

Monash Lectures Online: cost effective flexible delivery

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Abstract:

This paper discusses the implementation of the Monash Lectures Online service within the Monash University Library. In particular, the paper discusses the issues involved in shifting from an analogue taped lecture service to a digital World Wide Web environment. Major issues discussed include the technological development involved in the service and the implementation and effectiveness of the user interface.

1. Introduction

For over twenty years Monash University Library has provided a Taped Lecture Service (TLS). In 1997 this service provided taped lectures on audio cassettes for forty-five humanities and social science subjects. Students have audio access to these recorded lectures in the Matheson Library on the Clayton campus. In 1997-98 a pilot project for an audio-on-demand service was conducted. This project investigated the feasibility of substituting digital audio technology for analogue tapes in order to deliver recorded lectures to authorised users via Internet access.

This paper will provide a brief overview of the pilot project. Equipment, software, staffing and funding requirements for a full scale operation were determined during the pilot. The recording process had to be efficient and reliable for the library to consider further development of the service. Feedback on user acceptance and library and academic staff reactions were taken into account in developing the user interface. The pilot also raised awareness of academic staff to the potential of this technology in their teaching. Other issues which are discussed are the efficient digital recording of lectures in the complex environment of lecture theatres and lecturing schedules, access restrictions, and intellectual property issues.

Following successful conclusion of the pilot, the Library is now gradually replacing the TLS with the Monash Lectures Online (MLO) service. The infrastructure is set up to record lectures automatically with minimal staff processing of the audio files required to make the lectures available the same day. The reduced impact of the digital recording on library staff resources has allowed a significant increase in the number of subjects recorded, with further increases planned. The service has proved popular with students and the majority of students are now accessing the service from home.

2. History

2.1 Taped Lecture Service

The existing TLS had its beginnings in the early 1970's. The service was designed to cater for students with disabilities and those who missed their lectures because of timetable clashes or illness. The service quickly became very popular. This was due to a number of reasons. Students were wanting to hear the lecture again because of language difficulties; many students had domestic and work commitments preventing attendance at lectures; and some students had a preference for the recorded format over the live lecture environment.

The Teaching Services Unit of the Educational Services Branch at the Clayton Campus of Monash University is responsible for recording all of the lectures for the TLS. Recording takes place in a central recording office, which is fitted with an amplifier and cassette decks. This equipment is linked to 17 lecture theatres by telephone cables, though which the feed from the microphones is transmitted. For theatres not linked to the recording office by the cable network, separate tape decks are operated manually in each theatre.

At the close of the working day, a library staff member collects the finished tapes from the Teaching Services Unit recording office every day during semester. At the library the tapes are labelled, provided with an online catalogue entry and shelved at the Music and

Multimedia Service Point in the Sir Louis Matheson Library. Tapes recorded in the morning and early afternoon are available by 5.00 p.m. Late afternoon lectures are picked up in the following day's batch of tapes and made available that day.

To use the tapes the students first check if their subject is offered in the Service, either by searching the online catalogue or by looking at a list available in the library. The students request the tape, specify the subject and the date of the lecture. If the subject is available, library staff will lend the tape and a set of headphones to the student. Tapes are loaned for the period of one hour and ten minutes. Students listen to the tapes in a listening room fitted with work stations dedicated for the TLS. Each work station consists of a carrel with a low cost cassette deck secured to it. Group listening is possible though bookable listening rooms.

2.2 Pilot project

In 1997 a pilot project was established to assess the possibility and potential of remote recording of lectures and making the lectures available in the World Wide Web environment. The aims of the project were as follows:

- To replace the existing TLS by utilizing enhanced technologies to provide an efficient and cost effective service.
- To derive indicative cost information to establish the operational requirements for provision of an ongoing service, based on experience with the pilot, including technology development and staffing.
- To obtain data about user acceptance.
- To provide an on demand service to students on and off campus, to cater for flexible study modes, as outlined in the Monash University Learning and Teaching Plan and to contribute to the development of the Monash University Virtual Library plan.

The Pilot project went through three separate and sequential phases. The initial phase of the pilot was a trial of the streaming media technology, which demonstrated the ability to flexibly deliver the lectures on demand and highlighted the obstacles to successfully implementing the service. The second trial phase drew on the experiences of the first. The size of the pilot was increased to the level of a scaled down production service and options for automating the recording process were investigated. The third trial proved the automatic recording approach as the appropriate one to meet the original objectives of the pilot. In February 1999 the pilot was officially named Monash Lectures Online and began operations as a fully-fledged library service.

