Educational technology and the mass lecture:
A restatement of fundamental issues

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Many more students and staff come into contact with basic educational technology in lecture theatres and classrooms than with computer based education or open learning systems approaches. Such delivery systems must be reliable, user-friendly and supported by well trained staff. The issues of ensuring proper lecture theatre design and fit out to ensure ease of use of educational technology and the need to attract sufficient budgets to do the task properly, are central if the use of educational technology is to become a fundamental feature of teaching and learning at the tertiary level in a time of mass lectures and static budgets.

Much of the literature in recent years in the field of educational technology has been concerned with the use of computer technology and its many technical and pedagogical variations. While the use of computer technology will play a crucial role in higher education in the coming years, what is also true is that burgeoning enrolments with budgets expanding at a lesser rate has seen a rise in the number of very large classes, particularly for common first year subjects at many Australian universities. The literature is strangely quiet on the challenges this poses to academic staff and providers of the physical plant needed to teach classes of 500-600 undergraduates in one session. The development of computer assisted instructional materials is interesting from the view point of an educational technologist but in many cases the numbers of students enrolled in courses using these systems is quite small. Even at my own institution, the CBE section, which is the largest of its type in Australia, still only presents a fraction of the courses taught at QUT. Similarly much has been written

about the use of television in education. At QUT the Educational Television unit produces teaching material which is either incorporated into CBE programs or is replayed to students in lecture theatres, classrooms or individual viewing stations in the library where the quality of the viewing environment can influence the learning outcomes.

What needs some further discussion by the educational technology community is the design of large lecture theatres, the techniques required to teach effectively to large student numbers and the implementation of an appropriate strategy to ensure the academic staff make a conscience shift from small group, where interaction and clarification can easily occur to large group instruction which relies on the verbal and visual presentation strategies and which tend to result in information dissemination sessions. To focus on the possible uses of instructional technology to individualise learning or to reach learners off-campus is very valuable in offering many alternative approaches to providing learning experiences to students, but providers of educational technology still need to address the very real issues of providing successful learning experiences to students sitting in a lecture theatre with 500 other undergraduates. A related issue for the providers of educational technology is to convince the financial administrators that the audiovisual fit-out of these teaching spaces must include more than a blackboard and an overhead projector.

At QUT, the Audiovisual Services Department has the responsibility of equipping the general teaching spaces with appropriate educational hardware in new and existing buildings. Our experience has been that architects are generally ignorant about lecture theatre design. As was said to me recently by an architect working on the latest new building with five lecture theatres and 19 classrooms, "In my days at uni the lecturer used the blackboard, gave out some notes occasionally and it was lucky if he had an overhead projector to use. A slide projector was set up for special occasions." A big class might have had 100 students. Today, universities are building lecture theatres to seat 500 or more students.

The question arises as to what audiovisual technology do you install in these theatres and what type of interfaces do you provide for the lecturer to control the theatre technology? Universities are not generally able to provide full-time staff to help academic staff operate the technology involved in large lecture theatres, thus much attention needs to be given to the interfaces between the user and the technology. A 500-seat theatre requires that staff use some technology even if it is only a radio microphone and some still visuals. Staff need to be easily able to control the volume of the PA system and adjust the lighting level for the use of visual material. In lecture theatres over about 250 the use of conventional

overhead projectors becomes less useful. This is because it is difficult to maintain image sizes which conform to the standard of screen sizes being one-sixth the distance from the screen to the last row of seats. In such cases a video projector will produce an image of the correct size but this means the use of an electronic visualiser for the projection of still visuals.

The introduction of electronic visualisers in place of the traditional overhead projector raises three issues. Firstly, the academic staff must be trained to produce visuals appropriate for the electronic visualiser, as material prepared for the overhead projector is not always appropriate for this different technology. Secondly, the quality of the images produced by the video projector must be sharp enough to permit students at the rear of the theatre to read the text. Thirdly, the intensity of the image must be adequate to allow the house lighting levels to be high enough to enable the students to see to take notes, and also for the lecturer to clearly see the students. The image brightness and resolution obtained from conventional three beam projectors is not always satisfactory when the image sizes required exceed about four metres wide, despite what some of the manufacturers claim. The price jump in moving to new technology, providing larger and brighter images, such as LCD projectors, in the very large venues is substantial.

A related issue is that of convincing the university administration that costs for the educational technology required in such large venues rise very rapidly. This is perhaps the major problem facing tertiary education providers of educational technology. At QUT a recent building was constructed with 20 classrooms and a 430 seat lecture theatre. Despite the Audiovisual Services Department providing a detailed costing of $180,000 for the equipment needed to fit out this building before construction began, the initial project budget allowed only $50,000 for the audiovisual equipment. After protests a further $80,000 was allocated. With a smaller lecture theatre involved, this total of $130,000 would probably have been adequate but a 430 seat lecture theatre requires a screen about 6 m wide by 4 m high if students in the back row are to read any projected visual material, plus powerful audio amplifiers and speaker arrays. In this case a decision was made to use a $30,000 Sony VP-1271 video projector although the initial budget had included a $70,000 Barco Data 5000. It has subsequently been discovered that the Sony projector is at the limits of its performance projecting an image 6 m wide. Clearly it is not capable of producing an image that is bright enough nor sharp enough, particularly for the display of computer images displaying lower case text and 630 characters wide. With a total budget of $130,000 for the building, it was not possible to buy the Barco and still fit out the rest of the building. The key issue to note here is that the cost of equipping lecture theatres does not rise in proportion with the size and seating capacity of the venue. The cost

of satisfactorily equipping a 500 seat theatre is not just double the cost of equipping a 250 seat theatre, but closer to three times the cost.

