Masterclass: Making educational videos

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This handout accompanies the Masterclass in *Making videos and flipping your classes.* It covers some basic principles and guidelines for creating video content efficiently and effectively for your subject.

TL;DR

Some quick research-informed tips [2; 7] on effective educational videos:

- Not all content is suitable for video – consider the purpose of your videos
- Shorter videos are more engaging – and easier to re-make if necessary
- Low-fidelity videos engender a more engaging, personal feel
- Intersperse slides with your face at opportune times
- Be yourself – speak with enthusiasm
- Recording and then splicing full lectures is not engaging
- Prepare and plan what you will say and show in the video

VISUALS

Videos do not require high production costs to be effective

The desire to make polished 'movie quality' videos can be timely, complex and expensive. Investing huge amounts of time in the pursuit of perfection may not always lead to learning or translate into student engagement. Fortunately, some of the best educational videos, such as those by the Khan Academy, have been created using **simple technologies and limited time** and financial resources.

Research suggests that **high production value may not matter** [2]. As far as engagement goes, informal settings such as that of an individual's office or home may be more effective than a professional studio [2] (Figure 1).
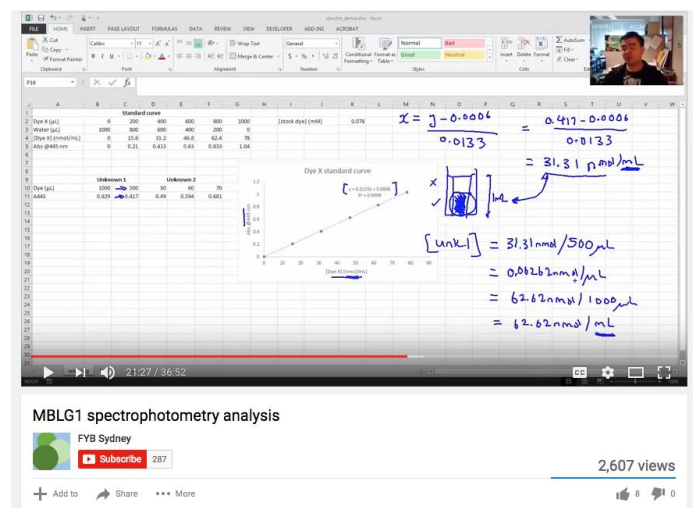

Figure 1: Screenshot of screencast lesson produced using a webcam, Wacom digitizer tablet, screen annotation software, Excel, desktop microphone, and a laptop, recorded in an office.

Fidelity as a continuum – how 'real' does something have to look for learning to occur?

For educational videos there is often the assumption that "more realism corresponds to greater comprehension" [6]. However, there "are times when the ideal expression of a message can be achieved through visual shorthand", this can be done by reducing "the qualities embedded in the graphic" [5] (Table 1).