2.2.1 Pilot Project First Phase, July – November 1997

Goals

1. Feasibility study of delivering the lectures on demand using streaming media.
2. Develop experience using the RealAudio software to record and stream the lectures.
3. Compare the sound quality of digitally encoded lectures with the sound quality of the audiocassette tapes.
4. To obtain data about user acceptance

Description

- Install trial version of the RealAudio server.
- Trial live digital recording using temporary equipment. Recorded three subjects from one lecture theatre wired to one recording computer. The recording was performed manually at the lecture theatre and the audio file was copied onto a ZIP disk, to be carried back to the Library.
- Access to the lectures using the library's web catalogue.
- Students using the pilot service were encouraged to answer a questionnaire, and feedback from the lecturers that were recorded was sought.
- Access to the trial service was only available in the library. No external access was allowed.

Results

1. Streaming media was found to be a feasible means of delivering lectures. (See 3.2 for streaming process)
2. Installing and using the RealAudio software presented no challenges or special demands. The audio files recorded during the trial were clear, clean and easy to listen to for extended periods.
3. Encoding process had no adverse effect on the sound quality. (See 3.2 for description of encoding process)
4. Questionnaire responses indicated that students were enthusiastic about the pilot service, happy with the sound quality of the lectures and indicated they were willing to access the service from their homes.

2.2.2 Pilot Project Second Phase, December 1997 – June 1998.

Goals

1. Remotely control the recording computers.
2. Transfer the digital audio files to the RealAudio server using the University network.
3. Increase the number of lecture theatres fitted with the recording computers.
4. Develop either an automatic method of recording the lecture or a remote switch that would activate the recording PC from the lectern.

Description

- Seven lecture theatres were fitted with recording computers.
- Various remote control programs investigated, Lap Link was eventually chosen and successfully incorporated into the recording process. Lap Link software offered a stable program for remote control and file transfer. It was to be used in other processes in the library so a license was readily supported.
- Recording of the lecture was manually performed but the use of remote control software meant that one staff member could simultaneously manage the recording in several theatres at once. 14 subjects were selected and recorded.
- Questionnaires were again distributed to the students using the service and a promotion campaign of the pilot service began.
- Studies into developing switch and automatic schedule recording systems started.

- Advanced Network Systems Performance Applications Group (ANSPAG) and the library agreed to develop a scheduling program in March 1998.¹ A schedule program was rapidly developed and tested.

Results

1. Remotely controlling the recording process improved the access to the recording computers and minimised staff resources required to record more lectures. These improvements in efficiency were not enough to make large scale lecture recording a feasible proposition. The recording procedure would have to be a largely automatic process.
2. An automatic recording system was successfully developed and tested by ANSPAG. Development of the alternative switch based system had stalled because of problems getting the RealAudio Encoder software to recognize the switch signal. The effectiveness of the schedule solution resulted in the abandonment of the switch based solution.
3. Continued student support for the on demand lecture service. Increased demands for access to the service from home or other, non-library, locations.

2.2.3 Pilot Project Third Phase, July – November 1998.

Goals

1. Test ANSPAG's schedule program in a production environment. Determine if automatic recording software was reliable enough to justify the commitment of further resources to develop the pilot into an established library service.
2. Password protection to be implemented.
3. Allow students to access the pilot service from home.

Description

- Introduction of the schedule program. Recording was monitored to identify unexpected problems and solve them.
- A generic password was distributed to the students. This password was later superseded by the more secure AuthCate password system.
- Continued promotion of the service.

Results

1. The Schedule program was successfully trialled and consequently adopted as the means of recording the lectures.
2. Password protection was applied to all subjects to restrict access to Monash staff and students.
3. Home access was launched and feedback from users was positive. 40% of all files were delivered to students accessing the service from outside the library.

¹ ANSPAG is an unincorporated joint venture between Monash University, Telstra and Siemens formed under the Cooperative Research Center program of the Department of Industry, Science and Technology. Based in the Faculty of Engineering, ANSPAG conducts research into advanced networking technology. For further details see <http://www.anspag.monash.edu.au/>

2.3 Pilot summary

The pilot project demonstrated conclusively that remote and automatic recording of the lectures and making those recordings available via the World Wide Web was both feasible and cost effective. The student response to the pilot showed that they were very enthusiastic about an online recorded lecture service. With these positive results from the pilot program, the decision was made in 1999 to expand the number of equipped lecture theatres from 7 to 20 and begin the planned phasing out of the TLS commenced. This expansion was assisted by university strategic infrastructure funding.

