DIAGNOSING AND DEVELOPING THE IT SKILLS OF NEW ENTRANTS TO HIGHER EDUCATION

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Abstract

This paper presents an approach to the diagnosis and development off IT skills using Computer Aided Assessment (CAA). It looks at the rationale for the assessment of IT skills and the relevance for higher education in general. It reflects on some of the outcomes of the project and staff and student thoughts on the use of CAA in this context.

Introduction

This work reports on a pilot project to establish an approach to the diagnosis and development of students IT competencies using CAA. The project was developed from recognition (within the institution) of the increasing diversity in the IT competency of new entrants into higher education and their increasingly varied background and expectations of university education. Furthermore, that an effective mechanism needed to be put in place to ensure that all undergraduates have a core set of basic generic IT skills in the very early stages of their University education. These skills would then create a foundation of these competencies that could be built upon and contextualised within the HE curriculum. A fundamental aspect of the project was to put in place computer based diagnostic testing to enable tutors and students to assess initial competencies, follow a customised learning plan and to track subsequent development.

Context: the importance of IT skills to new entrants to HE

There is an increasing amount of research in the Higher Education sector regarding students experience during their first year of study. Yorke and Longden (2004) identified four key reasons why students leave programmes of academic study. Two of these reasons can be seen as being within the area of influence of institutions. These are: the students' experiences of their programme and more broadly experiences within the institution of study and, secondly, students' failure to cope with academic demands made by their programme of study. It is for these two reasons that the importance of IT skills to new entrants are worthy of further investigation.

- Students need a set of generic IT skills to satisfactorily undertake their course of study. Student satisfaction and progression are

compromised if they do not have these skills. Equally where students are uncertain of a particular skill set formative assessment and the accompanying feedback is important (Yorke and Longden, 2004)

- IT skills are a prerequisite for e-learning – usage of Virtual learning environments has increased substantially in recent times and staff in institutions are developing increasingly complex learning systems this makes increasing demands on student IT skills.

- Students without a basic set of IT competencies place considerable pressures on support mechanisms within institutions.

- The use of IT applications within a class may be based upon assumptions regarding existing levels of students' IT competency. If these assumptions do not hold, lecturers can unexpectedly find themselves undertaking remedial work with those students in the class who do not have sufficient IT skills.

- There is increasing recognition of the importance of IT skills in benchmarks on key skills, from professional bodies and employers.

Institutions who do not give students the opportunity to improve and update skills may well be compromising these students chance of success.

The project approach

A set of key principles were established that guided the approach the project.

The first principle was based on a study of entrants over a three-year period that showed a large diversity in the level of IT skills and confidence of individuals. It was therefore important to the team that any approach should take this into account.

The second principle stemmed again from a survey of first-year entrants that revealed a range of preferred approaches to acquiring IT skills. Whilst some preferred a classroom environment others preferred to follow approaches such as working from home.

A third principle was that students should only do what they needed to do and avoid repetition. Student feedback confirmed that repetition of the learning of areas that they were familiar with was de-motivating.

Computer Assisted Assessment Process Design

The approach taken was to design an assessment process that fitted in with several aspects of the University environment such as the use of WebCT and the need to have a system that was aligned to the European Computer Driving Licence (ECDL) since the same assessment process could also be used for staff as well as having value added benefits for some students enabling those who wished to do so, to continue on to the ECDL.

Based around this, the assessment was developed in seven separate tests based around the seven module domains of the ECDL. These tests were standalone in that they could be used separately if required. Each test was developed into a series of sub-sections that also echoed the ECDL syllabus for that particular module domain. Within this sub section a question bank was developed from which a selection of questions was delivered at random to the student. The types of questions used were mainly multiple choice, with the question types restricted to those available in WebCT Campus Edition. The pass mark was set at 80% as with the ECDL, but in the later version this was set at 60% for those not taking the ECDL since this was nearer to the baseline level of competency required by tutors teaching at Level One.

