Implementation of Optical Fibre Communications Module in a Virtual Learning Environment

Study Author: Phil Barker, ICBL, School of Mathematical and Computer Sciences, Heriot Watt University.
Tutor in Study: Professor John Fothergill, Department of Engineering, University of Leicester
Subject area: Electrical, Electronic and Computer Engineering, Communications Engineering.

This case study has been developed from data gathered through a demonstration of the teaching and learning materials available, interviews with the tutor, student questionnaires and focus group.

Background

This report covers the use of the BlackBoard Virtual Learning Environment (VLE) as the sole means for delivering content and most of the assessments for a course taken by fifty students studying a variety of degrees in Electrical and Electronic Engineering or Communication Engineering. Most of the students were in their third year, however, depending on the degree being studied, some would be in their second or fourth year. The student group includes overseas students who do not have English as their first language. Few (or none) of the students would have used a VLE for learning before. The tutor for this course is the Pro-Vice Chancellor for Teaching and Learning and has many duties which would interfere with teaching by conventional means.

The module on optical fibre communication systems has been taught for many years as a traditional lecture course, but is now delivered almost entirely online. The bulk of the content delivery is through forty short lectures, which comprise an audio-video recording of the lecturer, slides, and a transcript of the lecture, and which are supported with handouts. The recordings are accessible at any time, and can be paused, rewound, replayed etc. under the control of the student. The online resources also include ten other video clips and animations, video contributions from an external expert, thirty-five formative assessments (quizzes), online summative assignments, links to selected external resources, and a message board for queries (the tutor will not answer general queries on the course content unless they are sent through this message board), the previous year's message board is available for reference. The only elements of the course that are not online are an initial introductory lecture during which the students are introduced to BlackBoard, problem classes before each summative assessment and a final group assignment.

Students may access the material whenever and wherever they want. At the start of the course the tutor kept a check on who had accessed the material and the quizzes and sent messages to each student to let them know whether they were making suitable progress. During the course three online summative assessments are taken by the students under exam conditions in a computer lab and act as "synchronization points" so that students cannot leave all of the work to the end of the course.

Reasons

The tutor wanted his students to have personal experience of eLearning, to understand the role of IT in personal development and to introduce them to a mode of independent learning. He saw that freeing content delivery from the template of fixed-length lectures would allow him more flexibility in the length of each learning unit rather than having to break only at the end of a lecture-slot. He hoped that the students would benefit from being in control of the pace of their learning and of being able to follow optional pathways through the course, using supplementary materials as required, and from having access to more interactive material and rapid feedback from formative and summative assignments.

There were also reasons which derive from the tutor's position within the university. Firstly his busy schedule often took him away from the University so he needed a flexible mode of delivery. Secondly he was in a position to push for wider use of VLEs and eLearning in general throughout the University and he felt that he needed a sound understanding of that mode of teaching and learning if he were to do so. He therefore wanted personal experience of using a VLE and to appraise how students from different backgrounds and with different needs reacted to learning in this way.

Lecturer's Perspective

The tutor decided to convert the course to online delivery with something over a seven month lead time before delivering the first material to students. He had assumed that technical problems would cause delays, however in the event he found that "pedagogic design of the course was the biggest hurdle". He decided to use an online variant of lectures for the delivery of the core of the material since students are comfortable with lectures and so this would give them a point of reference in understanding how to tackle the VLE. He made sure the lectures could be controlled by the students and aimed to include with these lectures as many different types of resource as possible so that the students could work in their own style at their own time. He also included quizzes and other activities to motivate the students, and checks such as assignments during the course so that students could not get left behind if they failed to realise how organized they needed to be in order to follow an online course. Special care was needed with the summative assessments which have to cover the learning objectives and the distribution of student skills. Each assignment has similar weight to a single exam question and comprises about 15 questions ranging from very easy to very challenging. The tutor found that, while online assessment is not limited to simple multiple choice questions, there are limitations imposed by computer marking of assignment questions. He found it possible to do some assessment of higher order learning outcomes online, however there was a need for an element in the assessment that examined the student's reasoning and did not rely on there being a single right answer. To address this, the final assignment is a more open-ended piece of work taken off-line.

In order to implement the course the tutor had some institutional support to record the lectures and for a postgraduate student to help put the course together in BlackBoard, which helped to "take the drudgery away".

Students' Perspective

The student response to the questionnaires and group interview[1] was positive, the students were especially appreciative of the flexibility offered by the online course and being able to work at a time that suited them ("you could learn the course material whenever you liked"), pace of their own choosing ("you could pause it to write your own notes") and repeat lectures and quizzes as required. The course was seen as well organized being easy to follow (from 39 of 44 questionnaire returns, agreed that it was easy to follow, 20 of these strongly agreed) and presented in a logical order (41 agreeing, 25 of these strongly agreeing). Only two students found using BlackBoard to be boring, and on the whole students agree that using BlackBoard increased their motivation to learn (17 were neutral, 12 agreed and 10 strongly agreed that their motivation had been increased). The mix between different resource types and the discussion board were all received well by the students as was the choice of short lectures which "focussed on what he was trying to say, rather than trying to fill a one hour slot". They also felt that there was greater interaction with the tutor through the discussion board than was typical in a lecture.

There were some complaints about technical problems related to playing videos and simulations, but these were nearly all fixed rapidly. Also, there were reports of problems accessing the server at particular times, which was remedied by allowing the students to download material for offline use.

---

[1] Forty-four student questionnaires were returned out of a total fifty; ten students representing a range of degree courses and level were interviewed in a single group.

Students did also express some misgivings about widespread use of VLEs fearing the loss of social interaction with other students. A balance between courses taught face-to-face and courses taught online was seen as necessary but there were differing views over whether it would be better to have only some activities (e.g. lectures) online for all courses or have some courses entirely online and others entirely face-to-face.

Issues

- The tutor found it necessary to put effort into rethinking the pedagogy of the course. ☺ It is important that students know in advance of server downtime whenever possible. Downloading material for offline access can help.

Benefits

- The students found learning online to be "very flexible, you can learn how you want to learn". Perhaps surprisingly, both tutor and students remarked that they had better access to the other: the tutor could monitor student progress through logs and the students had access to the discussion board: "does seem like you get slightly more interaction with him".
- Since going online, the uptake for this course has increased, while the drop-out and failure rates have decreased.

Reflections

The tutor has achieved his aim of finding a flexible way for him to deliver the course without disadvantaging his students. The students appreciate flexibility in when they study and what pace they take the lectures. In basing the online course around recorded "lectures" the tutor has (in the words of a student) created a course which is "similar to usual lectures but with added advantages".