3. Description of the Monash Lectures Online Service

3.1 Overview of the Service: getting from the lecture theatre to the desktop.

The lectures are recorded live in the lecture theatre by an automatic recording system. The recorded lecture is then delivered to the library's RealAudio server via the University's network. Students can then stream the lecture from the server by using a multimedia computer, with Internet access and the RealAudio Player installed.

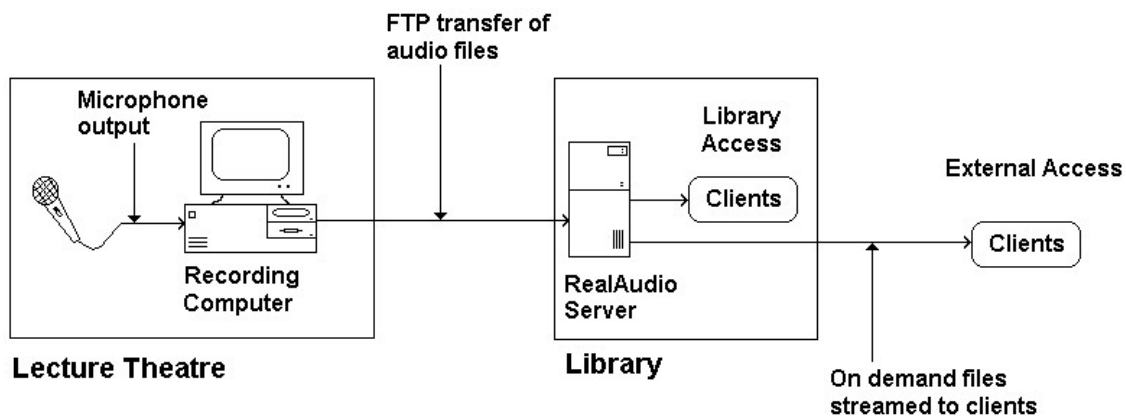


Figure 1. Path of lecture files

3.2 Streaming Media

The MLO service uses streaming media to replace the analogue tapes as the means of delivering the recorded lecture. Streaming media allows large audio/video files to be broken into small packets of information to be sent over a network connection. The media player receives the packets and plays them as soon as they arrive. The process delivers audio immediately, without the long download times necessary for large media files.

Real Network's Real Media standard was chosen to encode the lectures in the pilot project. Real Media was chosen because the format had been well established and had become an accepted standard. The player is freely available on the Internet. The server and encoder software were free for the purpose of a trial which reduced the cost of the pilot project.

Finally the audio compression, the streaming characteristics and the subsequent playback were superior for the purpose of recording lectures.

The streaming media used by MLO is the Real Audio clip. RealAudio uses various audio codecs (compression/decompression algorithms) to encode standard audio into a format that can be streamed. The codec chosen as the standard for recording lectures is the 28.8 Voice codec. The reasons for choosing this codec are that it plays good quality audio and that it requires only a 16 Kbps bandwidth at the users end of the network connection. The 16Kbps requirement is well within the capabilities of the 28.8 modem.

3.3 Lecture Theatres

Recordings for MLO are currently made from twenty lecture theatres on the Clayton, Berwick and Gippsland campuses of Monash University. Each of these lecture theatres has been equipped with a digital recording system, which is designed to record the lectures automatically.

Each lecture theatre has

- A Pentium computer.
- A secure location for the computer, usually a lockable cabinet or a projection room.
- A network port and a power point.
- Audio feed from the lecture theatre's sound system or from a radio microphone receiver.

Each computer is connected to the University's network. The network connection consists of a 10mb ethernet cable which allows the recorded lecture files to be delivered to the RealAudio server and for library staff to remotely control the recording computer. The audio input from the lecture theatres is plugged into the 'line in' jack of the recording computer's soundcard.

3.4 The Recording Computers

The recording computers are controlled remotely from the library using Lap Link Host software. Using the remote link the library staff are able to perform regular maintenance activities. This can include defragmenting the hard disk, restarting the computer to refresh system resources, and reprogramming the recording schedule.

The components of the Recording Computer are:

- Pentium computer, with a minimum 16 Mbytes of memory.
- 16 bit sound card.
- Lap Link Host software.
- Schedule software.
- RealAudio Encoder.
- Unique file name creation program.
- Batch file to transfer the audio files via ftp to the server.