Depending on the learning outcomes you may want to blend or combine a range of low and high fidelity visual content (Figure 2) for example by annotating a high fidelity photo or video with overlaid writing or drawing. Alternatively, having your face included in the video (e.g. as a talking head) may help make the video more personable.
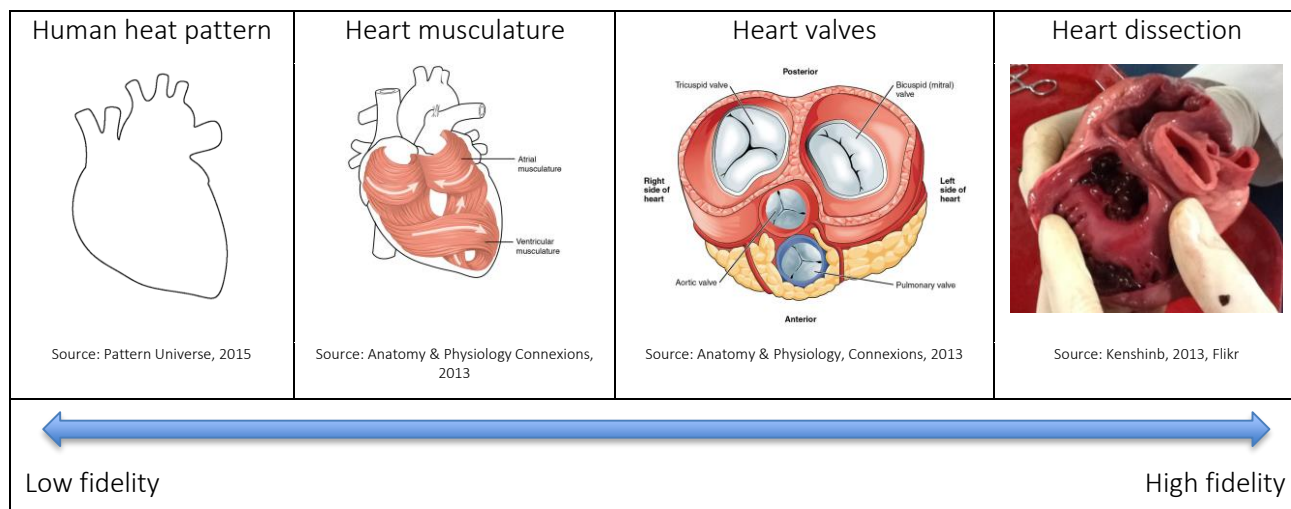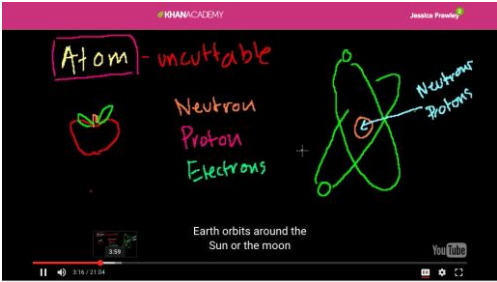
Human heat pattern	Heart musculature	Heart valves	Heart dissection
Source: Pattern Universe, 2015	Source: Anatomy & Physiology Connexions, 2013	Source: Anatomy & Physiology, Connexions, 2013	Source: Kenshinb, 2013, Flikr

Low fidelity ←————————————————————————————→ High fidelity

Figure 2: Fidelity as a continuum in visual images.

Table 1: The affordances of lower and higher fidelity graphics.

	Lower fidelity	Higher fidelity
Affordances	• Quick visual scanning • Less information and load on working memory • Fewer visual distractions or 'noise' • Less superfluous visual information	• Authentic 'real world' examples • Contextualises information • Increases visual processing and complexity • Easily capture other features of what is represented (e.g. sound, rapid behaviour etc)
Example	Introduction to the atom: https://www.youtube.com/watch?v=1xSQlwWGT8M	How a hard drive works: https://www.youtube.com/watch?v=AfmTaOJMoUk

Including yourself

Including yourself in the video as a 'talking head' allows you to make eye contact with the camera and personally connect with your students. **A video is like a one-on-one conversation with the student** and helps to maximise engagement [8].

- If it helps, you might like to stick a photograph of a person above the camera to help you make an emotional connection [7].
- Don't be afraid to include aspects of your teaching that, though imperfect, **show humanity**. For example, if you make a mistake don't stop recording but explain how you would work through it.
- Although some people script their videos, talking conversationally to the camera may be more natural and engaging. If you need to structure this 'conversation', then perhaps storyboard your video (described in a later section).

Creating content for different screens

Your cohort will own a variety of devices with different screen sizes. You therefore need to consider how to produce content that is visible and legible; what looks great on a huge Mac desktop monitor may not translate to a smartphone. A few guiding principles to follow:

- **Colour and contrast:** High contrast between colours works well (e.g. black and white) instead of low contrast (e.g. yellow and white). Watch out for colours that are more susceptible to being misrepresented by the computer (e.g. neons, pastels). Also by opting for colours that have a high contrast you make your videos more accessible for students who may have vision difficulties. If you are filming a video of yourself, make sure the light is neither too bright or too dark.
- **Size and visibility:** Make sure what you are presenting is large enough to be read on a range of screens. If you are using an annotation approach (e.g. drawing) make sure the 'pen' is thick enough to be clear. If you are using PowerPoint, then pick a font that is large enough and clear enough to be read.
- **Legibility:** If you are using annotation software or recording your handwriting using a camera, then write as clearly as you can. However, don't worry about not having perfect cursive or calligraphy as your spoken words will clarify anything that is a bit scrawly.

