An End-user Evaluation of a Lecture Archiving System

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ABSTRACT

Lecture archiving and the provision of online access to it are becoming increasingly ubiquitous in tertiary education and there is a growing body of associated literature. However there is limited attention given to the implied interaction between students, staff and the computing complex required to create and serve recorded lectures online, or the different interests of the human parties involved. This paper reviews HCI principles in the context of current research on lecture archiving from the academic's, and student's perspective. It then addresses findings from qualitative and quantitative surveys of students' use of lecture archiving across six University of Auckland Business School courses in Summer school 2009. Our experiences of a subsequent deployment in Semester One of 2009 are also considered in conjunction with relevant server log data. Interface, storage, retrieval and delivery issues are addressed, along with their observed impact on student and staff uses of archiving technology.

Categories and Subject Descriptors

H.1.2 [Information Systems]: User/Machine Systems – *Human factors*

D.2.1. [Programming Techniques]: Software Engineering - *Requirements/Specifications*

H.4.3. [Information Systems Applications]: Communications Applications - *Computer conferencing, teleconferencing, and videoconferencing*

H.5.1. [Information Interfaces and Presentation]: Multimedia Information Systems - *video*

K.4.1 [Computers and Society]: Public Policy Issues - *Intellectual property rights*

K.6.1. [Management of Computing & Information Systems]: Project & People Management - *Systems Analysis & Design*

General Terms

Management, Measurement, Performance, Design, Reliability, Human Factors

Keywords

Lecture archiving, lecture recording, video, multimedia, communications

1. INTRODUCTION

The Innovative Learning Technologies Centre (ILT) operates within the new University of Auckland Business School (UABS). As staff and students came to terms with their new environment, ILT was tasked with a number of KPIs to improve their collective capabilities – among these a technique for lecture recording that would be the least disruptive to existing workflows but produce outcomes that would meet or exceed users' expectations.

The appropriateness of reporting on this research arises from a definition of HCI - *Human Computer Interaction is a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them* [1]

2. RESEARCH LITERATURE

Lecture archiving and the provision of online access to it are offered at most universities. A review of the literature reveals that archiving is popular with students [2] [3] although the benefits for learning are not yet clear. There is documented resistance from some academic staff [4] while others embrace it enthusiastically [5]. Discussion of the deployment of archiving typically focuses on getting it running successfully [6]. There is much less attention given to what happens when students, staff and a computing system used to create and serve online lectures interact and what this means more broadly.

The Faculty of Law, Monash University report their use of lecture recording dating back to the 1970s. Buxton et al [7] provide an excellent review of historic issues as well as a view to the future. They note that given decades of experience it was only in 2006 that there was any formalised research undertaken to determine real student needs or desires. Noticeably missing from their paper was a prediction that server analysis accompanied by surveys of lecturers and students would be possible or desirable.

3. RESEARCH METHODOLOGY

A design science approach to this project was accepted as a framework for undertaking the accompanying research. A design artifact was created based upon previous research and it evolved given the planned, frequent input from the user community [8].

4. TRIAL AND SURVEY

In Summer School of 2009, ILT undertook to introduce lecture recording in a trial with five volunteering academic staff across six academic papers. From week three of the semester we gathered weekly data on student use of the lecture recordings which has subsequently been analysed. We also worked closely with staff and got feedback directly from them during the pilot as well as surveying their overall experience at the end of the trial. We were able to learn from other implementations to avoid obvious mistakes in the trial launch [9] [10] [11] [12].

4.1 Trial Goals

Broadly, our goal was to trial a specific lecture-recording platform (Camtasia Studio and Camtasia Relay) across a sample of undergraduate courses within the Business School in order to identify and improve implementation and user-experience issues. The implementation issues we anticipated centered around a spike in demand at exam time and technical issues related to the lecture recording process.

4.2 Technical Trial

Lecture recording began in Week 1 of Summer School 2009. Workflows were finalised over the following week and lectures were available to students as streaming media from week three via a web page. The lectures were available to students as streaming media <u>only</u>. This was to avoid some concerns about IP issues.

It was anticipated that Camtasia Relay, a simplified version of Studio emphasising uncomplicated workflow, would be used in the trial. Unfortunately there were delays in implementing the server installation of the software. As a result academic staff recorded a video screen-capture and voice-track using Camtasia Studio 6 on a Tablet PC with a wireless radio microphone. The Tablet PC was plugged into the usual e-lectern. Academic staff then placed the archive (raw .camrec files) manually onto a shared drive for post-processing to .wmv files.

4.3 Staff Survey

As mentioned previously, ILT staff were in constant contact with academic staff throughout the trial, managing support and discussing any issues staff members identified. Notes were taken of these interactions. A survey was undertaken at the end of the process to allow staff to consolidate their feedback in the form of an online qualitative questionnaire.