3.5 Automatic Recording

- *Automatic nature of the recording process.* The recording process is automatic and functions without any human oversight. Use of the automatic method of recording the lectures almost completely eliminates staff involvement in processing the recorded lectures. With automatic processing, the recorded lecture is ready for access within three minutes of completion of the recording.
- *Automatic start-up and finish.* A schedule program starts and stops the RealAudio Encoder at the times programmed into the schedule. The RealAudio Encoder is started at the indicated time and day, and records the audio input until the time duration set has elapsed, whereupon the schedule program stops the Encoder.
- *Generating unique file name and creating the metadata file.* Each lecture recording is given a unique name, which is based on the time and date that the recording began. For example a lecture given at 10.00 am on 12/10/98 will be named **12-Oct-98_10-00am.ram** by the schedule program. The schedule program will also generate a metadata file (.ram) of the same name as the RealAudio file (.ra). The purpose of the metadata files is to pass the Web address of the recorded lecture's RealAudio file to the RealAudio player on the client's PC. Using the address the RealAudio Player can establish a link with the RealAudio Server and begin streaming the RealAudio file.
- *Transfer of the recorded data to server.* A file transfer protocol (ftp) script file transfers the RealAudio file and its associated metadata file to the RealAudio Server, saving the files in the appropriate directory. On the RealAudio Server there is a directory for each subject, which is named after the subject's code. The automatic processing of the files is now complete.

3.6 Recording Reliability

The automatic recording process cannot compensate for recording equipment failure or for human error. Consequently these problems usually result in the complete loss of the lecture. During first semester 1999 the rate of recording failure was 9% of all the scheduled recordings.

Typical problems that cause failed recordings are:

- Lecturer did not use the radio microphone correctly; this can include forgetting to wear microphone or switch it on.
- Audio equipment in the lecture theatre failed. This can include breakdown of amplifier, power cuts and human intervention
- Recording computer crashed. This could be due to continuous operation without maintenance.

Most of these problems are outside the direct control of the library. The environment in the lecture theatre is the responsibility of the lecturer and Teaching Services Unit theatre custodian. To resolve the systematic problems the library liaises with these parties and encourages them to develop solutions. Problems due to human error will resolve themselves as library staff and lecturers gain more experience working with the MLO service.

Problems with the recording computers crashing stem from the practice of operating these computers continuously. Consequently the computer's system resources gradually degrade and eventually cause the computer to crash. To refresh the system resources and thus prevent the crashes the recording computers are remotely restarted at least once a week. It is planned to install another schedule utility that will scan and defragment the recording computer's hard disk each night.

While great care is taken with quality control, the MLO service will rarely have 100% success with scheduled recordings. Improvements in reliability require further research, technological development and funding. At this point the service could cease to be cost effective. It is the library policy that the MLO service is offered as a supplement to the lectures and not as an alternative to attending the lectures. Therefore the library does not guarantee the recording of any lecture or any part of a lecture. Failure of some recordings is accepted as the price of increased flexibility and low cost recording.

3.7 Client access

The lectures recorded for the MLO service are available 24 hours a day, 7 days a week, and for most subjects the lectures are retained for the duration of the semester.

Students can access the service from any Internet connected computer. The computer must have a soundcard, with speakers or headphones and the RealAudio Player software installed. This is available as free download software. Students accessing the service from outside the library are free to listen to the files as long as they want to. Students using library workstations are restricted by the Library's opening hours and by the 3-hour loan for the headphones.

In 1999 access to 17 multipurpose workstations was provided in the Music and Multimedia Section of the Matheson Library for students to access the MLO service. To use these workstations the students must book one of the PCs and borrow a set of headphones from the service point. Students also use these PCs for general Internet access.

The lectures are accessed through the Voyager Library Catalogue or from the MLO Web page. Catalogue entries are created for the subject. Students locate their subject by searching on the subject code. The Uniform Resource Locator (URL) in the catalogue entry for the subject points to the subject's index web page, which lists all the available lecture files for that subject. Selecting the lecture file will activate the RealAudio Player and the lecture will commence playback after a few seconds delay. The RealAudio Player software has the standard play, pause, stop, volume control, fast forward and rewind controls.

To eliminate the necessity of daily updating the list of available lectures it was decided to exploit a feature of the web server software - the 'on the fly' generated index web pages. When a browser requests a directory that has no index.html file, the server software generates an index page on the fly. The resulting page is a basic list of the contents of the directory. By using an 'on the fly' index page as the main access point to the subject's lectures the student sees the current list of available lectures. Because all the files in the directory are RealAudio metadata files they are displayed in the index page as hyperlinks, which can then be selected to begin playing the lecture. A header file in the directory is picked up by the server software and is displayed at the top of the index page. The header contains the subject's title and code. The advantage of the 'on the fly' web page is that it is constantly being refreshed and updated each time it is accessed. Apart from initially setting up the

subject index page, the only maintenance required is to occasionally remove lecture files due to occasional recording faults.

