E-lectures Within an Integrated Multimedia Course Design

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INTRODUCTION Myth has it that once upon a time lecturers in universities read their lectures from handwritten manuscripts which were dusty with age. Students scribbled these lectures down in the lecture halls as best they might in a bizarre mimicking of the medieval scriptorium. Later the blackboard was available for the lecturer to jot down enigmatic words like *Goethe, empiricism, the Enlightenment,* and *mass* with the double *ss* underlined. Some lectures used the new technology of textbooks. Then came the overhead transparency with its wonder of coloured pens.

There is another myth: that new technology will make the face-to-face teacher obsolete, that you will get a better education watching a professor at Harvard who is a leading luminary give great lectures while you attend the lecture live in real time on the Web. When radio arrived, when television arrived, and when computer-aided instruction became possible, similar claims were made.

These are significant myths in that they constitute a part of popular culture and are thus difficult to influence. They are consequently significant in that they influence public opinion and, through it, political opinion and public policy. Neither set of myths is supported by the actual business of teaching and learning.

Dusty old professors could be brilliant, inspiring teachers and many were first rate at constructing a curriculum that met the objectives they had for a class. Sitting in front of a monitor watching someone far away can also be boring. Live and in real time is not actually live at all.

However there is no doubt that new technologies can significantly aid student learning provided that their use is sensitively tailored to students' learning needs, provided that these needs are not seen as students' expressed needs but their real needs. Frequently only the teacher knows what those are, since the teacher knows the contents of the course, where the learning problems are, and how they need to be addressed. In this paper we describe an attempt to use available technologies in an integrated way to make a number of learning pathways available to students. We will discuss the way in which course objectives must be carefully examined for the appropriateness of particular pedagogies.

ELECTRONIC AND OTHER RESOURCES Before outlining how electronic resources have been put to use in the two courses that are the case studies of this report, it is important to see what place such resources play alongside all the other resources that exist. We have suggested earlier that

a careful analysis of new and old technologies is essential if they are to play their appropriate part in educational delivery. Furthermore changes of educational technology are not new, as we suggested earlier, nor is the claim that new technologies will replace earlier ones. Again, that being so, the realistic analysis of the potential of new technologies is essential. Here we will report on the use of Web-based resources for teaching, all of which exist alongside and are parasitic on existing technologies. As shown in Table 1, each Web-based technology that we will look at in more detail later has advantages and disadvantages. None replaces any of the others. Each supplements the others providing additional learning opportunities.

Table 1   Learning resources and presentation pathways

Way to Learn	Medium 1	Medium 2	Medium 3	Web-Based Medium
Lectures	Attending a live lecture in a lecture theatre	Hearing the lecture audio on cassette in the library		Hearing the lecture as part of a video online
Lecturer's notes	Seeing on overhead projector	Seeing copies in library on short-term loan		Downloadable file on a server
Lecturer's PowerPoint presentations	Seeing on overhead projector	Seeing as presentations from laptop and projector in lecture theatre		Seeing as part of a video and in downloadable form
Course handouts	Paper copy in lectures			Downloadable form
In-class tests	In lecture theatre on paper	Trial versions for self-testing		Self-administered quizzes
Practical exercises	In lectures	In tutorials	Using textbook	Self-administered quizzes
Asking questions	Before, after, and during lectures	In office hours		Through e-mail
Discussions	In the student caf	In tutorials		Online
Textbook reading	On your own			

FIRST-YEAR LINGUISTICS COURSES AT UNIVERSITY OF CANTERBURY

Linguistics at the University of Canterbury is taught in two one-semester courses. Both courses are taken as stand-alone ones and as avenues to further study. The first is an introduction to linguistics using English as the language of exemplification. That being the case, the course is cross-listed as an English-language course attracting a significant proportion of non-native speaker students. It also attracts students who are studying other languages, as well as students taking the course for general interest. The course content consists of three sections looking respectively at English words, English

sounds, and English sentences. The approach is partly expository and partly analytic. Students must acquire a pre-theoretical conceptual understanding of how languages work and the terminology that goes with the study of languages. They must also learn analytic techniques such as phonetic transcription and grammatical analysis. Most students have done no linguistic study previously. The course is the prerequisite course for all subsequent linguistic study in the linguistics programme.

The second course follows on in the second half of the academic year. It deals with how languages operate in a social environment. The first half of the course looks at the individual as a social being operating with language. It examines, for example, how humans use linguistic politeness techniques. The second half looks at language in nation-states. It begins with a study of five different countries and their language history and policies and then turns to issues such as linguistic human rights in a nation-state. The objectives of this course are educative in a broad sense and partly attitudinal. It aims to make students more aware of and open to seeing the language issues they themselves face as individuals and as citizens of a nation-state. The course provides a background for those who are going on to study sociolinguistics at higher levels.

