An Overview of a Hybrid System for Distance Teaching at UCL

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Introduction

The Mullard Space Science Laboratory (MSSL) is a remote site of UCL (University College London) and is situated 40 miles from London in the Surrey hills. While there are no undergraduate students at MSSL, the academic staff still have teaching duties, which are usually undertaken at UCL's main Gower Street campus. This involves a round trip of approximately four hours (in some cases) for only one hour's worth of teaching; the travelling is therefore costly and inefficient. Remote teaching via a video link offered the potential of a very effective solution to this problem, so MSSL began trials from 1998 with UCL's Media Resources Department using videoconferencing equipment to link up to the main UCL site.

The aim of the trial was to gain experience with the format and to gauge student reaction with a view to using the technique more widely for teaching from MSSL and other remote sites.

The lecture course chosen for the experiment was High Energy Astrophysics, which is given to final year BSc, MSci and MSc students. There were several advantages in using this particular course. Final year students are much more confident in the University teaching environment and in their interactions with lecturers, so they are more relaxed in an unfamiliar studio setting. The course is very popular so the students have more enthusiasm and are more receptive. Finally, the course is quite descriptive with fairly basic physics and mathematics, so it lends itself very well to discussion.

Technical set up

In 1998, a VCON *QuickConnect-6* system was installed at MSSL to support a dial-up connection to the existing Tandberg codec in the videoconference studio located at UCL's main site and has been in use since then. The system uses three pairs of ISDN lines to achieve an overall bandwidth of 384 kbps. An IP connection using *Microsoft NetMeeting* software links PCs at both sites. This is used to display *Microsoft PowerPoint* slides generated from the PC at MSSL, which are then sent to the PC at the UCL site. The screen output from the PC at the UCL site is displayed on an LCD projector (with VGA capability) onto a projector screen. In normal

operation the students therefore see an image of the lecturer on one screen, transmitted via the ISDN link, and the *PowerPoint* information on an adjacent screen.

Video teaching techniques

Teaching in university, as in any environment, is enhanced by a high level of communication and interaction between pupil and teacher. For it to work successfully, video teaching must allow this interaction at a similar level to conventional, classroom lectures. The system described provides two-way audio and video for the students and lecturer. Microphones are placed around the studio so that the lecturer can hear students from all over the room. The author/lecturer (LP) sees the studio on a monitor in front of her, while the students have two large screens in the studio as just described: one of the lecturer and a second which is used to display course notes via a *PowerPoint* presentation. The lecturer has 'far end' control of the camera in the UCL studio, with the ability to pan and zoom around the room for discussion with individual students.

Figure 1. Lecturer teaching

A whiteboard is available at the MSSL site, with a separate camera, just as a blackboard or whiteboard would be in a classroom lecture. It is also possible to annotate and amend the *PowerPoint* slides in real-time. Animations and video footage have been introduced and these are popular with the students. The opportunity is actively maintained for students to talk and ask questions before and after the lectures using a separate console in the studio. A document camera for detailed stills of hardcopy material (e.g. images and documents) is also part of the system.
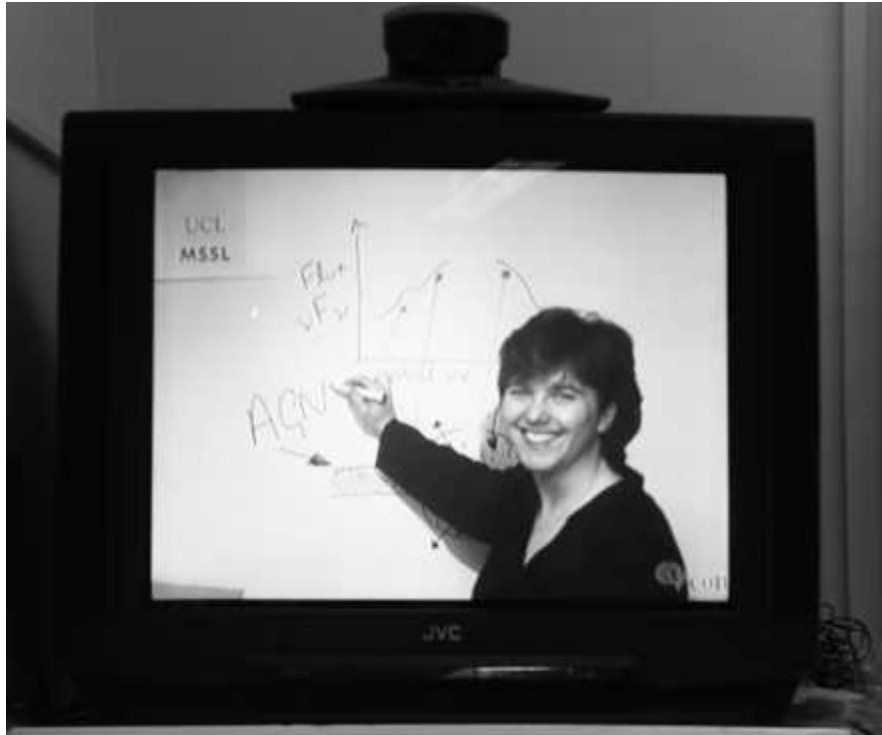
Figure 2. Whiteboard at the MSSL site is projected onto a screen at the UCL site