4.4 Student Survey and Server Data

The student survey involved a qualitative questionnaire over two weeks, followed by quantitative and qualitative questionnaires over four weeks. The quantitative parts of the survey were used to validate the relative significance of points identified by students in the qualitative stage. The questionnaires were presented online and students self-selected to participate. The survey was matched with quantitative data on usage taken from the logs of the LR streaming server. Students were encouraged to participate by the weekly offer of a book voucher prize draw of $60.

4.5 Scope

4.5.1 Participants - Staff

At a meeting chaired by the Dean, December 12, 2008, academic staff members from across the business school were solicited to participate in a lecture-recording trial scheduled for Summer School 2009. From approximately 20 expressions of interest, 5 lecturing staff across 6 papers committed to the trial.

4.5.2 Participants – Students

All students involved in the selected classes were asked to fill in a weekly, class-specific online survey. The number of students self-selecting to answer the survey ranged from 1 through to 26 per paper. This equates to between 3% and 20% of students per paper. Across all papers, 10% of students answered the survey in the third week of semester, 9% in the fourth, 7% in the fifth, 6% in the sixth and 6 % in the final week.

4.6 Trial Findings

4.6.1 Proportion of Students using the Service

The general indication is that online lectures were very popular with students across all the disciplines surveyed. 63 % of students said that they would choose a paper with lecture recording over a similar one without. The proportion of survey respondents claiming to have viewed a lecture online averages approximately 75% across all papers.

On average the number of requests varied around 90 viewings per day. There were a total of 569 students enrolled in the courses that were recorded, so this would equate to 16% of all students requesting a file each day.

There is a noticeable drop in viewings between Fri 6th through to Mon 9th of Feb which was a public holiday (Waitangi Weekend)

A very significant trend is the peak across Sat 14th – Mon 16th which are the 3 days leading up to exams, mirroring our expectations.

	Averag Viewing (per day)	Class	Coverag
ACCTG.102	67	234	29%
ECON.201	1	92	1%
INTBUS.202	5	41	11%
INFOSYS.1x0	10	118	9%
INFOSYS.222	16	84	19%
Grand Total	99	569	17%

Table 1. Coverage

Coverage describes the average percentage of students in a given course that viewed the recordings per day. Table 1 shows that the coverage between each course varied, ranging from 1% to 30%. This could reflect a number of possibilities including, for example, that the teaching style of the course in question did not suit the recording situation, that the concepts or theories taught were conveyed adequately in class, or that many students in Summer School were repeating courses, so may have been seeing

concepts or theories for the second time and feeling no need to review.

An investigation into individual video viewings profiles proved to be insightful. The distribution of the number of times an individual video was watched within a course varied significantly. This suggests that some recordings were just "not in demand".

An appropriate example of this would be the recording for ACCTG.102 on the Tuesday of Week 5. This is a 2 hour lecture recorded in 2 one hour chunks. Part 1 of this class was viewed 145 times whereas part 2 was only viewed 96 times. The average number of viewings per day for this course is 52. (Please note - Econ 201 was only recorded for 2 of 6 weeks.)

4.6.2 Student Access: Related Issues, Solutions
Students typically viewed lecture recordings from a variety of locations, the two most popular being home (by a narrow margin) and then somewhere on campus.

Some students attempting to view lectures from home experienced difficulties. Comments from the survey and directed to the research team indicate the following as likely issues:

- Unable to access the Digital Services Student Services web page as s/he couldn't locate it, didn't know what password credentials to supply or their usual login didn't work off-campus
- Streaming did not work at home due to a client-side issue or slow connection

In the first survey every student respondent reported s/he had a broadband connection. Given the small sample size it is difficult to assume no students have a "dial-up" ISP. In any event New Zealand has notoriously slow broadband.

4.6.3 Student Usage
4.6.3.1 Reported and Observed Frequency
Most students surveyed claimed to watch a particular lecture once. As the semester progressed, there were a slightly higher number of students watching some lectures with more frequency, even while the overall numbers of survey respondents dropped. The increased proportion of reiterative viewing indicates that student use of recordings changed as they were preparing for exams.

4.6.3.2 Reported Types of Use
It is possible that students err towards reporting usages which are viewed as more worthy. That said, the most frequently cited benefits to students in the Summer School Trial were revision of hard concepts, then additional note-taking, followed by revision for the exam or assessment, then review of material they had missed in class through inattention. Time Shifting – where students might skip a lecture due to work or an appointments knowing that they can catch up online - was mentioned next. Students indicate that attending paid work, particularly if offered casually/at late notice, may have been a reason for using LRs.

Finally LR use did not appear related to the timetabling of classes (i.e. early morning classes). Academic staff reported minimal or no drop in attendance.

4.6.3.3 Drawbacks and Requested Improvements
The most often cited drawback was not having lectures available soon enough after class and the second was not always having the lecture recorded (due to technical problems)). The third most common problem cited was not being able to download lectures. The most requested improvement was correspondingly to provide lectures sooner after class, followed by making files downloadable for home or media device viewing, and then having every lecture available. A lower proportion of respondents also specifically requested file formats suitable for different devices and for files to be available in a variety of file sizes. This indicated some respondents were keen to watch lectures on home PCs and on portable media devices such as iPods. One student mentioned that they wanted to be able to watch the lectures on the bus.