The choice of what user interface to use is also a crucial one for the providers of educational technology. At QUT the decision has been to use the AMX theatre control systems, although there are other systems available. These theatre control systems do permit staff to operate all the theatre technology from a single panel of buttons or a touch screen and go a long way to giving the staff member confidence to use the technology available. These systems also come at a price. Careful attention must be given to the design of the button panel and touch screen layouts when introducing this type of technology. Input from potential users of the system should be obtained as often technical staff responsible for the installation are so familiar with the technology they have difficulty in approaching the operation from the view point of a novice and so tend to overlook basic functions. The educational technologist must be wary of theatre control systems that do not easily allow for upgrading and reconfiguration so that new devices can be integrated with a minimum of cost. The systems should not be hardware specific.

As mentioned earlier, the use of computers in tertiary teaching is rapidly increasing. At QUT, staff are increasingly requesting the use of computers in lecture theatres. There are several ways of meeting this request which need to be considered by the providers of educational technology services. In large lecture theatres there must be a video projector capable of displaying the appropriate computer images. With few standards in the computer industry this is a major problem for those equipping lecture theatres, as often the projector purchased only a few years ago will not be capable of displaying current computer output, even though it may display video images perfectly satisfactorily. Audiovisual staff also need training in the methods of connecting computers to video projectors, as different computers require different cables and create different problems to be solved. High output overhead projectors and LCD projection panels are one solution to this problem in smaller venues, but in theatres seating over about 200 to obtain the required image size so that the computer image is legible from the rear of the theatre, video projection is the only solution.

The use of computers in lecture theatres raises a number of issues. Machines can be permanently installed which raises security issues, or portable machines can be brought into the theatre as needed and connected to the projector. Connections to the university network must also be provided in the theatre. Portable machines must be configured to permit network access while machines permanently installed must be configured to prevent unauthorised access to the network and be checked regularly for viruses.

It is also clear that a major task for the providers of educational technology is to train staff in the use of the technology and the strategies for teaching large numbers of students in the one venue. Even if the staff member is not sympathetic to the use of educational technology, once they are required to teach before a class of 500 undergraduates they must use some technology. The challenge is to reach the disinterested or unsympathetic staff member. Much has been written about procedures for the assimilation and dissemination of educational technology but it is, nevertheless, an ongoing issue. Courses mounted by the Audiovisual Services Department or the Academic Staff Development unit on using educational technology tend to attract the keen and enthusiastic, yet the classroom support staff are sure to be called to assist the disinterested staff member when they suddenly find themselves facing 500 undergraduates and an array of technology that they had not bothered to find out about before the lecture. This is often a crisis situation that occurs just before the class arrives or during the lecture when the staff member tries to do something, such as dim the lights, and realises that they don't know how. Often the academic staff are threatened by the situation and some are antagonistic to technology in the first place. In such situations the technology is almost certain to fail or not perform as well as it should. What do you do with an academic who declares that it is against their educational philosophy to lecture to large groups, yet is directed to take some sessions in a 500-seat theatre by the Course Coordinator or Head of School? While poor teaching techniques and unprofessional conduct will reflect on the academic and school involved, problems with the technology, be they real or not, will be reported by the staff to their colleagues, and so increase the suspicion about educational technology held by many staff, as well as giving the learners an inferior experience which should be the main concern of everyone involved in the situation.

I see reliability of the technology and systems as crucial to the success of educational technology in the era of mass lectures. In large lecture theatres the equipment must be relatively easy to operate and it must work every time. In fact, no matter what technology is used for the distribution and presentation of audiovisual material, the reliability and ease of use must be paramount. In systems that distribute video programs via cables to classrooms from a central control room, it is crucial that the correct tape is loaded in the right machine and directed to the correct room at the requested time and that a staff member is on duty at all times. Human error does occur and if a staff member is expecting to screen a video program to their class and it does not happen, a sense of unreliability is created in the mind of the lecturer and they will be less likely to try the use of technology again. The need for reliability of service applies equally for all classroom delivery services. At QUT the aim has been to equip each teaching space with the most commonly used items, such as OHPs, VHS video players and TV sets and try to keep these up to date so that they are

reliable. Delivery of equipment to classrooms is restricted to 35 mm slide projectors and some special items such as LCD projection panels and laser disc players. Audiovisual Services classroom support staff now spend more time on audio and video recording lectures and setting up additional microphones in lecture theatres when teams of lecturers decide they will participate in the mass lecture presentation, than on trundling equipment between rooms, floors and buildings.

In summary, while it is clear that the use of computer technology is already having a major impact on the learning experiences of university students, those charged with providing educational technology services in Australian universities of the '90s must also be concerned with the issues of teaching space design (because it is unlikely that anyone else will do it satisfactorily), system design for the delivery of educational media in mass lecture situations and the old issues of the need for constant training of academic and support staff on the operation and effective use of current media presentation technologies. Such issues may not be at the cutting edge of educational technology but if educational technology is to be supported by the universities as an integral component of the teaching learning process in a period of contracting budgets, then it is important to get the fundamentals right. The delivery systems must be reliable, technically appropriate, user friendly and be supported by knowledgable and helpful staff. In the design of teaching spaces, there must be a total system approach to the design which considers lighting systems, acoustics, sight lines, screen sizes as well as the audiovisual equipment and system controls. Educational technologists must continue to devote attention to the delivery mechanisms and systems for the presentation of instructional media programs if instructional media is to be integrated into the main stream of university teaching and learning.

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