

# “Internet on a CD”: Creating learning objects with QuickTime for sign language students.

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**Abstract** In the rush to get ‘online’ the humble compact disk (CD) is often overlooked as an alternative method of delivery for e-learning. For content that contains large files such as QuickTime movies, the CD offers real benefits for both students and teaching staff. The CD has advantages over traditional methods and Internet delivery.

Using the guiding principle of “a simple solution for effective education,” a new mode of teaching was developed for the delivery of sign language movie samples. QuickTime movies have functions that are ideal for the repeated learning of a skill. Incorporating QuickTime movies into interactive Web pages, published on a CD, adds value to the educational experience and empowers students by giving them the tools to carry out self-directed and paced study.

This paper outlines the development of an “Internet on a CD” resource for sign language interpreters. Seven units of learning, two life stories and two formative assessments were included on the CD. Student and staff feedback has been positive and the projects principles allow it to be adapted to other subject areas with ease.

## **Introduction**

The Deaf community is a socio-linguistic minority in New Zealand societal who often rely on Sign Language interpreters to actively participate in their society roles. Interpreters work in community interpreting, which includes areas such as medical, legal, counseling and educational settings. The school of languages at the Auckland University of Technology (AUT) offers a two-year Diploma in Sign Language Interpreting and a one year Certificate in New Zealand Sign Language (NZSL) and Deaf Studies.

Each of these courses has a yearly intake of 18 students. On average, only one of these students would be Deaf. Many of the other students would have links with the Deaf community through family, friends, work colleagues, school friends and as professionals such as teachers and social workers. Most students are planning on diversifying their employment opportunities through acquiring Sign Language interpreting qualifications and skills. Both groups study a common paper, NZSL 1, which introduces more complex aspects of signing.

Prior to 2003, students enrolled in NZSL 1 borrowed VHS tapes of tutors and subjects using sign language. Students viewed and translated from these tapes as practice during their

course. This method allowed only one student to view each videotape at any one time and also led to wear and tear on the tapes. A significant amount of staff time was taken up duplicating, distributing the tapes and tracking their use.

NZSL is an indigenous language of New Zealand, used by the Deaf community. Being a spatial language it has no written form. This can make analysis of the language very difficult as the aspect being focussed on, such as a particular handshape, movement or inflection, only presents itself for a moment. Isolating this moment from videotape is also problematic, with picture searching providing a rather clumsy and inefficient mechanism for this purpose. Pausing clips often results in a 'jerky' image on the screen and slow motion rarely has any fluidity.

The problems with videotapes can be overcome by using digital video clips. QuickTime (Apple computer, Cupertino) is a high quality, cross platform multimedia application that is freely available, interfaces with most Web browsers and is ideal for showing movie clips. QuickTime has already been used creatively to provide solutions in e-education projects (Crean 2001, Pearce and Livett 2001, Seagrave *et al.* 2001).

Multimedia and text based computer options have been promoted as a way of educating Deaf students (Rathinavelu and Shankar 2001). A comprehensive search of the Internet found only three organisations (ASL 2001, Hanke 1995, Michigan State University 2000) using QuickTime with Deaf people. All of these Web based resources are in a dictionary format for sign language with only one word or a few words describing a situation being used. In contrast, sign language interpreters' deal with phrases and sentences in their profession. Therefore, there is a real need for a resource that meets their usage. In addition, none of the other projects, to the authors' knowledge, actively promote the use of the built-in features that QuickTime has that make it suited for learning sign language.

CD's have been used for a number of years as a medium to deliver educational material. Some critics have suggested that the growth in bandwidth will allow the Internet to supersede the CD (Bates 2001). Despite increases in bandwidth the majority of students access the Internet via a 56k modem connection. This is not ideal for video streaming and can lead to frustration.

As sign language is regional, we planned to develop a New Zealand resource for the Deaf through the digitisation of existing VHS video samples into QuickTime movies. These would be incorporated onto a CD with supporting interactive exercises in the form of a series of Web pages that can work on any computer with access to a Web browser. This would provide a viable alternative to Web-based delivery of content and make a valuable student-directed learning tool. The QuickTime movies created will become building blocks to be used for this CD, and future school of languages projects (both static and dynamic).

Melding the QuickTime media assets with interactive hypertext mark-up language (HTML) would develop learning objects. A learning object (LO) can "be defined as a unit of instructionally sound content centred on a learning objective or outcome intended to teach a focused concept. A LO may contain opportunities for practice, simulation, collaborative interaction, assessment, and educational resources. A LO is constructed from Media Assets, such as paragraphs of text or html, screen titles, captions, video, animation, diagrams, and sound narration." (Heins and Himes, 2002).

The goal was to produce a ‘blended learning’ (Valiathan 2002) CD using a constructivist theory perspective that would compliment the face to face lessons held with the students. While the CD does not allow learner to learner interaction, it does promote learner to content engagement. The CD encourages active learning that is self paced and becomes a tool to broaden the students sign language vocabulary. One risk for the project was that transposing current content into a new media would be simple duplication (Burr 2003). The unique advantages of the new media offered enough benefits to proceed.