The *PowerPoint* slides used in the lectures, with additional material in note form, are placed directly onto the Web so that students have the 'official' versions available to them. Concern was expressed that the students would not attend the lectures themselves, but this has not been the case. Many students download the pages before the lectures and so are prepared in advance, often ready with questions.

The major difference between classroom and video teaching is the human interaction, which cannot be replaced with video presentation. The teacher must use a different technique. It requires a much more direct approach and a consideration of what the students see and hear. Many students enjoy the novel way of lecturing and seem to be confident in the unusual setting. In our experience, students actually interact more during video teaching than in classroom lectures.

Class size

Normally, about 30 students register for High Energy Astrophysics, which is about the maximum capacity of the videoconferencing studio. However, it was found that filling the studio to capacity was not popular with the students. They felt very uncomfortable and less 'involved' when the room was crowded, which made it much more difficult for the lecturer to maintain their attention and keep the teaching interactive. In order to address this problem, the group has been split into two separate classes.

Preparation for video teaching

Prior to running the remote teaching sessions, one author (CP) visited MSSL and gave a half-day introduction to distance teaching techniques, which was attended by several interested parties at MSSL. Trials with the video link were run, supported by Media Resources staff, to give the lecturer (LP) experience with the system.

Each year an induction session for the course students is arranged where they are invited to visit the videoconference studio, be briefed on the facilities and talk with the lecturer using the video link, in advance of the teaching sessions.

Teaching technique

The tutor puts considerable effort into getting the students to feel at ease with the medium. She adopts an informal style, greeting the students individually as they enter the room and taking every opportunity to maintain an informal dialogue with individuals and with the group throughout the lecture. To break up the session and re-focus the students' attention, she has a mid-session interlude expressly devoted to an interactive exchange with the students, discussing session material, other course issues or simply informal banter (e.g. getting a student to tell a joke). She encourages the students to interrupt if they have problems and seeks positive feedback regarding the progress of the session (e.g. 'can you all see that equation? - *silence* - say yes Liz if you can see that equation ...'). This appears to be successful and the students are at least as responsive as they are 'in person'. She also uses the ability to control the videoconference camera remotely to good effect, focusing on specific students where appropriate.

Student reaction

Not unexpectedly a wide spectrum of opinion has been expressed in the (anonymous) student feedback undertaken over the module's four-year teaching period. In this time, with the lecturer's experience of the medium and improvements in technology and studio facilities, student reaction appears to have improved a great deal. In order to measure the success of the program, it is essential for us to analyse course assessments longitudinally, taking account of these changes. With the program having completed its fourth year, we now have a much higher level of stability so a long-term study is timely. This will be conducted when all student responses are received at the end of the academic year 2001-2002 when the authors hope to submit their findings.

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