AUDIO

AUDIO QUALITY IS IMPORTANT

Audio quality is *really* important. We cannot emphasise this enough. Low fidelity graphics can simplify a concept, a webcam image of you talking to your class from your living room can be personable, but students will tune out if they cannot hear you or if there is too much auditory noise or interference. Cleaning audio files is difficult; it is easier to record once and get it right. To do this always:

- Use a dedicated desktop microphone[1]
- Record the video in a quiet place
- Practice using the microphone and enunciate clearly

CONTENT

Choosing content to be transformed into video

Videos take time to create and are not easily edited so you need to consider what content in your course would work as a video and what would be better taught face-to-face. Content that may lend themselves well to video are:

Figure 3: Foundational chemistry concept explained using a PowerPoint and voiceover.

- **Core concepts** that are unlikely to change (e.g. a particular equation, foundational concepts; e.g. Figure 3)
- Content that students find **difficult and may need to revise** (videos allow students to replay content as many times as they need)
- Content that is **tedious and difficult to cover in a lecture** (this has the added benefit of giving you more time in lectures for active learning approaches where students engage with an activity instead of just listening)
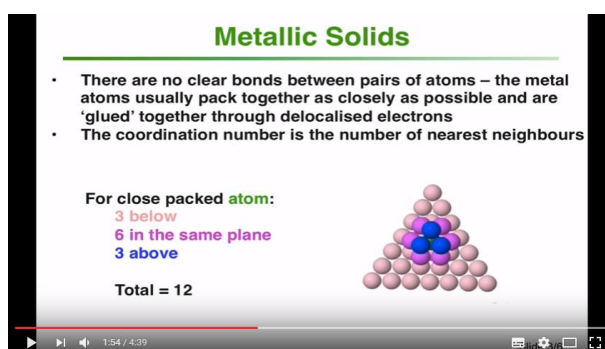
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[1] These typically connect to a computer via USB. We recommend the Blue Microphones Yeti, or the Samson GoMic. The Educational Innovation team has a few of these you can borrow.

Other uses for video

There are many other good uses for educational video beyond delivering or explaining content [3; 8]. Here are some examples:

- Interview with an expert
- Reviewing exemplar assessments – e.g. a screencast where you talk about an exemplar assignment and use screen annotation software to focus on particular aspects
- On location – contextualises what students are learning to real situations e.g. tour of a lab or facility
- Demonstrations of experiments
- Demonstrating how to use equipment – useful for getting students up to speed before labs (e.g. Figure 4)
- Recording a live event – e.g. video of a group discussion which can then be critiqued by students

Figure 4: Simple video showing usage of lab equipment, captured on a mobile device.

Sustainability and re-use

Because videos can take a bit of time to create, it is worthwhile considering how to make them sustainable so you can re-use them through multiple semesters. Part of this will come from making videos of content that is unlikely to change, although you may want to update how you explain it. Part of this comes from the actual presentation of the video. Consider:

- Not including dates, unit codes/names, and other identifying information in the video
- Not referring to resources or people/groups that are likely to change (e.g. "the week 2 folder on Blackboard")
- Using generic examples – e.g. when showing an exemplar assessment or solution, use samples that are not direct reflections of existing tasks