3.8 Security

To address lecturer concerns about the protection of their intellectual property rights, access to the Monash Online Lectures is restricted by password. The library uses the Monash developed, AuthCate password system. An AuthCate password is issued to all enrolled students and to all staff of Monash University. The password check is made when the browser attempts to view the subject index page. AuthCate can be set to check if the password holder is enrolled in the subject they are attempting to access. The subject specific check is a level of security that has been welcomed by many lecturers. This has been applied to all subjects. The principal advantage of using the AuthCate password is that the library is not required to manage the creation and distribution of unique passwords to the large numbers of potential users. AuthCate is used by students to access many other online resources including databases and course notes.

Once clear of the password check, the student is only allowed to stream the audio files from the RealAudio server. Apart from being an efficient means of delivering audio across the Internet, streaming also preserves the integrity of the files because a complete copy of the entire audio file is never downloaded onto the client's computer.

3.9 Dimensions

As at 1 September 1999:

- There were twenty lecture theatres on the Berwick, Clayton and Gippsland campuses of Monash University equipped for recording MLO
- Permission had been received from academic staff to record 58 subjects from the Faculty of Arts, Law, Business and Commerce and Medicine
- There were 120 scheduled recordings of lectures made each week
- There were 121 hours and 30 minutes of audio files recorded every week
- Capacity – hard disc space required for MLO service per semester – average 2.19gb.

3.10 The user environment and feedback

During the initial pilot students were able to access the service in the library only through a dedicated homepage within the Library homepage. Promotional activities to launch the pilot included:

- Asking lecturers to promote the new service at their lectures
- Producing fliers to give to students at the relevant lectures outlining the new service
- The training of library staff to enable them to understand, promote, introduce and teach the students how to use MLO Service
- Promoting the service through signage and fliers throughout the library.

In the first semester of use, feedback was requested from students in the form of a one page questionnaire. A brief overview of the feedback concluded that:

- Most students would use the service in preference to the TLS
- Most students were using the service because they were unable to attend the lecture
- Most students found the sound quality acceptable
- Most students did not find using the service difficult to use
- Most students would use the service if it was available to access from home.

The feedback did cause a number of useful modifications to the service:

- Access to the recordings was secured by password
- Access was limited to students enrolled in the subject
- Downloading of the audio files was prevented to the lecturer's intellectual property rights
- Access to the service from home
- OPAC was replaced by Web pages as the primary means of access
- Quick start access to the MLO service from the library's main front page
- Lecture recordings retained for longer periods.

In 1998 as the project continued with an increasing number of subjects being made available through the service, similar promotional activities were carried out to encourage students to use the service. Subjects included in the service continued to have lectures taped so that a parallel service was operating, but students were encouraged and over time seemed to prefer the MLO service to the TLS. In Semester Two the service was delivered outside the library as well, and password protection was put in place to ensure only Monash enrolled users were able to access the sites. All enrolled students at Monash University have Authcate access which allows password access to protected sites. Data indicates that this expansion of the service was supported by the students with over 40% of files delivered from the service were accessed outside the library.

In 1999 the project continued with an increasing number of new subjects. Tapes for a number of subjects were dropped completely so that a number of subjects were offered 'solo' and the newly introduced law subjects were also offered only through MLO. As a trial, three additional dedicated PC's were installed in the Listening Room area where the TLS tape players are offered. These PC's are in continual use for students to access the MLO service only. It is planned that the remaining tape players will be replaced with PCs as the MLO service grows and more library services are offered online.

Statistical data collected in Semester One 1998 and 1999 from the TLS service and the ReadAudio server, has provided comparative data to indicate that the MLO service is as heavily used as the TLS. See Figure Two for data indicating average use per subject for both tapes and lectures.² The dramatic difference in the June 1999 total over the June 1998 figure reflects the fact that MLO recordings are retained for the entire semester, instead of the two

² The stream as defined in Figure Two is a network connection between the server and client where the lecture was played for 5 minutes or longer. A stream can be directly compared to a tape loan.

weeks for the tapes. Students would be using MLO service to review their lectures for the past semester as part of their exam preparation.

