

Accessibility in Online Learning: Audio and Video



Kirsten Bole
Natasha Boskic
Nathan Hapke

Faculty of Education
University of British Columbia
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Chapter 1: Introduction

Background

This manual is an extension of research and work done at External Programs and Learning Technologies in the Faculty of Education at the University of British Columbia. The original Web Content Accessibility project was developed from September 2005 to August 2006, with funding provided by BCcampus. Its mission was to improve the accessibility of the



unit's distance education courses for persons with disabilities, and to encourage and educate others to do the same with their online materials.

In our second year of this project, we chose to focus on multimedia tools, specifically the use of audio and video clips in online courses. We wished to encourage the appropriate use of multimedia tools, which can be invaluable as learning tools for all students. They can often illustrate a point or explain a concept far better than text can do, and are critically important in accommodating different learning styles. However, audio and video can also become barriers to students with disabilities if used without accessibility in mind.

Several of the online Education courses included videos or audio readings. In the past, these would be mailed to the student on DVD or VHS. Some of the smaller videos had been digitized for those students who wished to watch them online.

In total, approximately 15 hours of video were transcribed and/or captioned, ranging from a few minutes to two hours in length. Their styles varied from simple subject interviews to documentary-style films and educational tutorials. The most challenging videos proved to be a series on observation of young children, as the speech was often difficult to understand and sometimes there were many voices speaking at once.

Acknowledgements

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- Mary Anne Epp and Corey Davis (BC College and Institute Library Services)
- Donovan Tildesley (University of British Columbia)
- Patricia Woods (Neil Squire Foundation)
- Our project partners at SET-BC, Simon Fraser University and British Columbia Institute of Technology

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Chapter 2: About Accessibility

What follows is a brief review of some of the basic ideas and principles of accessibility. In our previous manual, “Accessibility in Online Learning”, we detailed the steps that you could take to make a typical HTML-based website more accessible. If you would like to learn more about these ideas, please download the manual at <http://eplt.educ.ubc.ca/accessibility>.

What is accessibility all about?

Inclusivity: ensuring that all users, regardless of any disability they may have or special technology they may be using, have fair and equivalent access to all the information on your website.

If your website is not accessible, you may be excluding a segment of your audience from your content. For an academic website, if your students cannot access their course materials, they could be placed at a distinct disadvantage and their coursework could suffer as a result.

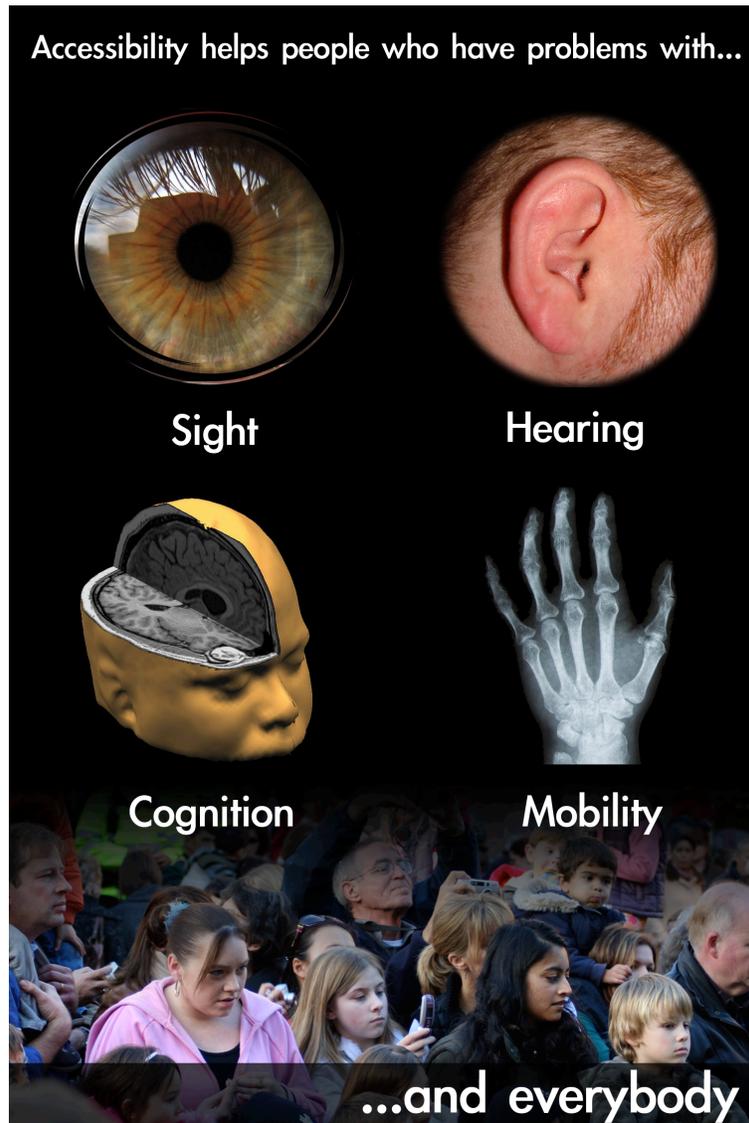
Usability: Usability is, simply put, how easy it is for people to use your site. Many accessibility recommendations and guidelines actually improve the integrity of your code and the overall usability of your interface.