A significant proportion of students wanted to see lectures accessible via the LMS and a minority of students, those in a class where the instructor used the whiteboard and document camera often, wanted to see this material included in the lecture recording.

Additional drawbacks identified included slow playback, difficulties with locating specific material within a lecture recording, sound quality, the length of time it takes to review a lecture, not being able to participate in class activities or ask questions and difficulties in interpreting the lecturer.

4.7 Discussion of Trial Findings
It is interesting to note that the drawbacks did not discourage students from using online lectures. Very few respondents wanted an improved web interface and there were few comments about sound issues, even though sound recording problems were reported with reasonable frequency by staff undertaking the Trial. According to our data, only students who could not get lectures to stream at all stopped trying to watch them.

A minority of respondents identified not being able to hear participants in the lecture, such as questions asked or the lecturer's answer as problematic. This point indicates that there is some recognition of the value of hearing class participation in learning, over and above the content of the lecture itself. The general quality of the comments received indicates that students view online lectures as a valuable learning tool for revision and review but not as a replacement for actually attending class, asking questions and interacting with instructors.

5. SEMESTER ONE PILOT
From March 3, 2009 a Pilot running Camtasia Relay was deployed in the UABS across all core BCom papers. The initial uptake amounted to a total of 17 hours of lectures recorded in the first week. As the semester has continued, there has been increased uptake of recording by staff across the school in both Bachelor of Business and Information Management (BBIM) and General Education papers and BCom papers at Stage Two and Three. We are now recording 30 hours of lectures a week and are scheduled to record 36 hours from the first week after the semester break.

5.1 Platform and Deployment
A (rapid, iterative) design science methodology has been used for the Pilot [8]. Our choice of platform and our decisions about what features to enable as the Pilot has rolled out have been based on feedback from users from the Trial and throughout the Pilot.

The platform being used in the Pilot is Camtasia Relay. Relay has greatly simplified what is required of academic staff when recordings are undertaken, decreased our turn-around times on the

production of files, and the workflow that we designed in conjunction with the platform has allowed downloading of files suitable for both PC and portable media player viewing. As we neared the end of Semester One, we tested a new version of Relay that runs entirely off a 'pen drive' inserted into the USB port of the e-lecturn. We no longer need duplicate systems.

5.2 Staff Issues and Responses

Some academic staff at UABS were initially resistant to the recording process. According to ILT staff observations, this related to a variety of factors. Staff also voiced concerns about the added load placed on them by having to learn and use the technology (both hardware and software), copyright and intellectual property, fears that recording would be made into mash-ups on Youtube or similar and watched by other staff, possible pedagogical implications of the technology and fears about dropping attendance. These concerns mirror those found in other trials and surveys undertaken at other universities [11].

5.3 Student Usage

Extensive information about student use has been available from the lecture recording file server during the Semester One Pilot. We have access to information about individual users, their various requests and the timing and frequency of these requests, and the operating systems and browsers that are used most often.

Camtasia Relay is set to provide an .mp4 (ipod) and .wmv file for each recording. We have discovered a surprising preponderance of .mp4 use, leading us to infer that students may be taking the opportunity to use itouch and ipod devices to view lecture archives away from their desks.

Based on information from the server logs, also backed up by what we know about "traditional" usage, the number of Windows based PCs to Macs (including iTouch and iPhone) to Linux is exactly 96.07% to 3.78% to 0.15% respectively. It is safe to assume that most windows based users will opt for .wmv as it is natively supported on their system without the need for special codecs or players. Also, .wmv is a much higher quality recording than .mp4 (1024x768 as opposed to the 640x480 of the iPod format), while being less than 1/3 the storage size. It is easy to see that .wmv is the better choice for the majority of desktop or laptop users, especially as students access videos from home approximately 50% of the time and thus potentially incur a higher cost if they download an mp4. The fact that .mp4 downloads are roughly 47% the number of .wmv makes the proportional use of .mp4 extremely high. Based on our data, 96% of.mp4 usage is for iPod only, suggesting a surprisingly high student use of portable media devices. In fact, iPod use may be even higher than this indicates – in our data, .mp4 is a one-off download per device per user as opposed to the .wmv download count which includes "click to stream" for quick catch ups as well as download hits.

5.4 Faculty Administration

Many universities proactively seek to provide students with an enriched learning experience. The provision of LR can be a simple, inexpensive solution. In our Trial and Pilot the students' enthusiasm is persuading even reluctant lecturers to 'get on the band wagon'. We would encourage SIGCHI promote research exploring the significant impact LR has on learning and instructional design & delivery [6] [11] [12].

6. ACKNOWLEDGMENTS

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