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MathML/XML
series update

A quick and easy (rough and ready) method for online video

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Why record talks?

E-Learning in Mathematical Subjects (ELMS) talks at Nottingham Trent University have included several interesting talks with content not yet available elsewhere. For example, the May 2007 *Supporting Students with Disabilities Series* article by Maddox [1] contained much content given in his ELMS talk of May 2006. It is no slur on Maddox; finding time to write is difficult and publishing takes time too. Still, this left me feeling that interesting content had been lost to those not present which could have been recorded.

In this spirit, I would urge people to record live content whenever they can and make this available as widely as possible (with the speakers permission). ELMS talks are now recorded by NTU Visual Services. Prior to this, the following procedure was used "in house".

Format of ELMS talks

ELMS talks are generally a speaker at a lectern and slides and/or a demonstration on screen. It is necessary to record both aspects, with the screen at a good resolution, particularly if live mathematics or software demonstration is involved. ELMS talks run between 40-60 minutes, so good video compression was needed.

Recording

Two static cameras mounted to tripods were borrowed from the School, allowing a close up of the screen (Fig 1) and a wide shot incorporating the speaker (Fig 2) to be recorded. An additional benefit is added redundancy; if one camera failed to record adequately, an alternative was available.

A single camera moving between the screen and speaker might be preferred but only if an experienced camera operator was available. One camera could be removed if another method of screen recording were available: For presentations this might be simply giving out the slides; Screen recording software can record screen activity during demonstrations. Indeed, software exists to integrate video of the speaker with a screen recording (this can cost). The number of cameras needed would also depend on the room: some have the lectern far from the screen; in others they are closer. If the speaker's movements could be controlled (for instance, if you are the speaker) then a single static camera with a tight angle on both the speaker and the screen might be used.

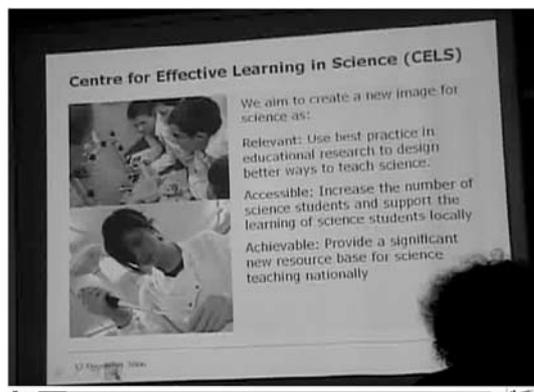


Fig 1 – Camera 1 records the slides. The slides can usually be read in the video or at least a good indication which slide is viewed.



Fig 2 – Camera 2 records a wide angle.

Sound recording requires the correct type of microphone. The cameras built-in microphones were of poor quality. Though a lapel microphone would get the best quality audio from the speaker it would not pick up audience questions. For ELMS, a portable digital voice recorder was placed on the front desk. This produced surprisingly good audio quality from both speaker and audience, though it requires syncing the audio to the video when editing. Another option was to plug an external microphone into a camera.

Editing

The footage was loaded onto a computer and edited. ELMS videos were edited in iMovie in Mac OS X. Other video editing packages are available. With two cameras, the videos needed mixing together. If only one camera were used and the footage were desired "as is", then this would be much simpler. Titles can be added optionally.

Distribution

The final step is encoding the content for online viewing or download. Video podcasting can be an effective method of distribution but the file sizes involved were deemed to inhibit this method. This may be the most suitable option for shorter videos. Conventional video streaming requires a media streaming server which streams content into a media player, meaning the start of the video can be watched before the rest has downloaded. An alternative to this is a type of simulated streaming provided by Flash Video Format (FLV) which does not require a special server. Actually, part of the FLV file is downloaded through Flash's ActionScript and played while the next part is downloaded, and so on. The FLV format provided good compression, getting an hour of video at 640x480 pixels to under 200MB. Videos were converted to FLV using the Riva FLV Encoder [2] in Windows, though other solutions are available (some are listed by Wijering [3]).

Note on compression

FLV works by storing a frame, then the changes between frames (rather than storing each frame in full) [4]. If the video is a static shot of a person standing still or a screen with little movement, the changes between frames are likely to be limited. Videos with lots of movement or cuts experience greater filesizes. The original source quality can have an effect here on clarity (see Figs 1-2).

On the ELMS website, videos are presented using the JW FLV Player [5], a Flash application that handles the progressive download of the FLV file and provides a player interface. This player is available under a creative commons license making it free for non-commercial use. The Flash authoring program is not required and the only requirement for the user is the free Flash Player. According to Adobe, the owners of Flash, the Flash Player is available on "99% of Internet-enabled desktops in [the UK]" [6] meaning it is very likely your audience will already be able to view your video when they arrive at your website. A basic configuration of the JW FLV Player

simply involves putting your video filename into the HTML code (instructions are provided).

The quick and easy method

If it is possible for a professional to record and edit the video this is recommended. ELMS definitely benefits from having NTU Visual Services recording talks. If such support is not available and the production values can be allowed to suffer a little, the following is a relatively straightforward method for getting content recorded and online:

- Record the talk with a single static camera (the easiest method; though on screen demonstrations or hand written content require more thought). Provide slides for download.
- Edit the video to remove irrelevant parts from the start and end. Encode this at 640x480 (large for web viewing but good for seeing small detail) in a format supported by your chosen FLV encoder (choose one in the next step).
- Convert the video file you have created to FLV format using an FLV encoder [3].
- Upload to a web server: the FLV file, the JW FLV Player and a HTML file with the JW FLV Player embedded. (For multiple videos, you only need the JW FLV Player uploaded once and different HTML files for each video).

A final piece of advice: practice the recording process thoroughly before doing it for real and don't underestimate human error.

References

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