For example, the Web Content Accessibility Guidelines (WCAG) recommend keeping your menus and navigation consistent on every page of your site. This improves the experience for blind users using screenreaders, who listen to the text on a website read aloud, and also for cognitively disabled users, who may have trouble remembering their path through a website. This change also helps everyone, since consistent navigation is easier to understand and use.

Providing alternatives: Many accessibility changes involve providing the same information in an alternative format. Images and videos must be described in text to be accessible through a screen reader. Audio transcripts must be provided for students who are deaf.

These alternatives can also be useful for students who do not have a disability. Students with different learning styles can benefit from information presented in an alternative format. One student may prefer to listen to a lecture rather than read it; an ESL student may appreciate being able to read captions along with a video.

Who is accessibility for?



Web accessibility seeks to address problems encountered by people with

- **Sight disabilities:** blindness or low-vision
- **Hearing disabilities:** deaf or hard-of-hearing
- **Physical disabilities:** difficulty with fine motor control
- **Learning disabilities:** cognitive issues such as dyslexia and aphasia, or issues caused by brain injury or neurological damage
- **Everybody:** Many of the changes that make a website more accessible also improve the experience for everyone else.

Accessibility Standards

There is a set of guidelines developed by the World Wide Web Consortium (W3C), a group that establishes specifications, guidelines, software and tools for various aspects of the web including file formats and scripting languages. One W3C program is the Web Accessibility Initiative (WAI), whose mission is to help make the Web accessible to people with disabilities. The WAI has developed the Web Content Accessibility Guidelines (WCAG) to address the accessibility of information in a web site. At the time of writing, the current version of the guidelines is WCAG 1.0, and WCAG 2.0 is under review. These fundamental directions are the foundation for an accessible website.

Essentially, WCAG 1.0 is a checklist for aspects of your website that need to be addressed, such as:

- Using proper XHTML and CSS code;
- Alternative text for images;
- Absolute and relative font sizes;
- Formatting data tables;
- Frames and forms.

A full description is beyond the scope of this manual, but summaries of the WCAG can be found online as well as in our previous manual, "Accessibility in Online Learning".

Testing for Accessibility

There are a number of tools available to help you check some of the more technical aspects of your website to see if it meets accessibility standards. One of these is WebXact Watchfire (<http://webxact.watchfire.com/>), previously known as Bobby. It is a very handy tool for double-checking that all your images have **alt** text, or that your data tables are properly labeled.

These tools are not the whole picture. An accessibility analyzer like Watchfire cannot tell you if the descriptions of your images make sense to a blind user, or if your page titles are meaningful. Your web site needs to be considered from a human perspective, and many of the WAI guidelines ask you to examine the context and meaning of your content more carefully.

Learning Styles

We have briefly touched on the idea that adaptations for accessibility can be helpful to students without disabilities as well. Most accessibility changes entail providing alternatives to one medium using a different medium, such as using text as an alternative to audio or video. Not only does this accommodate students with sensory disabilities, but also students with different sensory learning styles.

There are four main groups of sensory learning styles, and strategies for each style correspond to strategies used when making materials accessible for students with particular disabilities.

The following descriptions, along with a self-test and many strategies for learners, are available on the Diablo Valley College Learning Styles Survey at <http://www.metamath.com/lsweb/fourls.htm>.