In analysing from where the client was accessing the MLO service, it is obvious that the majority of users are choosing to access the service from computers outside of the University network. (see Figure Three) A significant fraction of users still access the service from inside the library, confirming the importance of the Library's workstations for meeting the needs of students with no alternative form of Internet access.

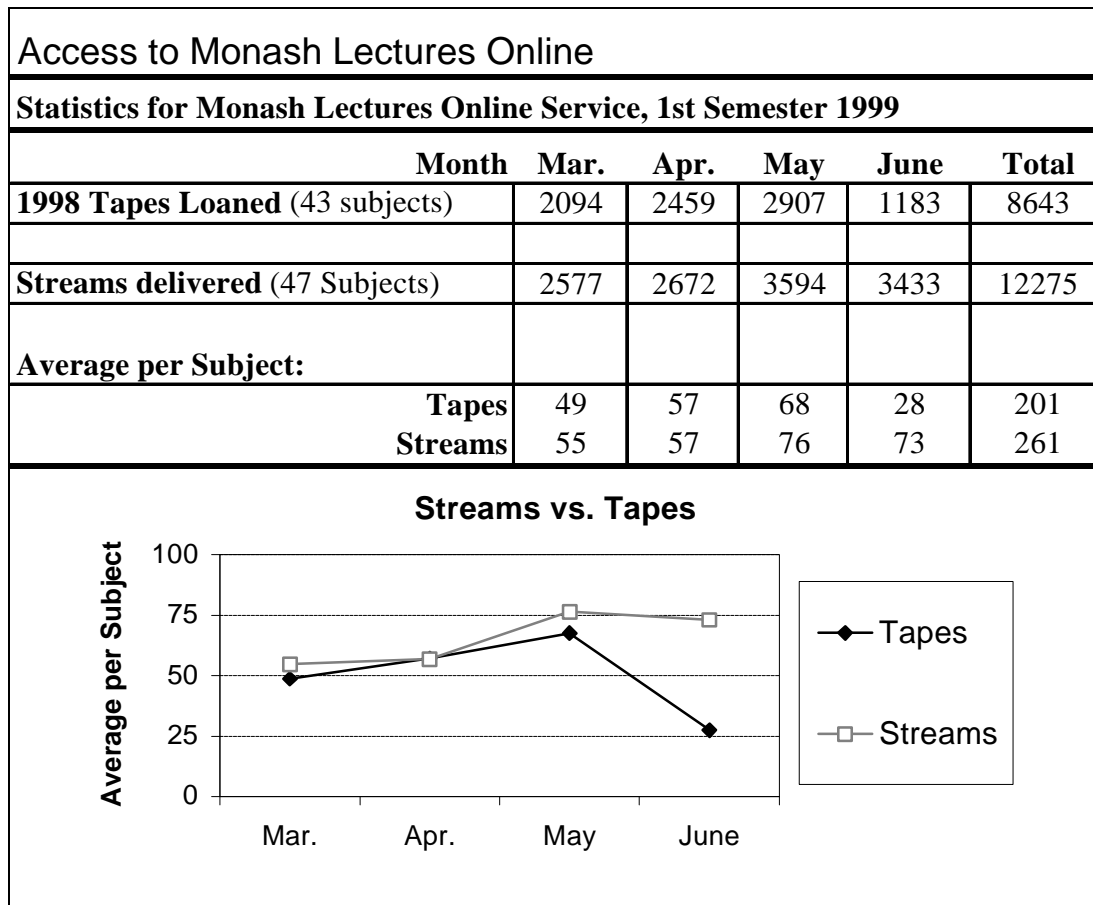


Figure 2. Streams (Semester 1 1999) vs. Tapes (Semester 1 1998)