THE WEBCT PROJECT The WebCT project for these two courses began in 2003 as a result of an initiative by the first author. Lectures for Ling101 and Ling102 had previously been recorded and the cassette tapes placed on reserve in the library along with the paper versions of the overhead transparencies used in the lecture theatre. It seemed likely that a better way could be found by recording the lectures, saving them as MP3s, and making them available on the Web. It also appeared likely that a way might be found of using PowerPoint presentations and saving the audio as a voiceover for the recording. The first author approached the IT department and subsequent investigation by the second author suggested that SnapzPro for the Macintosh, a screen capture utility, might serve the purpose. This technique was trialled in the second semester course with the help of technicians from the IT department including specialists in WebCT, streaming video technology, and AV. Numerous failures of one kind and another led to the evolution of viable techniques. By the end of the semester a number of QuickTime movies had been made and placed on a streaming video server, and student reaction was sought to determine how students felt about this technology. They were enthusiastic.

The aim of this part of the project was to replace the library recordings and text with integrated audio and video movies. The advantages were clear. Students could access the movies on the campus network more than one at a time and at any time that they could get on-campus access to the network. Access was therefore more flexible and audio and video were better integrated since students needed previously to integrate the overheads and sound themselves. Using QuickTime was also better for selective use of the recording, since the slider that enabled one to move through the movie always showed the current PowerPoint slide, thus serving as an index. So a student who might wish to see only a table that had been missed and hear the associated talk, rather than having to use the fast forward and reverse buttons on a cassette recorder until the desired section of talk was

found, could skip through the QuickTime movie using the PowerPoint slide as index. The movies also allowed students repeated access to the lecture expositions. They allowed students who had been ill to hear the lectures afterwards. They were available for revision.

However, students might also want the written notes and so the PowerPoint files themselves were placed on WebCT to allow students to download these. Most students have done so and printed them often using the form that allows notes to be written alongside. The result is that students attend to the lecture rather than their note taking and lectures have been more interactive. Most students have also read the notes beforehand and therefore the lecture can provide more detail and support for the major points made on the PowerPoints.

Since WebCT was to be the significant technology for the course, the first author also created some 30 quizzes to provide online tutorials for students. These give instant feedback on student understanding of terminology, concepts, and capacity in the required analytic techniques. They are an extra. Ten face-to-face tutorials are also provided, as are in-lecture class exercises and exercises in the text part-authored by the first author of this paper. Students were asked to provide feedback to the lecturer on the quizzes, and numerous corrections and improvements were made as a result of students using the quizzes and e-mailing the lecturer.

As a result the front end of the site has icons for the normal course outline while the course content icon contains all the PowerPoints in order as the topics are presented. Each is listed under the topic in the lecture schedule. Selective

release makes only the current set of topics available at the beginning of a section break. The movies are playable from a further icon which shows the date of each lecture rather than the topic since a lecture topic can overlap dates and often a topic will be finished in the middle of a lecture period and the next topic will be commenced. Quizzes are available from another icon. These are also selectively released to coincide with the period after the topic had been dealt with in class, so students could only try their skills in areas they had already covered in the lectures.

At the end of the 2004 academic year, a grant was obtained for increasing the question pool for each quiz and providing feedback on all the incorrect answers to aid learning. In this way the quizzes will operate as a mastery learning opportunity. Many students are clearly attracted by this opportunity.

Usage of the site for Ling101 was very high. It seemed as if it would be an adjunct initially, but in the first two months many students had more than 30 hits on the site and some as high as 200. It was notable that many of those with the higher access rates had non-Pakeha names suggesting that non-native speakers found the WebCT resources particularly useful.

Student results were also interesting. Ling101 has previously had a bimodal distribution with a strong peak at the top of the mark distribution and a somewhat smaller one in the fail range suggesting, rightly, that Ling101 is a mastery type course. Those who get it do well; those who don't, don't. However, in 2004, the distribution was trimodal with the same peaks as normal but with a further peak in the B range, suggesting that the

online resources may have pulled some of the students who would previously have failed into a respectable pass. The tests and examination were identical in character and format to those in past years. It remains to be seen if this alteration to the distribution maintains itself in future years.