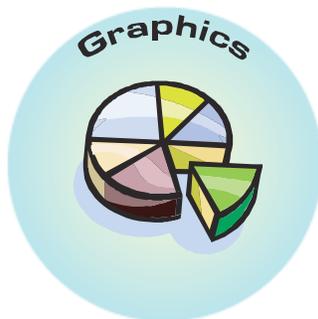
Visual-Verbal Learners



You learn best when information is presented visually and in a written language format. In a classroom setting, you benefit from instructors who use the blackboard (or overhead projector) to list the essential points of a lecture, or who provide you with an outline to follow along with during lecture. You benefit from information obtained from textbooks and class notes. You tend to like to study by yourself in a quiet room. You often see information "in your mind's eye" when you are trying to remember something.

- Use similar approaches as **students with hearing disabilities**.

Visual-Nonverbal Learners



You learn best when information is presented visually and in a picture or design format. In a classroom setting, you benefit from instructors who use visual aids such as film, video, maps and charts. You benefit from information obtained from pictures and diagrams in textbooks. You tend to like to work in a quiet room and may not like to work in

study groups. When trying to remember something, you can often visualize a picture of it in your mind. You may have an artistic side that enjoys activities having to do with visual art and design.

- Use similar approaches as **students with learning disabilities**.

Auditory Learners



You learn best when information is presented in an oral language format. In a classroom setting, you benefit from listening to a lecture and participating in group discussions. You also benefit from obtaining information from audio tape. When trying to remember something, you can often "hear" the way someone told you the information, or the way you previously repeated it out loud. You learn best when interacting with others in a listening/speaking

exchange.

- Use similar approaches as students with **vision, physical or learning disabilities**.

Tactile/Kinesthetic Learners



You learn best when physically engaged in a "hands on" activity. In the classroom, you benefit from a lab setting where you can manipulate materials to learn new information. You learn best when you can be physically active in the learning environment. You benefit from instructors who encourage in-class demonstrations, "hands on" student learning experiences, and field work outside the classroom.

- Use similar approaches as **students with learning disabilities**.

Chapter 3: Audio/Video

Why use audio and video?

Audio and video can be valuable tools in online courses. They can provide immense benefit for visual learners, ESL students and students with learning disabilities. Here are just some of the ways that video can improve a learning experience:

- Illustrating a point, providing examples, or describing a technique or process
 - A printed list of step-by-step instructions may not fully convey the necessary steps of a complicated process. Likewise, a short video of a chemical reaction, a physical process or a dangerous or difficult procedure can sometimes do more to explain a concept than pages of text could do.
 - In a language course, pronunciation is always easier to grasp when heard than when read from text.
- Conveying subtleties that don't come across in print
 - Text "comes to life" when read aloud. Consider a Shakespeare performance. The language may seem difficult and unfamiliar when read as static text, but when presented by an actor, the flow of the words is clear and the character's intent more apparent.
 - Audio readings of difficult passages can aid understanding by placing emphasis on key points or words.
- Adding a human factor
 - A video greeting to an online course can make students more comfortable by giving them a face to put with the name.

But do you really need it?

