Data Protection Act - eight principles			
Changes in Data Protection legislation for EC Directive for October 1998			
FAST			
BSA			
Legal Aspects of using E-commerce			
Searching for Legal information (past and current acts of Parliament)			
Negligence Law relevant to IT			
Contract Law relevant to IT			
Legal issues of the Year 2000 'bug'			
Computer Misuses act			
Legal responsibilities for people using IT			
Legal issues covering access to 'Outsourced' source code (if someone provides you software do you have a legal right to access the source code?)			
In a computing environment, what items can be covered by insurance?			
Warranties			
Intellectual property rights			

dissimilar to others and to promote discuss of what level of knowledge they should be aiming for in the topic. Overall, I found the technique very powerful in encouraging students to take responsibility for their own study.

**DISCUSSION: THE PEDAGOGY OF SKILLS
AUDIT**

Changes, debate and writings on assessment issues in higher education has a long history (Tillyard 1913; Winter 1993, p365); change in education is not new and

is an evolutionary process. Much of the recent literature deals with how to maintain quality in the assessment process while student numbers increase and resources are reduced (Gibbs, Lucas and Simonite 1996, p261). Many of these works examine innovative assessments such as self assessment and peer assessment (Gibbs 1989; Gibbs and Jenkins 1992; Hughes and Large 1993; Boud 1981, 1986; Adams and King 1993; Cheng and Warren 1997). The debate over assessment is very current and is likely to continue with the impending changes in higher education (Jacobs 1997). The debate is further enhanced with the advances in technology making distance learning more

attractive, and raises several questions on how to assess from a far, both summatively and formatively (Minoli 1997; Kapur and Stillman 1997). The resulting increased variety of entry routes, with their corresponding diversity of skill-sets, highlight the need for a monitoring device for the changing skill-set on new entrants. An initial skills audit, such as described in the Business Skills case in this paper, is one such example.

Probably the most common connotation of auditing is the accountancy sense of auditing a company's financial information (e.g. BPP 1997). A wider definition would include such items as 'to examine', 'to verify', 'to take stock', 'to check'. Defining auditing within a particular area will be very context related, for instance, audit in a computing sense would include such items as 'check on the accuracy and completeness of the results of computer processing' and 'check how efficiently a computer is being used' (Galland 1983) or more currently, checking on a range of items such as software licences and access controls (Alter 1996).

A key aspect of auditing from a student skills perspective would be the 'taking stock' of student knowledge. This already takes place in most institutions, typically before a course starts or at the end of a course. 'Taking stock' of student skills at the start of a course will include setting and checking pre-requisite entry qualifications, so that faculty can expect a minimum level of skills from the student cohort. 'Taking stock' at the end of a course (e.g. an exam) gives an indication that students have met the learning and attainment criteria for that course. The results of this taking stock is used by faculty, students and others. What is less widely used is the 'taking stock' during the course and, the use of that 'taking stock' by the students during the course. This sort of auditing of student skills is not new and has been used successfully elsewhere, a good example being the Maths Science Inventory (LeBold, Budny and Ward 1998).

As can be seen, some sort of skills audit is already widely used in higher education, usually at the start and end of a course. However, less commonly used is the self student audits during the course. The self skills audit can be considered as a Self Assessment Skill Activity (SASA) (Adams and King 1994) that can be used to develop student learning patterns especially if a systematic approach is taken (Boud 1986, p27). Though the skills audit for the level 3 unit described in this paper does not form part of the formal (summative) assessment, it would only take a small step to make it so. A self audit may be an excellent start for a learning contract (Sutherland 1997, p193; Brown and Knight 1994, p90). As such a

skills audit could meet the *summative*, i.e., giving a mark, and *formative*, i.e., giving feedback, aspects of assessment and encourage more learning independence in the students.

A self skills audit seems particularly relevant for distance learners. As has been discussed elsewhere, distance learners have a unique set of assessment needs and associated problems (Harris and Bell 1994, p164; Minoli 1996), particularly when it comes to feedback and contact with other students and staff. A self assessment of own skills would go some way to meet the feedback needs of distance learners. It may also be used as a focus for discussion between students and between staff and students, especially if used in conjunction with technology (Kapur and Stillman 1997), such as in providing discussion notice boards, possibly containing group results of self assessments.

SUMMARY

The use of skills audit cases described in this paper shows a progression from level 1 to level 3 of undergraduate study. At level 1, the main aims were to examine the skills of the new entrants enabling early identification of weaker students, quick feedback to the students and, monitoring the delivery of topics within the unit. At level 3, the main aims were to foster self study, changing the emphasis on what the tutors do to what the students do. The use has changed from predominantly a monitoring tool for staff at level 1 to a study tool for students at level 3. Level 1 is used as mainly formative assessment, level 3 as mainly summative assessment. Ownership of the audit moves from the tutor in level 1 towards the student at level 3. A self audit seems particularly appropriate for distance learners, especially if used in conjunction with distance learning technology.

Overall, the skills audit approach is a simple yet powerful tool in the teaching and learning process. Given the changes in the UK education system, a skills audit has use as a monitoring device for the changing skill-set on new entrants. The changes in education results in a broader skill-set of a cohort of students along with reduced feedback to individual student, i.e., a reduction in formative feedback. It is increasingly difficult in the IS/IT field to monitor individual student performance and give individual feedback and direction. The use of a self skills audit provides one mechanism to meet the formative feedback needs of students. This seems particularly appropriate for distance learning.

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