Students were introduced to and sold the idea of achieving a minimum level of competency in IT skills. Initially the students took a pre-course diagnostic questionnaire. The questionnaire established details about how the respondents previously acquired their IT skills and their perceived skill levels and confidence. This was designed to inform approaches to teaching prior to the development of skills and competencies, to provide the student and tutor with guidance on the level of support that they were likely to require and also to inform future developments of this project.

Within the first two weeks of the term students did a series of computer-based diagnostic tests via WebCT. The aims of these tests were to provide an individualised learning plan and to provide feedback to the students on their real rather than perceived abilities using IT. Students were taken through the first two tests (normally Word and PowerPoint) in an appropriate class and shown how the system worked and the resources available.

Feedback was not included with the questions but the students were asked to look at their marks within a subsection and if these did not meet the threshold, the students were asked to work through the relevant sub-sections of the tutorial packages. This was facilitated by the fact that the paper-based and computer-based tutorial packages also complied with the subsections of the ECDL syllabus. On working through the sections of the tutorial packages the student then could re-take the test hopefully to reach the required level or to be in a position to take the ECDL exam.

Marks achieved were monitored and evaluated in terms of overall performance of the cohort taking the tests, something that has led to changes in teaching and initial exercises given to students in subjects that utilise technology. Evaluation of the performance of each individual student was not carried out due to the numbers and time required. Additionally, this was presented to the students as an opportunity and requirement to develop themselves and to reach a baseline level of skills for them to be able to successfully approach modules that use ICT. Students not taking the ECDL have been asked to submit evidence of marks achieved in a skills development portfolio, so avoiding the need to chase up individuals.

Figure 1 shows the process.