A grant was also obtained in 2003 for work on a further technique to be implemented for the Ling102 course. Since that course is interested in individuals and their social circumstances, the first author decided to use folk linguistic intuitions as a starting point for many of the topics. Mastery quizzes could not play such a central role since the course material was not so much to be mastered as understood and contemplated. So a survey technique was developed, again using WebCT, where students were asked their opinions on various matters relating to language and their views were fed back to the class. The survey tool provided by WebCT was used to gauge student opinion on issues relevant to the course. For example, students were asked to rank suburbs of Christchurch in terms of the quality of the English spoken there. Not surprisingly, the evaluation they gave correlated positively with mean house prices, showing that the students who live in Christchurch have well-developed folk awareness of socioeconomic variables and these are correlated with standards relating to language use. Lectures then focussed on the evidence for standards and correctness.

We now turn to the technical backdrop for the courses described above.

WEBCT AS AN E-LEARNING HOST
The University of Canterbury uses WebCT Campus Edition v4.0. Most lecturers begin by using WebCT as a delivery vehicle for syllabus and calendar and for copies of lecture notes or other written materials. As staff become comfortable with the medium and its capabilities, they often begin to experiment with the many other interactive learning tools that WebCT offers. The most popular of these are discussions, assessment (quizzes, tests, assignments), and multimedia presentations.

WebCT's role in the presentation of multimedia varies, according to the size of the files involved. Small video and audio clips and pictures, up to around 200 or 300kb in size, are treated just like any other file type. Staff upload the files to the WebCT server, then add a link to these which students click to view the object. If a multimedia file is larger than 300kb, the download time becomes problematic, and larger files also put pressure on the students' limited disk allocation. A further factor is that the entire file must be downloaded before it can be viewed, which leaves students staring at a download screen just when their interest has been aroused. This is a disruption to the learning process, so once file sizes become large other alternatives are employed.

Streaming video differs from standard video clips in that the server sends the picture in small packets, so the replay can begin as soon as the first packets have arrived. If the viewer jumps to the middle of the movie, the server just sends packets from the middle; access to any part of the stream is very rapid, while keeping network traffic at very low levels. Work on streaming video began in late 2002, and delivery of streaming video began in early 2003.

At the same time, the third author was experimenting with Camtasia (http://www.techsmith.com/). This software captures the computer screen, or designated parts of a screen, along with voice narration. In the linguistics courses, PowerPoint slides and voiceovers are captured during lectures. The final video, with title slides and other enhancements, can be saved in many formats. The preferred format is Macromedia Flash, which produces a Web page containing a Flash animation, which is very economical in size.

WebCT acts as the gatekeeper to control access to a powerful Macintosh server, running QuickTime video streaming software, on which the videos are stored. This guarantees that only students enrolled in the course can view the material. In WebCT no ongoing work is required as the store of lectures grows; all that the lecturer does is to create one link to the HTML index file on the Macintosh at the start of the semester. This link opens the index page on the streaming server, and students click the lecture they want to view. To the students, this process is seamless; the video clip starts playing within the WebCT frame, so students have no idea they are viewing material on another server.

The video server is not open to the Internet outside the campus network, primarily for security reasons. In addition, the video stream requires a fast connection to deliver the pictures without halting and jerking. Video compression could be increased even further, but this would compromise the on-campus viewing quality. However, the WebCT server is available off-campus, so all other aspects of the WebCT course are available any time,

any place. Surveys and server logs show that students really do value the ability to do their work at some very odd times, which is an endorsement of this addition to flexible learning.

THE STREAMING VIDEO SERVER

Apple's QuickTime Streaming Server (QTSS) technology is used to host all streamed video content. Currently hundreds of hours of video content is hosted for 21 degree-related courses. This video content is accessed thousands of times per week and is almost constantly in use 24 hours a day, 7 days a week. The type of content includes videotaped lectures, legacy educational material imported from VHS tape, QuickTime movies of PowerPoint presentations created using screen-capture software, videotaped free-to-air television broadcasts, and mock radio broadcast material created by journalism students. In the case of videotaped lectures, our current work flow has a turnaround time of approximately one day, from the time of filming to the time the content is available on the streaming server. Turnaround time for the other content varies, depending upon the post-production work needed, but in the case of PowerPoint presentations material can be ready to host within hours.

All content is made available through Web pages that are linked back to the relevant WebCT course material. We have specifically chosen Real Time Streaming Protocol (RTSP) streaming as the mode of delivery, as opposed to the more traditional download-and-play, because it provides a level of protection against illicit use of the material. With an RTSP stream, as with a downloaded movie, the content can be viewed on-demand and the user can jump both forward and backward within the movie.

However, the Web browser plug-in does not cache the content in a usable form, so it is not possible for the user to keep the content and use it in a way the lecturer did not intend, e.g., by selling it to a third party.