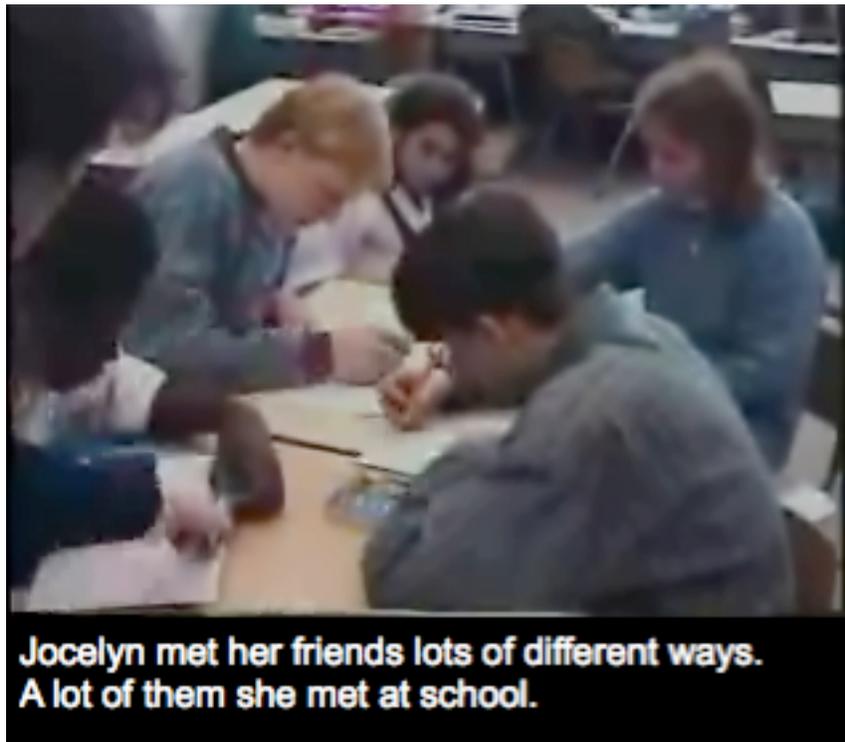
It is possible to have too much of a good thing. Not every circumstance calls for multimedia, and there are enough drawbacks to make careful consideration important. Will the video you use in your course truly add something to the experience, or is it gratuitous use of video for its own sake?

Students with slow dial-up connections may not want to spend time waiting for a lengthy video to download, only to find out that it is promotional or

entertaining, or only deals with very simple concepts they already know. Others with vision or hearing problems may not be able to get as much information from the audio or video clip as their classmates. There are steps you can take to accommodate students in these instances:

- If a multimedia element is not essential to the understanding of the course material, inform students that the element is optional.
- Transcripts offer students the option of skimming the text of the video first to determine if it's worthwhile. We will discuss transcripts further in a moment.
- If possible, let the students choose whether to stream or download the video. Streaming video starts quickly, and plays while it loads, but requires the user to be connected online for the duration of the video. Many people prefer to download the entire video once to their own computer, so they can view it repeatedly without the need for an active internet connection.

Transcribing, Captioning, and Described Video



While multimedia opens up many opportunities for learning, it is critical to remember that it can also close doors for some people. To this end, it is important to include transcripts and captions for each audio or video clip,

as an alternative for those who cannot access the information contained within the media item.

Transcript: the conversion into written, typewritten or printed form, of a spoken language source.

Caption: text displayed alongside a video, which describes all significant audio content in the video.

Descriptive video or audio description: an additional audio track which narrates the activity on the screen during natural pauses in the soundtrack.

When to do it yourself; when to call a professional

Transcribing and captioning are not for everyone. If you are considering transcribing your own audio or video, consider these criteria before you jump in.

- Your spelling and grammar must be excellent. You must have a thorough understanding of the language in which the clip is spoken.
- For captioning, you must pay careful attention to detail. Line breaks must be carefully timed so that the pace of the text moves at a legible rate. Speakers may need to be identified to avoid confusion as to who is speaking the captioned text. You must watch the video both with and without sound to ensure the material still makes sense.
- Patience is needed to listen to and repeat passages where words may be difficult to distinguish. You may need to research the correct spelling of names when it is not apparent solely from listening.
- It is time-consuming work: transcribing and captioning can take roughly three to five times the length of the clip, depending on your typing speed and the complexity and density of the information within the clip.

If you do not have the time, the patience or the accuracy to do this yourself, there are many services available that will transcribe and caption your video correctly. Fees range depending on the firm and the length of the video.

Descriptive video is considered to be an art form best left to trained professionals. A script must be written that not only describes the scene and the actions of the characters accurately and concisely, but can be spoken in the pauses between existing dialogue without interfering with the scene.