## **Method**

The CD developed was for the NZSL 1cpaper. As it was new teaching material based on existing paper and videotape resources, ethics approval was not required.

The CD is a cost effective way to distribute multimedia material to students (\$3.50 per copy with printed label and jewel case). While the cost of producing one CD is minimal, most of the time and expense in such projects is in the initial development of the CD. Digitising analogue video is also time intensive.

The CD is small, portable and each student can have their own copy. Similar CD projects have replaced photocopied paper notes costing up to \$20 each. The environmental impact is also reduced when compared to paper printouts. Some students still prefer the tactile aspect of paper notes, but were encouraged to expand their study skills by embracing ‘screen study’.

iMovie 2 (Apple computer, Cupertino) was initially used to digitise the existing VHS video samples. A digital video camera was used as an analogue to digital converter. After editing and adding titles, the clips were exported as a QuickTime movie to be used in the project. A resolution of 480 X 360 pixels at 15 frames per second was selected as the optimal movie size for our project. This is a larger resolution than is used in most Web based QuickTime movies, but the larger size was needed to show the intricacy of sign language.

QuickTime has some built in features that make it custom made for our purpose. When embedded into a Web page, the movie has a controller at the bottom of its screen incorporating ‘play’ and ‘pause’ buttons. A sliding ‘playhead’ shows you the progress through the movie and allows users to ‘scrub’ or drag through the movie to the part they wish to see, or quickly review a sign. Once the movie has played it can be viewed again instantly by clicking on the ‘play’ button.

The most powerful built-in feature that QuickTime offered was the ability (when the movie is paused) to ‘step’ through the movie one frame at a time by using the right and left directional arrows on the users keyboard. This feature works on all computer platforms tested and through a Web browser, allowing the students to repeatedly view subtle movements at their own pace, ensuring that they understood the movement. It increases the students’ ability to identify and isolate linguistical aspects of sign language.

The Sorenson 3 codec was used to compress the movie as it was found to be more compatible. The MPEG-4 codec was initially used, but many of the PC’s at our University had not been updated to allow the movies to work. In future the MPEG-4 codec may be used as it produces smaller sized files than that obtained with the Sorenson 3 codec. Digitising the video had the added benefit of preserving them for future generations, as the video clips are a valuable resource.

As video is designed to be viewed on a television (interlaced), the movies did not look as sharp on a computer monitor. These interlacing artefacts (Luke, 2003) made the movie appear to have horizontal lines that did not match up. This made the image detail harder to see, especially with movement. This is unwanted when the clarity of a hand sign is being observed.

Final Cut Express (Apple computer, Cupertino) was then used as the prime video editor. The deinterlacing filter was applied and this greatly improved the quality of the movie clips. Another advantage to using Final Cut Express was the ability to use the crop function to remove aspects of the movie that were not needed such as left, right, top and bottom of the scene around the subject. This greatly reduced the QuickTime movie file size.

The colour corrector video filter of Final Cut Express was used to enhance the movies. Many of the existing VHS clips used were filmed in poor lighting conditions. The 'whites' slider was moved to the right to lighten each frame of the movie. This improved the clarity of each clip and also catered for Windows based personal computer (PC) monitors and their gamma settings. PC monitors usually make any image or movie produced on a Mac (Apple computers) look slightly darker. As most of our students would access the CD on a PC we purposely made the movies slightly lighter.

Dreamweaver (Macromedia, San Francisco) was the HTML editor used to design the supporting Web pages that the movies were embedded in. Dreamweaver was chosen as Macromedia also supply free from their Web site, the Coursebuilder extension.

Coursebuilder is a 'wizard' interface that creates the JavaScript within the Web page. It does not require any plug-in or applet downloads to view the interactions. It allows the creation of true/false, multi choice, text entry, drag and drop, timed response, scoring and customised interactions within Web pages (Hess and Hancock, 2001).

Interaction was promoted by asking questions about each of the video clips and providing activities that could be done surrounding the skills learnt in each of the structured, graduated lessons. Feedback was provided by customised text messages that the student activated when making their answer selection. Positive verbal reinforcement was given for correct responses, correction and direction for future study was given for incorrect answers.

Two previous formative exams were also included to assist the students' preparation for the traditional assessments during their course. The CD assessments were presented in the same format as the traditional assessments so that the students had more familiarity with the assessment procedure.

The finished CD contained 193 Web pages, with 118 movies, totalling 50 minutes of video. These resources totalled 330Mb thereby leaving room for future development. Using the entire space on a CD could yield twice as much content. Seven units of learning, two life stories and two formative assessments were included on the CD.

The CD was distributed to the students during an introductory session where the CD's features were demonstrated to the class. The students were encouraged to use it at home (if they had a computer) or on campus, where computer labs are made available for student use.