STRUCTURE AND STYLE

Video length

Research conducted on student engagement with videos suggests that **shorter videos are more engaging**, with 6 minutes being the optimal time [1; 2; 4] (Figure 5). That said, we have seen students fully engage with 45-minute screencasts which were tutorials on using Excel to analyse and present data, but this was based on skills acquisition not content or conceptual understanding, which would typically benefit from shorter snippets.
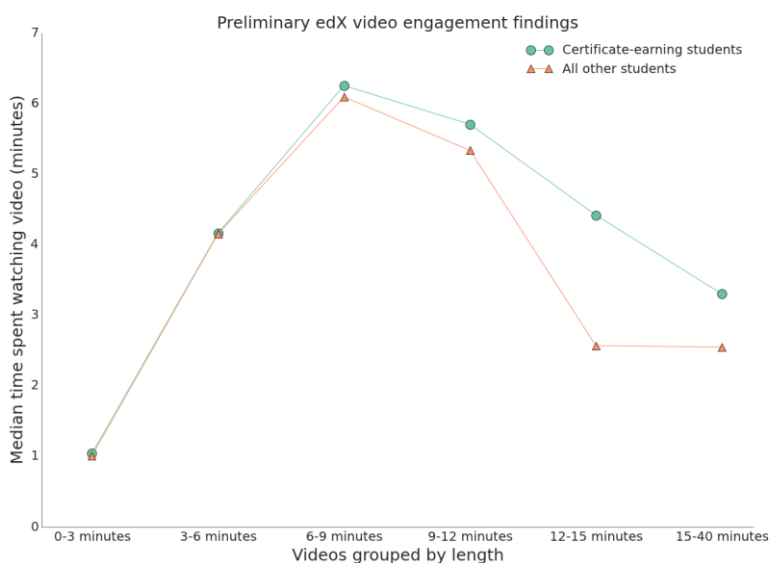

Figure 5: Optimal length of videos on the edX MOOC platform [1].

Production styles

There are several production styles [3] (Table 2). **You can use more than one within one video**. For example, you can run Khan style annotations over code or PowerPoint slides and can incorporate a 'talking head' of you at your office desk to personalise the lesson. For a more detailed description of some of the software tools, refer to the section later on in this document.

Table 2: Production styles and suggested tools.

Style	Description	Some suggested tools
Slides	PowerPoint slide presentation with voiceover	- Computer - PowerPoint or other slideshow software (e.g. Prezi) - Desktop microphone - Screencasting software
Khan style	Full-screen video of an instructor drawing freehand on a digital surface, which is a style popularized by Khan Academy videos	Desktop approach - Computer - Wacom digitizer tablet & stylus - Screencasting software - Screen annotation software - Desktop microphone - Webcam Tablet approach - iPad or Android tablet - Microphone - Stylus - Screencasting app
Udacity style	Full-screen video of a document camera surface, where the instructor's hand is typically visible and a voiceover is captured	Similar to the Khan style approach, can be captured using desktops or tablets. Screen annotation software is redundant. The camera (either a camera attached to a computer, or a built-in camera on a smartphone or tablet) can be mounted above the drawing surface.
Code	Video screencast of the instructor writing code in a text editor, IDE, or command line	- Computer - Software being used for writing - Desktop microphone - Screencasting software
Classroom	Video captured from a live classroom lecture	- Computer - Microphone - Echo360 - Webcam
Studio	Instructor recorded in a studio with no audience	Not covered in this masterclass
Talking head	Close-up shots of an instructor's head	- Computer - Desktop microphone - Webcam - Recording software

Errors and editing

It can sometimes be **beneficial to leave errors in the recording**, as long as you pick them up. When students hear and see how you identify, acknowledge, and then deal with errors, they can learn strategies to refine their own thinking as well. It also introduces an aspect of unpolished humanity into the video.

LEGISLATIVE CONSIDERATIONS

Copyright

You will need to be mindful of copyright, especially if you are distributing your videos through a public channel (described in the next section). If only students enrolled in your course can access your videos, then you may be covered under educational licences[2]. If videos are made available more widely, and even if not, best practice is to use material that is licensed as Creative Commons. There are search engines that can help you uncover such material[3].