Captioning Tools and Techniques

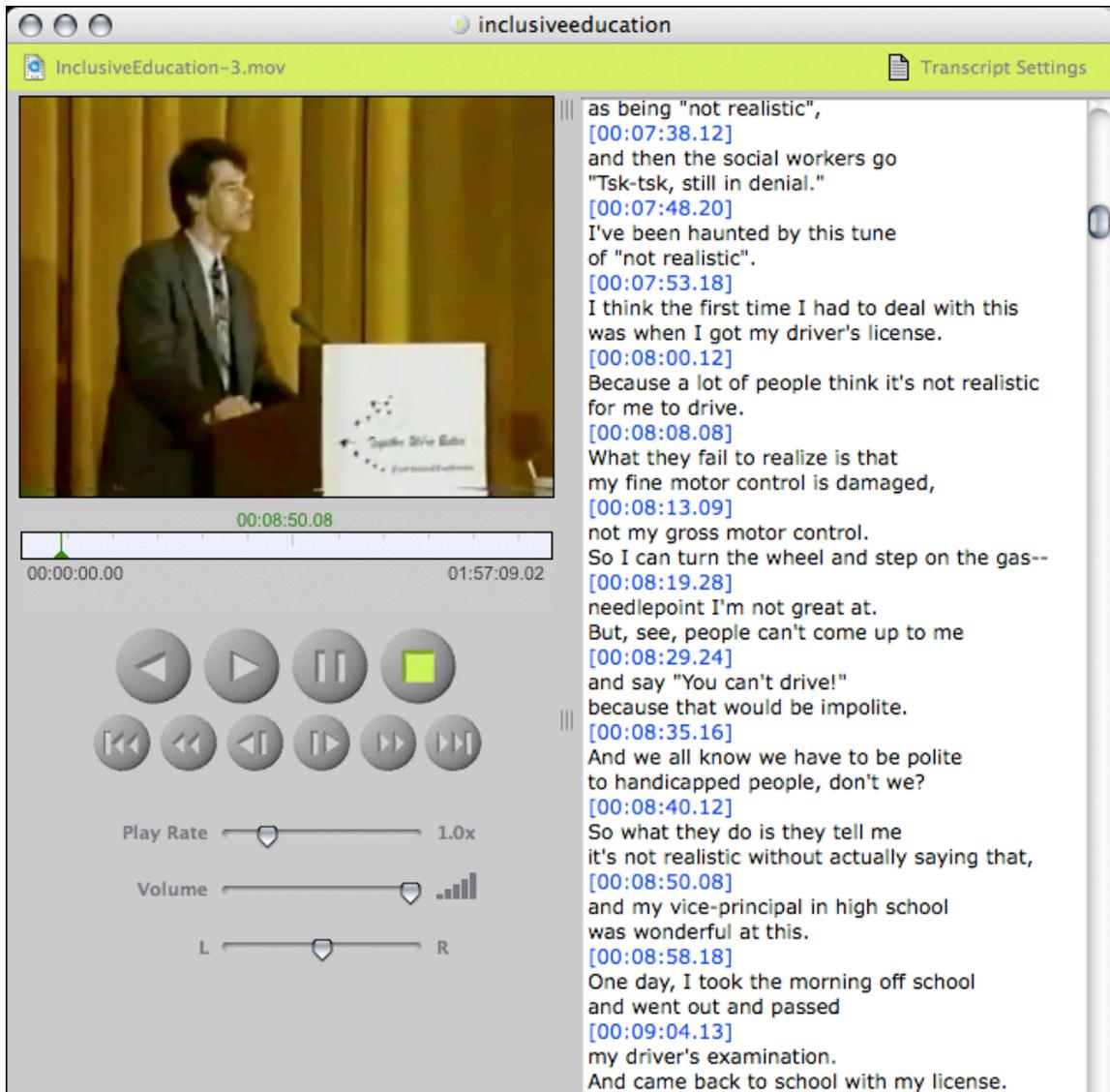
The basic premise of transcribing is simple: type what you hear. What matters is finding a workflow that works for you. In principle one could transcribe just by opening a video in a media player, opening a text editor and typing away - and if you are only transcribing one short video, this may be good enough. For longer projects, it is easier with the aid of specialized programs that assist by allowing you to pause, play and rewind the video without switching windows, slowing the rate of playback, and adding hotkeys for frequently-used phrases. For captioning, you will need a program that adds your finished captions to the video file.

Choosing the right tools

Two of the technologies that we have used to caption video are SMIL (using MAGpie) and QuickTime Text (using InqScribe).

MAGpie, or Media Access Generator, was created by the National Center for Accessible Media to help multimedia developers make their materials accessible. MAGpie generates captions in file formats such as SMIL that can be loaded by a user's video player, allowing them to display the captions alongside the original video. The end user would download two files from the server: the original video, and the file containing the captions.