## Results

After four weeks a short written survey was conducted to obtain student feedback on the value of the CD as a resource. The students' identities on the responses were kept anonymous. 36 students are enrolled in the paper, 21 returned the survey. All of the students said they would recommend this type of resource in the future for other modules.

The students were asked to rate the overall use of the CD on a Likert scale from one (hated it) to five (liked it a lot). 62% rated it at five and 38% rated it as a four (liked it). There were no scores from one to three.

When asked to write comments on what aspects were found most beneficial about the CD, the three most popular comments from multiple respondents were:

- *"You could stop it whenever you needed and rewind it for another check"* 28.6% of class
- *"The quizzes and question and answer sections"* 28.6% of class
- *"You can take it at your own pace"* 9.6% of class

A range of positive individual responses were also given:

- "Being able to control the speed of the signing was beneficial"*
- "Relating the questions to the video was a good way to learn"*
- "Gave us practice of comprehension"*
- "We could ask lecturers questions after watching the video clips"*
- "Visual practice at home"*
- "The Internet style"*
- "Watching different peoples style of signing"*
- "Instant feedback"*
- "General body language and facial expressions"*

When asked to write comments on what could be changed to improve the CD, the three most popular comments from multiple respondents were:

- *"Include more activities with more video, narrative and content"* 14.3%
- *"Make the video clips slightly smaller so questions could be beside the video"* 14.3%
- *"Make the video quality better"* 9.6%

A range of individual responses were also given for what could be improved:

- "The people asking the questions being filmed as well"*
- "Stop the movie from starting straight away, let us start it"*
- "A quiz or narrative where we write the story as they are telling it"*
- "More finger spelling"*
- "Updated versions for future papers"*
- "A better explanation of how to use the CD in the computer"*
- "On a floppy"*

Most of these comments are about enriching the content and not the method of delivery. The feedback will be incorporated to improve the quality of future projects.

## Discussion

HTML was used in developing the CD for a number of reasons. It allowed students to work on their computer with the CD and not have to be connected to the Internet. The movies

would be bandwidth intensive over the Internet, but they load in a very short time off a CD. The browser format is familiar with most students and they can navigate around it with ease. Web pages with the inclusion of QuickTime movies and Flash files have become so sophisticated they can rival the look of a custom made application CD. If needed, the CD could make an instant transference to a Web site for use on an Intranet or the Internet.

To enable readers of this paper to view the CD it has been loaded onto a Web server. Be aware that the movies may take some time to load. It is available to view at: [http://freshedu.aut.ac.nz:1680/NZSL1\\_2003/index.htm](http://freshedu.aut.ac.nz:1680/NZSL1_2003/index.htm)

While an interactive CD could have been developed using other applications such as Director (Macromedia, San Francisco) one of our goals was to keep the development of the CD a 'simple solution' and make any learning curve for staff as small as possible. AUT has adopted the Blackboard learning management system (LMS) and this has the facility for an Internet driven Web page to read movie resources off a CD that the student has inserted in their CD drive. Video clips on the CD could be integrated with the Blackboard platform in the future.

Teaching staff were asked for feedback on their experiences of using the CD as a teaching aid. Academic staff were not prepared for the range of technical issues that arose from student use of the CD. Some computers used by students at home and at the University had older browsers and versions of QuickTime that did not allow all aspects of the CD to work. Often an upgrade would solve this but staff spent time debugging these issues with students and technical staff.

While staff were involved in the initial development and subsequent beta testing of the CD, in future more time will be spent in preparing staff to answer students questions. An effort was made to forge a strong connection between the curriculum and the contents of the CD. Each unit on the CD was designed to support what was being taught during the same unit in the classroom. All staff involved in the project saw positive value in the CD resource and plan to develop more for other papers in the future.

During the development of the CD, applying this model to other teaching areas was also promoted. In the principal authors Division of Sport and Recreation, lecturers are already planning on using this model in anatomy, biomechanics, coaching, nutrition and exercise prescription papers. Since the project has been shown to staff and interested parties, the Royal New Zealand Air Force Parachute Training and Support Unit and the AUT Nursing School have expressed interest in using a similar model of video clips on instructional CD's that they are planning to develop (personal communication, March 20, 2003).

QuickTime VR has been used in other educational projects (Phillips *et al.* 2001) and is an area of future exploration for our team. QuickTime VR could aid sign language tuition in the more complex areas of linguistics and ethics. The possibilities of offering walkthrough interactive scenarios could allow the students to work with a range of characters in a lifelike environment.

## **Conclusion**

The CD is a valuable resource, and has sparked future areas of development. The inherent features of QuickTime allow students to 'step' their viewing of the clips to observe the skills being demonstrated. Innovative use of existing technologies has produced a usable learning option, that is tailor made for the needs of sign language tuition.

The ability to view the CD on any computer with a web browser gives the students “the provision of (time, place and pace) access to learning.” (Health Faculty, 2003) Until more students adopt broadband Internet connections, the CD is a viable delivery medium for large teaching content files.

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