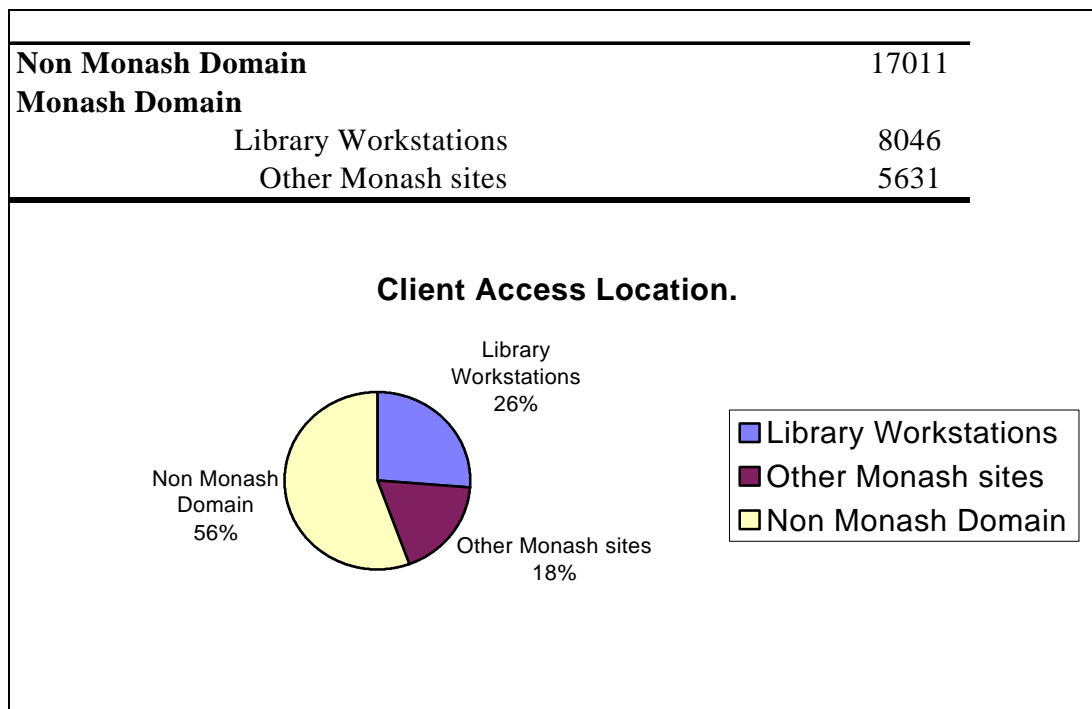


Figure 3. Client Access Location – Semester One 1999

4. Cost effectiveness

One of the aims in the development of the online lecture service was to ensure that it was a cost effective solution. The cost effectiveness of the solution adopted can be measured in three ways:

1. Flexible delivery of the lectures
2. Efficient recording
3. Human resource management.

4.1 Flexible delivery

In terms of flexible delivery, the on demand delivery used by MLO is a major improvement over the cassette tapes.

- The MLO lectures are available from any Internet capable multimedia computer, at any location. The tapes are only available from the Matheson Library.
- The service is not restricted by library opening hours, but is available 24 hours a day, 7 days a week.
- There is no restriction on the length of time spent listening to the MLO lectures whereas tape users were limited to a period of one hour and ten minutes in the library.
- The compressed RealAudio format files are a more efficient storage medium than the tapes. Server capacity has been allowed for 3gb. Lecture files can be retained for up to a year. In contrast the tapes are recycled every two weeks due to space restrictions. Currently audio files are retained for the duration of the semester.
- Simultaneous access by up to 100 clients is allowed to any file on the RealAudio server. In contrast one cassette tape is made for each lecture, restricting use to one person at a time.

- The development of MLO has contributed to the flexible delivery mode for delivery of University teaching and research.

The impetus to develop the more flexible environment was due to the popularity of the tape service and the added incentive to cater for flexible study modes. The development of flexible study modes was included in the Monash University Learning and Teaching Plan of 1998 to provide direction in this area for the next three years. The flexible learning component of this plan seeks to 'increase the learner's choices of: methods and timing of interaction with teachers...without diminishing the quality of that interaction; [and] place and timing of learning...An increasingly valuable component of student-centred flexible learning is the appropriate use of media and technologies.'³ As part of this drive towards a flexible learning model, the university has strategies to 'develop and disseminate new and appropriate educational technologies [and] improve and extend IT infrastructure and other support systems'.⁴ The library's role in this strategy is to develop a virtual library. This has been under development since 1993. The introduction of electronic resources through CD-ROM and online networks has established the library in a strategic position to offer flexible methods of accessing information to on and off campus students and staff. The infrastructure of the Monash University Library information technology systems has given the opportunity for the MLO project to develop and provide a valuable and useful service to students

4. 2 Efficient recording

Recording and processing of the lectures is automatic. The focus of staff activity supporting the recorded lecture services has shifted from processing and handling tapes, to quality control and trouble shooting in an online environment. All lecture recordings are checked daily to determine that the lecture was recorded successfully. Failed recordings are marked as such and the link on the subject index page is deleted. All failures are carefully checked for problems with the recording computers, lecture theatres, and the network. If the source of the failure is located, then a solution is quickly developed to avoid repeat occurrences. On the subject web page a note is posted to alert students to any recording failures or problems.