Figure 1 - Key processes
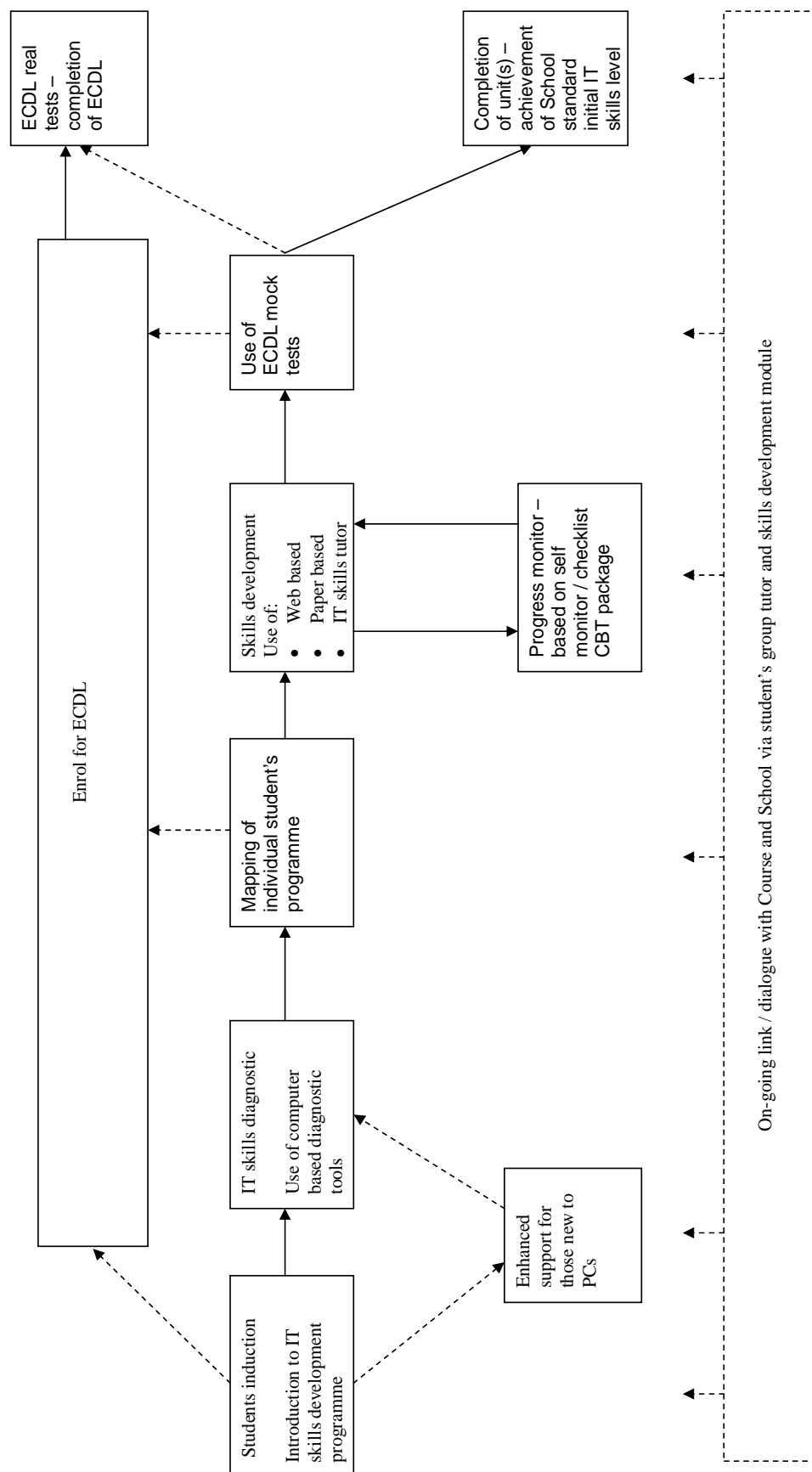
Outcomes

Feedback on the project came from a combination of student focus groups, general student comments and tutor observations. Five main paradoxes were apparent:

Most new students have some IT experience, but in some this is very limited. Furthermore asking students about their levels of computer experience was a very poor indicator. In particular there was a noticeable difference between genders and their ability to accurately diagnose their level of IT skills. Based on this project team felt that this demonstrated the importance of diagnostic testing of new entrants rather than relying on themselves to position their skills against a set of criteria and take appropriate remedial action.

The students IT key skills and knowledge were patchy. Typically, students who could use programs such as Word, thought they were good using the web to search for information, and said they could use Excel, but few had additional experience. Diagnostic tests revealed that the students could indeed use the Word (but not the more advanced features) but elsewhere had a much weaker skill set. Focus group discussions revealed that many students were used to following a set of instructions to achieve a given goal but were much less adept at thinking of how to apply this to a new situation.

The students recognise the importance of having good IT skills, but did not appreciate the skills they would need for their studies. There was a tendency for students to overrate their skill level (particularly young male students) and to base their ideas or the skills they would need at university on the skills they were taught in school (understandably so). The project team considered that aspects of this may be due to differences in subject areas, something that other authors also noted (Kirkwood and Price, 2005)

Students expressed a range of preferences of how their IT skills training should be delivered. While some preferred a classroom delivery (54%) others preferred more flexible options such as blended modes or entirely computer based delivery.

The students said they were keen to develop their IT skill set but for many this was only if they could gain credit for it and that it was clearly a part of their course. This fits in with Brown, Race and Bull (1999) who state "assessment is the engine which drives a great deal of student learning". For tutors this was an interesting paradox since students could see the relevance for their future career but were not keen to put the time in on their own.

Some reflections on the approach

The use of computer-based assessment was seen as useful by the project team since it provided a number of benefits.

From a tutor perspective

- It provided an independent arbiter of skill levels. This was particularly useful for some students who had high levels of confidence using limited aspects of an application.

- A small number (20 of 394) of students were sufficiently unconfident or inexperienced that they felt it necessary to take up a day long 'IT skills primer' From a tutors perspective in the structuring of early classes it helped to know that these students had (hopefully) some of the basics in place and their confidence boosted.

