



## Office of Open Learning

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## STLHE 2016

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# A Brilliant Design: Using the Lightboard to Rapidly Develop Innovative Online and Blended Learning Resources

## Construction

### *Some online resources for existing designs*

Peshkin's lightboard <https://sites.google.com/site/northwesternlightboard/home/construction>

Other lightboard designs <https://sites.google.com/site/northwesternlightboard/lightboards-of-the-world>

## Design Specs:

### *Lightboard*

- Fully welded aluminium frame with removable top beam to secure the glass
- Glass is held in place with industrial glass posts.
- Frame is mounted on industrial quality mulitlocking wheels (solid rubber)
- Middle beam in base of frame is intended to allow the frame to be bolted to the floor for extra rigidity if stored in a permanent space.
- Overall height is 6'8" so it can be rolled through standard doorways on campus
- Glass is 12mm OptiWhite low-iron architectural glass, 7' x 3'6" with polished edges for clean light transmission with minimal distortion.
- Lighting within the board is provided by 24V double bright plus LED strip lights (Hitlights, at 3.5 Watts/ft, comes in a 7m roll) run around the perimeter of the glass and attached with high temperature, non-conductive silicone tape (Kapton tape). LEDs provide 335 lumens/ft in pure white light (purchased from LED Canada).
- To clean markers off glass, use paper towels moistened with water, then dry paper towels. Ethanol can also be helpful. Most glass cleaners are not useful in the first instance, but can be good for a final clean after the marker is removed.

### *Filming setup*

- Camera: JVC GY HM-200 4K camera shooting in 1080i, output to SDI (could also use HDMI), and can also webcast live from the camera if networked. While this is a professional camera, lower end cameras and even phone cameras will do a decent job for webcast footage.
- Image filmed from a front surface mirror (sourced from FirstSurface Mirrors in Ohio (<http://firstsurfacemirror.com/>) – this is important to avoid distortion of the image.
- Audio is recorded using a Sennheiser wireless on-camera lapel mic system. Audio is passed through from the camera to the switcher and on to the recording, but it could be taken directly into the switcher
- Switcher: Blackmagic Design ATEM Production Studio 4K (6G-SDI, UHD) switcher with 8 input channels. This is used to live mix multiple media inputs to the final image the instructor sees and which is recorded. Can mix multiple audio and video channels. Our system is controlled by the ATEM software directly on the laptop (Dell M4800 multimedia laptop) that also records the final product.
- Blackmagic Design UltraStudio capture device: used to capture the high quality feed from the switcher and encode as H.264 for transfer to the laptop via USB3.0 for recording with the Blackmagic MediaExpress software (although others could be used, such as directly to Adobe Premiere, Final Cut Pro X (Mac)). This ensures the stream of video data does not overwhelm the recording computer. We also have an Atomos



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Samurai Blade external monitor and recorder that can record the feed directly from the switcher or UltraStudio in either the full UHD resolution or other smaller formats directly to an SSD.

- Use largest preview monitor possible for faculty to see themselves in. Mounting on a wall and angling down will reduce reflection on the glass. Mount it directly in front of the lightboard as close to the camera position as possible so the instructor looks towards the camera.
- To reduce the camera picking up reflection of the monitor, use either a Circular Polarising or Linear Polarising lens filter (depending on the type of screen used, one or the other of these will be needed) and adjust until the reflection is no longer visible in the output.

### Lighting and background

- The instructor is lit by overhead, fill and key lights (all CFL and LED). Currently this is a portable setup, but when it is in a studio, permanent lighting will be arranged to allow us to better control the lighting.
- Backdrop is pure black fabric. PowerPoint template is pure black also. Faculty can wear contrasting light coloured clothing to stand out against the background (solid colours are better).

### Instructional Design Tips

Peshkin outlines best practices at <https://sites.google.com/site/northwesternlightboard/tips-techniques/best-practices>. Below are some tips that we found especially useful:

- Wear solid coloured clothing with no text or stripes. Light colours will contrast, dark will blend in.
- Know what and where you will draw, but do *not* strive for perfection; be prepared to do multiple takes.
- Keep the video short, speak with enthusiasm, and use a combination of writing and drawing/images to engage students (Guo, Kim, & Rubin, 2014).
- Look at the camera when not writing so you appear to be speaking directly to the students.
- If using PowerPoint slides, orient images to right if right-handed; orient to left if left-handed.
- Use minimal images, talk through any images displayed, and talk through writing on the board.
- Don't write over your face.

### Resources

#### Lightboard

Lightboard Open Source Hardware Info <http://lightboard.info/>

Northwestern "Lightboard" YouTube video <https://www.youtube.com/watch?v=N1I4Afti6XE>

7 Things you should know about...™Lightboard <https://library.educause.edu/resources/2014/8/7-things-you-should-know-about-lightboard>

#### Online Instructional Video

Guo, P. J., Kim, J., & Rubin, R. (2014). How video production affects student engagement. *L@S '14 Proceedings of the first ACM conference on Learning @ Scale*. NY, NY: ACM (pp. 41-50).

<http://dx.doi.org/10.1145/2556325.2566239>

Hibbert, M. (2014). What makes an online instructional video compelling? EDUCAUSE Review. Retrieved from <http://er.educause.edu/articles/2014/4/what-makes-an-online-instructional-video-compelling>

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