A different approach is to caption your videos using QuickTime text (QTText). For this, we used a program called InqScribe, which is an inexpensive and effective program to assist in transcribing and captioning audio or video. InqScribe produces QuickTime Text files, which are used to create a text track inside a Quicktime movie. In addition to being available separately from the video file, the QTText file can be embedded in the video so that only one file is downloaded from the server.



Captioning video using InqScribe

Issues in course management systems

When captioning using SMIL, students may encounter problems trying to load a captioned video through a course management system or any other login-secured website. The authentication required to retrieve the video is done by the web browser - which then has "permission" to download the file. However, the captions are in a separate document. They are requested by the video player itself - which does not have permission and therefore cannot download access the captions.

Captioned video files created using QuickTime Text are not subject to this problem, since all the captions are contained within a single video file. Using this technique, the administrator may have to offer multiple versions of each video, both with and without captions.

Voice recognition

Consumer-level voice recognition technology is not yet sophisticated enough to produce an accurate transcript from a given audio or video clip. Most voice recognition software must be trained in advance to recognize the voice of a specific individual, the speaker must be careful to speak clearly and steadily, and the transcript must be edited afterwards for any "misheard" words.

While you cannot automatically transcribe videos with voice recognition, you can use voice recognition software such as Dragon NaturallySpeaking instead of typing. This has a few advantages. First, you don't have to use your hands to type the video, which means you can use your hands to control other things such as pausing the video and controlling the playback speed. You'll also find that after using Dragon for a little while that the accuracy is very good especially on long blocks of text, which videos commonly have. In some cases you may be able to caption video faster using voice-recognition than typing it out manually.

If you wish to try this method, you will need to spend some time training the software to your voice, and become accustomed to speaking punctuation aloud. Once it is reasonably accurate, you can "shadow" the video by repeating the dialogue you hear into the microphone. Make sure to check the results for correct grammar, punctuation, and word usage.

Transcription guidelines

Unlike captions, a transcript of your audio or video will be separate from the actual media clip, so it is important to include key information that might be lost.

If your audio or video clip switches between multiple speakers, be sure to identify the speaker at the beginning of their speech. Also, if there is onscreen activity that is critical to the understanding of the clip, describe it briefly. For example:

Instructor (writes equation $x=y^z$ on the board): You can see here that as the value of y increases, the value of x also increases exponentially.

Student: Is this going to be on the exam?

Instructor: Possibly.

Captioning Guides

For captioning, it's important to have a captioning guide on hand. A guide will help you create captions that are natural and easy to read. Typical guides offer advice on line breaks, punctuation, abbreviations and more.

Here are a few examples of captioning guidelines, but they are by no means comprehensive. Links to captioning guides are available in the Resources section of this document.

Caption placement

Captions may be placed over any part of the video image as long as it does not interfere with any existing text or illustrations, faces, or speakers' mouths. It is important to be consistent throughout an entire video and use the same placement and style for all captions. Typically, no more than two lines of captions should appear onscreen at once.

Line breaks

To facilitate reading, lines must be broken into grammatical segments. Natural breaks within sentences are after commas and phrases. It is more important to break the sentence naturally than to keep the length of each line the same.

AWKWARD:

After the incident, he felt
less comfortable going
out into public.

BETTER:

After the incident,
he felt less comfortable
going out into public.

Grammar

Do not correct a speaker's grammar, as it may be essential to the understanding of their dialect and personality. False starts, repetitions and

utterances such as "umm" and "err" may be removed if they do not add important dramatic effect, humour, or insight into the speaker's character.

Spoken: "He never, um, never done told me where to go."

INACCURATE: He never told me where to go.

BETTER: He never done told me where to go.

Ambient sounds and sound effects

Sound effects should be described only when they are central to the understanding of the plot or dialogue. For example:

(Phone rings once)

(Loud knocking)

Be sure to describe sounds, rather than actions; if a glass breaks onscreen there is no need to display "glass breaking".

Onomatopoeia, or words which suggest an imitation of a sound, can be used if space allows. For example:



Basic Audio & Video Encoding

Before you can put your audio and video files online, you will need to convert them to reasonably-sized digital files. If you're comfortable with computers and multimedia software, this section will help you make some necessary choices. Programs such as Apple's iMovie include presets for web and video that may be suitable for your needs. If you are interested in learning more about the technical aspects of video compression, please read on; if not, your department or workplace's technical support team may be able to digitize and compress audio and video files for you.