COSTS AND BENEFITS The high usage figures for the site are indicative of its having a high acceptability rate. Educationally, the benefits are relatively easy to enumerate. Students appear more involved and motivated by having the extra resources available to them. This shows in their survey assessment of the two case study courses and the lecturer. The lecturer has had the highest student evaluations he has ever had (4.8/5 and 4.9/5 on the University of Canterbury's standard survey) and very positive comments about the innovations. The increase in these scores seems to have had more to do with the WebCT resources than any major changes in the lectures or course content. The change in the pass distribution for Ling101 is an indicator of success. Fifteen students from Ling101 went directly into the second year class after only one semester at university. They coped well with the considerably higher level of work in that class.

Long-term it is more difficult to assess what the benefits for students will be. It may be presumed that the richer array of learning opportunities will lead to better retention of the conceptual content and skills acquired, but it is not yet possible to assess that.

The amount of extra work required to construct these resources is considerable. Somewhere around one to two hours is required to construct each quiz. Correction of errors on a sporadic basis does not seem time-consuming but probably is. Building the question database up to the point where there are enough questions in it to make the random selection of questions in each quiz taxing enough is also time consuming. Initially only 10 or fewer questions were constructed for each quiz. The aim is to have 30 available for selection. Furthermore, with all the multi-choice questions, feedback on the incorrect options will also take time and effort. That said, however, once these additions are complete, the resource should be reasonably durable. Basic linguistics courses all seem to need the kinds of competencies that the quizzes attempt to create.

The QuickTime movies (PowerPoint slides and voiceover) are not expensive to produce. A laptop is needed to drive the presentation and the software to record them is not expensive. A PA system or conference recorder is needed to feed the audio back into the laptop and a radio microphone can feed the speaker's voice into the recording system. Dubbing takes about 15 minutes after the lecture and post-production takes about another 10 minutes. All going well, the lecture can be up on the server half an hour after it was given.

A different approach used at the University of Canterbury involves lectures being filmed on digital videotape by a cameraman at the back of the lecture. Here the video is not of what is on the screen in the lecture theatre so much as of the lecturer at the front of the class as seen by someone sitting near the back of the class. The first author, having seen the full lecture recording technique, decided the voiceover technique was likely to have more immediacy for students and thus to be more effective as an adjunct source of exposition. Costs of

the full movie-making technique are also higher. They include the cost of the cameraman and post-production by AV staff. The immediacy of the voiceover technique is also lost since the movie presents a distant person rather than a voice alone.

However, many things can go wrong with the voiceover technique. The set-up and checking routine at the beginning of the class takes a good five minutes and the opportunities for forgetting something essential or not plugging it in are not to be underestimated, particularly at a time when one is also readying oneself for a class. Leaving one step out means no movie. Furthermore, there are no error messages and if one forgets something, then it is only later that this is evident. Sometimes the recording appears to crash under its own steam. The files are large. It is not surprising that there is the occasional crash.

LIMITATIONS There are courses for which the outlined resource strategy would not work nearly so well. In the second year syntax class taught by the first author, a great deal of time is spent drawing diagrams on an overhead projector. No doubt with a drawing tablet these drawings might be made into QuickTime movies but the chances are that they would look messy. Unless there was intelligent software behind the process, straightening out the lines and doing optical character recognition on the lettering, the movies might be more of a hindrance than a help. In this second year class, students also spend time in class doing exercises. A movie would need editing to cut such episodes but they are an essential element of the course and so students would need to be under no illusion that they had missed essential parts of the course if they attended only

to the movies. That is not to say that technological innovation may not allow these problems to be overcome in future.

It should be clear that these technologies have advantages. They also have disadvantages pedagogically. There is no technology like a book. Ling101 has a text and the Web is not a substitute for it. It has a lecturer who, when he lectures, is genuinely live as opposed to technologically live. A movie of a person is not the same as a person, just as a live musical performance is not the same as the best CD recording of that performance. Tutorials with a live tutor provide learning opportunities with a feedback that cannot be given by a mechanical contrivance. Even e-mail feedback is not as immediate as a present human can provide. The live tutorial is thus superior in some respects to the learning opportunities that be gained from online quizzes. The point to be taken is that each technology has its own character and the best learning environment is gained from exploiting each for what it best offers.

POSSIBLE FUTURE DEVELOPMENTS The first author hopes to make a full CD version of all the Ling101 lectures once teething troubles are overcome and a full set of lectures can be recorded. This will have the advantage that students who are not able to gain access to the broadband campus network can also use this resource. If the quizzes can also be provided on this medium then they will present an integrated extramural package when used with the text. Intellectual property issues will have to be dealt with.

As Web-based technologies improve, they can be exploited for the benefit of students. They will not replace other

technologies. No previous technology has. Nor are they cheaper. Education doesn't come cheap. In that it is like heart bypass surgery. Techniques may improve but the human input must always be there. If it isn't, worthwhile learning is not as likely to happen.

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