The automatic creation of the recorded lectures delivers savings in staff time that can be used to support other library services or to increase the overall numbers of subjects recorded. For example, in the first year of its full operation the MLO service recorded 30 hours a week more lectures than the TLS. The service has considerable potential to record far more subjects than the TLS could ever offer. The Law Faculty increased the number of subjects recorded from 12 subjects to 22 when it switched to the MLO Service. The network capability within the university has allowed the service to expand across campuses with a centralised management process.

4.3 Human Resource Management

The human resources required to run the Service obviously depend on the number of lectures recorded. Currently the most significant impact on time required is the establishment of the lecture recording program for the scheduling software at the beginning of each semester. Lecture theatre timetables are consulted to establish which subjects are being offered in the

³ Monash University. Learning and Operational Teaching Operational Plan; Operation Draft 1998 - Summary. (Clayton; Vic: 1998), p.5.

⁴ *ibid*, p.7

MLO equipped lecture theatres. Academic staff are approached for written permission to record the lecture and make it available through the Service. The scheduler software is programmed for the semester, directories are set up on the server and a list of subjects to be recorded is made available to students. This often assists the student in their choice of subjects.

Once the timetable is established and the recording PCs checked and tested, the service is ready to commence. Once the semester is underway the staff member takes time at the end of the day to check the files. This can take approximately 20 seconds for each file, with more time required for problem files. Problem files can take up to 3 minutes to check and post a message to indicate unavailability. Additional time needed to trouble shoot problems is variable and difficult to predict.

The project has been supported by a dedicated Project Officer (.8 time and Higher Education Worker Level 6) since June 1997. In conjunction with Music and Multimedia staff the service has been implemented and promoted. The development of the Scheduler program was undertaken on short term contract by an ANSPAG officer. The long term delivery of the service is planned to be managed by one library officer (who had previously been allocated management of the TLS), with additional staff trained to act as backup during periods of leave. This officer will continue to maintain other duties including rostered desk shifts and processing of multimedia materials. This officer will also be involved in maintenance and trouble shooting of the PCs in the lecture theatres, with additional support provided by library systems staff as required.

5. Future developments

Feedback from students, academic and library staff has indicated that further development of the audio only service should be considered. These developments suggested include video, powerpoint presentations, overheads, text and animation and other images.

These media can be streamed using the Real Media G2 standard which supports the streaming of video, pictures and text. Inclusion of images to the audio recordings would obviously enhance the learning experience of the students. For certain subjects, particularly the sciences, the images presented during the lecture are critical to understanding the topic. For these subjects there is almost no benefit of having an audio only recording of these subjects.

After some investigation it became apparent that the creation of multimedia enhanced recorded lectures would be both time consuming and resource intensive. The virtue of the MLO service is that the recording process is automatic and the processing time is very short. Any lecture recorded can be available on the Web in minutes. Multimedia enhanced recordings would be more time consuming to prepare, possibly taking up to 25 hours to be prepared. While the audio recordings were simply a case of content capture and delivery, the multimedia lectures would require the library to become intimately involved in content creation process. At this point of time this is not considered an appropriate role for the University library to perform. Other internal units like the Center for Learning and Teaching Support or Centre for Higher Education Development would be better placed to support and manage the creation of multimedia enhanced lectures. The library is considering working in collaboration with these units for further development.

Future uses of the streaming media recordings made for MLO service can be offered to interested lecturers to be used as an audio resource for creation of multimedia lectures and also for enhancing teaching web pages with short audio clips. The library could also consider offering to stream multimedia lectures, created independently by the lecturers, from the MLO Real Audio Server. These possibilities indicate that the MLO service is entering an important phase in terms of future expansion and development.

6. Summary

The current success and future sustainability of the Service can be measured and summarised through a number of features. These features have been carefully developed and trialled during the pilot programs and modified and implemented to create the service as it stands at this point in time. Those features that are essential to the success of the service are:

- The automated recording of lectures in remote lecture theatres both intra and intercampus.
- The automatic transfer of files to the RealAudio Server and appropriate directory for efficient delivery to the user on the Internet.
- The availability of the service through the medium of the Internet which is available 24 hours a day, 7 days a week.
- The ability for the service to be centralised both through the library server and to the staff member who oversees the service, despite lectures being recorded simultaneously across lecture theatres and across campuses.
- The ability of the service to be managed by one staff member with minimal time spent on checking and troubleshooting.
- The willingness of our students to trial, comment and adapt to this new service. Their willingness, openness and ongoing critiques have helped shape the service to the success it is today.