- Many students had relatively high skill levels using Word but much lower skill levels using programs like Excel. In addition while students had much practice using Word in their pre-HE studies very few had any extensive experience using Excel. One tutor commented "They seem to be great at following instructions to create a spreadsheet, but quite poor when asked to create a spreadsheet themselves"

- Provided an easy way for students to repeatedly assess their progress; this lead to worthwhile improvements e.g. average improvement for using Word was 21% to achieve a mark around the ECDL pass level of 80%

- In some cases, students just took the diagnostic tests to confirm that they had a good skill set. In some modules such as PowerPoint, students scored and average of 62% and found themselves with only limited work to do to reach the 80% level.

- This approach enabled the team to provide repeat assessments and tracking for a large number of students with minimal intervention

- It also enabled fast, relevant and direct feedback to the students, something also noted by Peat and Franklin (2002)

- At the same time this provided useful information for tutors in developing appropriate tutorial support for subjects using IT.

- It achieved greater cost-effectiveness by targeting support and training at those who need it and allowing more effective use of IT labs in the Learning Centres.

- Linking this skills development approach to the ECDL had some problems in that there were some areas of the syllabus that many students fail to see the relevance of. Towards the end of this project links with the ECDL's syllabus was much less emphasised whereas links with the students subject area syllabuses were emphasised

- The option of taking the ECDL and the full seven areas proved initially popular, but enthusiasm for this reduced in the face of work load required. The dropout after one semester was 30.2%. The requirement to study all seven ECDL areas was later reduced to

just Word, Excel, PowerPoint and File Management.

- A few staff not associated with these tests did not see value in testing and further developing IT skills or saw priorities in diagnosing and testing other areas (notably maths and literacy skills)

- This project placed another demand on the congested time around induction and the first weeks of the first term

- The ECDL syllabus is quite large, placing some demands on the students' time for a prolonged time.

Student Perspective

- Students like being able to practice tests – but disliked the extensive number of questions that were required to diagnose their skills in a given area.

- A number of students commented that they acquired skills by learning from the tests as well as by following the computer based training made available. Charman and Elmes(1998) supported the notion of improvement when CAA is used for frequent formative assessment.

- Students liked the improved choice and flexibility in their learning experience and the catering for different learning styles and preferences inherent in the system. Similarly the freedom to structure their own time and make repeated attempts on assessments was important , something also noted by Grebenik and Rust (2002)

- A number of students commented on the differences between their perception of their ability and the test results. For example some students who were seen as having expertise by their previous college or school found themselves struggling whilst an 'A' level computer studies student who rated in his skills as low found himself in the top 10 out of 300 students.

- Maintaining motivation and commitment in areas of study such as file management was not always an easy task from any students; indeed a good number did not see the relevance of such areas of study.

- The tests were considered by some students as being too long. This was more of a problem when the student didn't reach the threshold after the first couple of attempts; here the repetition was seen as a strong negative factor.

- There was some initial resistance to taking the tests from those students who already saw themselves as being competent.

Conclusion

As more and more students come through to university with greater experience of using computers it might be thought that there is no further need for the development and diagnosis of IT skills. However, the experiences of this project show that students' skills tend to be within narrow areas such as the use of word and often don't extend to commonplace applications such as Excel. The assessment and diagnosis of student skills can't really be left with students either since this project revealed a number of students whose perception of their skills were seen to be at odds with reality.

The experience on this project has been that a well constructed system can give benefits to the student and also or help the tutor at the same time. Certainly the use of such a system needs selling to the students but once in place students can certainly gain. The gains from the computer assisted assessment of IT skills are not just that the student acquires a mark but gets to know how their skills standard in a number of areas around benefits from an individual learning plan to remedy deficiencies in their skills. Furthermore, in allowing students to repeatedly test themselves and practice the tests some student will boost their skill set further.

Tutors benefit in terms of workload from the use of an automated computer assessment and are less likely to have surprises caused by assuming students will have a particular skill.

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