"Raw" audio or video, in its original high-quality format, takes up a huge amount of space. In order to effectively distribute audio and video clips, we need to compress them into smaller files, choosing a file format that can be read by most computers. This is called **encoding**, and the algorithm used to encode and decode video files is called a **codec**. You can encode video from most common video editing programs, such as iMovie or Final Cut.

File formats

For **audio**, the most common file format at the moment is mp3. Many programs are available for both Mac and PC which will allow you to save or convert your recorded audio file to mp3 format.

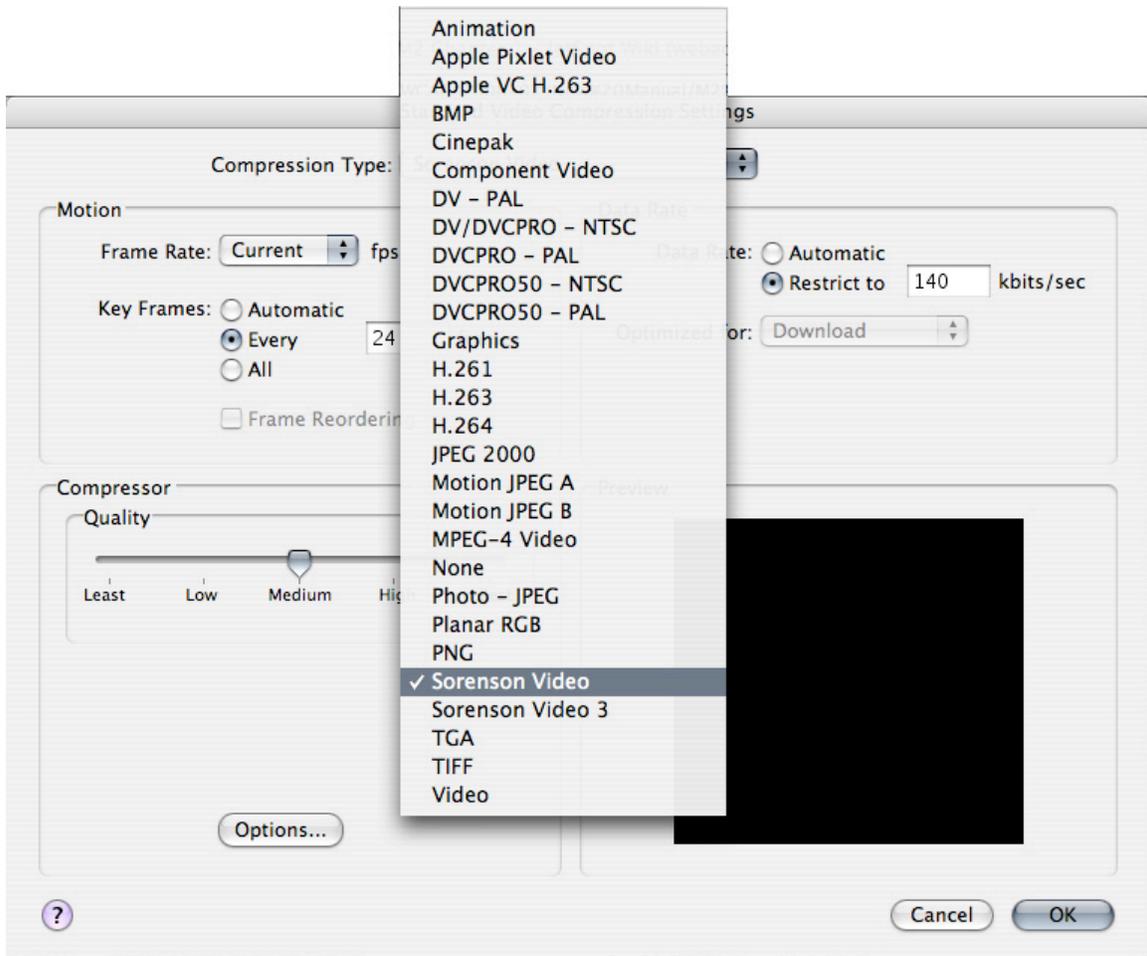
For **video**, there are a number of different file formats that can be used, and each has advantages and disadvantages.

- Quicktime, Windows Media, and MP4 are all popular formats. Quicktime is not native to Windows, and Windows Media is not native to Mac OS X, but either operating system can install applications to run any of these formats.
- RealPlayer and Flash Video are both streaming file formats. The user cannot download the file to their home computer; it must be "streamed" from a server. Streaming video starts much more quickly than downloadable file formats, but the user must have an active internet connection to view the video.

Video Codecs

Once you have decided on a file format, you need to choose a codec. Many recent codecs are more efficient and provide higher-quality video

with smaller file sizes, but people with older computers may not have the codec on their machine. Often the codec can be freely downloaded and installed, but this may be a barrier to people who are not comfortable with technology, or are using a public computer to access the web. Unless you can be sure that your audience has relatively modern computers, it may be best to go with a codec that has been widely available for a few years.



Choosing a codec in Quicktime Pro

Sizes and settings

Choosing settings for your audio and video file involves a tug-of-war between two goals. At one end, your goal is to keep the file size as low as possible, so that your audience does not have to wait a long time to download and view the materials. At the other hand, you will naturally want your media to be the highest quality possible, with the clearest, most accurate sound and picture.

Unfortunately, the two goals are inversely linked, and we can only achieve one goal by sacrificing the other. When compressing video, we seek a balance between a reasonable file size and adequate quality.

What follows is a list of suggested starting points for typical online audio and video. Please note that these are only rough guidelines. They will change over time as the software and technology continues to change - the most effective solution right now may be obsolete within a year.

In addition, there are exceptions to every rule. Those working specifically in the areas of music and film may require higher quality media than these settings will produce. Others may find that they can reduce the quality significantly from these suggestions, also reducing the file size, and that the results are perfectly sufficient for their needs.

Here are some tips from our experiences to help you get started.

Audio

- Most audio files have acceptable quality when exported as mp3.
- Any performance or interview recorded with a single microphone will be in mono. In this case, you should make sure to export your audio file with mono sound, since it will be half the size of a stereo file.
- Sound should be set no higher than 16 bit / 44.1 Khz, as this is the quality found on a CD. For mp3s, the bitrate can be 128, 192, or 320 kbps as needed (higher bitrate means better quality but bigger files).

Video

- For a typical 5-15 minute video for web, a screen width of 320x240 is adequate. If fine detail is necessary, you may want to consider a larger size, being aware that this will add to the file size of your video and make it take longer to download.
- At 320x240, the typical size of a video will be about one meg per minute of video.
- When encoding Quicktime movies, Sorenson Video, Sorenson Video 3 and h.264 are efficient and popular codecs.
- As with audio, consider whether the audio source is in mono or stereo.

Chapter 4: Resources

General accessibility

WCAG Guidelines 1.0

<http://www.w3.org/TR/WAI-WEBCONTENT/>

The accepted standard guidelines for web accessibility.

Dive Into Accessibility

<http://www.diveintoaccessibility.org>

Easy step-by-step guide to improving the accessibility of your site or blog.

Multimedia Accessibility

DO-IT Guide to Accessible Multimedia

<http://www.doit.wisc.edu/accessibility/online-course/standards/multimedia.htm>

Skills for Access: The Comprehensive Guide to Creating Accessible Multimedia for e-learning

<http://www.skillsforaccess.org.uk/index.php>

Case studies, resources, and help on issues relating to multimedia, e-learning and accessibility.

Transcribing and Captioning

WebAIM: Web Captioning Overview

<http://webaim.org/techniques/captions/>

Accessible Video Content

<http://www.unc.edu/webaccess/video.html>

InqScribe

<http://www.inqscribe.com/>

Transcription and subtitling software for Mac and PC.

Captioning guides

Canadian Association of Broadcasters - Closed Captioning Standards

<http://www.cab-acr.ca/english/social/captioning/captioning.pdf>

National Association of the Deaf: Captioned Media Program

<http://www.cfv.org/caai/nadh7.pdf>

WBGH Media Access Group Captioning FAQ

<http://main.wgbh.org/wgbh/pages/mag/services/captioning/faq/sugg-styles-conv-faq.html>

Learning Styles

The Four Learning Styles in the DVC Survey

<http://www.metamath.com/lswb/fourls.htm>

Wikipedia entry on Learning Styles

http://en.wikipedia.org/wiki/Learning_styles