Accessibility

If video containing audio is made available publicly, there is a requirement that captions or a text transcript are provided as well. These are not only required for viewers with hearing impairments, but also benefit non-native speakers. Best practice would be to provide full closed captioning through the video distribution channel[4]. Providing a script for the video would also be suitable (if you have used one to create the video), as long as the coverage is the same. If there is no script, then consider providing a written document with a series of dot points or notes about each topic in the video, designated by time marks[5]. There are a number of online resources about designing and building for accessibility, as well as practical approaches to making content accessible[6].

Additionally, consider the tips in the Visuals section above regarding colour, contrast, size, and visibility.

PRACTICALITIES

Preparing to create your video

Just like any other lesson, good planning will ensure that you cover everything that you want to, help reduce duplication, and make the process of capturing (and maybe editing) the video more time-efficient. Here are some questions that may help you prepare:

- **What is the video about?** Educational videos work best when they address a finite concept or skill. If you find yourself covering too much, break it into multiple videos.
- **What will students watch?** Do you want to scribble on a blank canvas, show them how to use some software, watch you talking for a bit, or a combination? Make the most of the video platform by using diagrams and animations, instead of text-heavy presentations.
- **What will students listen to?** Support what you show with what you say – don't just read words that are being shown on screen.

You may also want to plan the actual content of the video in a table (Table 3); this will help reduce anxiety while recording the video and ensure that you are succinct.

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[2] See https://library.sydney.edu.au/help/copyright/overview-for-educators.html for more information.
[3] Such as https://search.creativecommons.org/.
[4] For example, Kaltura has the ability to attach an 'SRT' closed captioning file to videos. There are a number of ways to generate these files – one is to upload your video privately to YouTube and use its built-in captioning tools (e.g. http://its.uiowa.edu/support/article/103635). Generating closed captioning files is non-trivial
[5] For example, "How to do X: this section shows...- 3.56 - 4:30".
[6] Such as http://www.mediaaccess.org.au/education/accessible-media-for-diverse-learners.

Table 3: Sample video plan.

Content/purpose	Visuals	Narrative
Hook	e.g. video of real world application of issue; e.g. screenshot of final worked spreadsheet with completed chart.	e.g. describe what this video will cover, what you will get out of it, why it's interesting.
Introduce sample problem	e.g. present a typical tutorial question and circle the important parts.	e.g. explain which parts of the question are important, how they fit together, and why.
Solve sample problem	e.g. show an image of crane on the side of the screen and scribble working-out on the screen, showing calculator when necessary.	e.g. describe the steps to solve the problem, what strategies you use and why, point out common mistakes.
…	…	…
Quick wrap-up	e.g. show overview of worked solution, highlighting key points, then show a similar problem.	e.g. explain holistic perspective of how the problem was addressed, refer to similar problems and potential follow-up work.

Creating your video

When you are ready to create your video, start by preparing your environment. A simple office or home screencasting setup is usually sufficient (Figure 6). A few things to take note of:

- Ensure your **environment** is controlled – remove distractions (close your email program so notifications don't awkwardly pop up while recording, redirect your phone to voicemail, and if you're at home, put the cat outside).
- If you are using a **webcam**, a simple light that casts some illumination onto your face is usually sufficient.
- If you are using an **external microphone** (highly recommended), position the microphone and set its mode[7] so that it captures your voice.
- Before you record the main chunk of content, record a few **test snippets** of you speaking, moving between slides, annotating the screen, etc, and play it back to ensure everything is working.
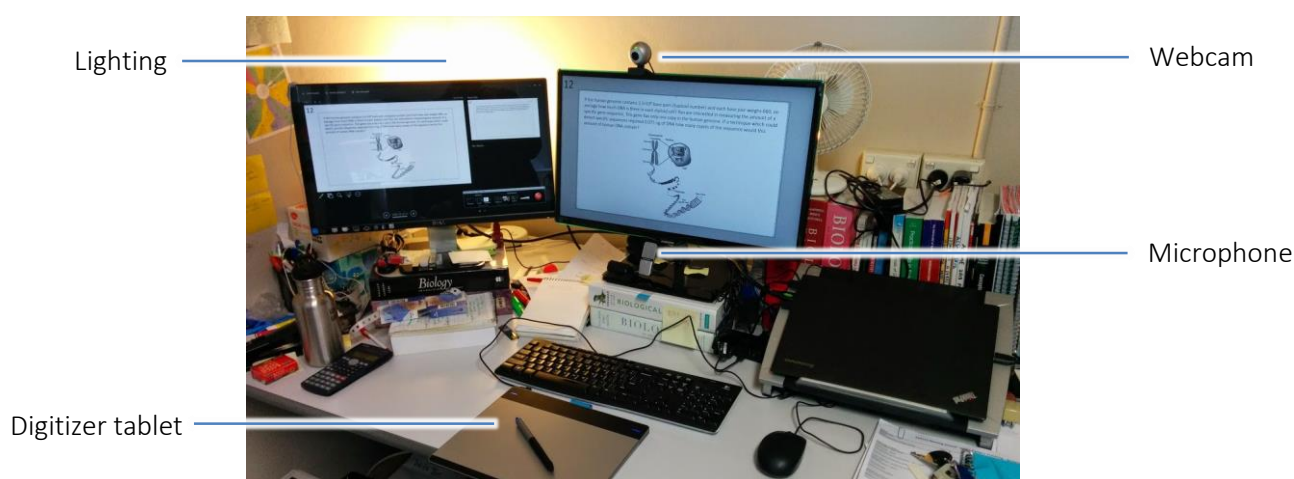

Lighting   Webcam

Microphone

Digitizer tablet

Figure 6: Sample office environment for recording screencasts.

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[7] Higher-quality microphones often have multiple modes which determine from which direction(s) the microphone picks up sound. If you are just recording yourself, the 'cardioid' setting is usually the best – make sure the microphone is facing the right way.

We have covered a number of video styles and tools in a section above. It is beyond the scope of this document to provide detailed usage instructions for these[8], although we do provide a brief summary of some of the key software (Table 4).

Table 4: Selected software for making educational videos. Software that requires a separate purchase (i.e. no institutional licence exists, or is not free) are indicated.

Software	Purpose	Compatibility	Functionality
PowerPoint	Voice over slides	PC[9]	Built-in ability to record a voiceover and screen annotation for each slide. A free beta add-on called Office Mix also allows you to easily distribute these recordings online and add interactive elements.
Echo Desktop Capture[10]	Screencasting	PC, Mac	Records the screen, as well as connected webcams and microphones. Also has simple editing (cutting/removal of parts of the video) functions.
Kaltura CaptureSpace Desktop Recorder[11]	Screencasting	PC, Mac	Records the screen and connected webcams and microphones. Has basic screen annotation functions built in, as well as simple editing (removing parts of the video, adding titles and credits).
Camtasia (paid)	Screencasting	PC, Mac	Records the screen, connected webcams and microphones, and computer audio. Has fully-featured editing functionality such as cutting, transition effects, zoom in/out, overlays, picture-in-picture, etc.
Explain Everything (paid)	Recordable whiteboard	Android, iOS	Records audio as well as elements drawn onto the app's canvas, which can include pen, images, video, and browser windows. Good editing features.
ScreenChomp	Recordable whiteboard	iOS	Records audio as well as elements drawn onto the app's canvas.
Ink2Go[12]	Screen annotation and recording	PC, Mac	Draw over the screen. Has basic screen recording functions.
ZoomIt	Screen annotation	PC	Draw over the screen, zoom in/out of screen.

Editing your video

With good planning, hopefully the amount of editing you need to do will be minimal or absent. If you do need to do some editing, some of the software packages mentioned in this document have simple editing functions built in (Table 4).

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[8] Feel free to get in touch with the Educational Innovation team for support.

[9] The Mac version of PowerPoint is not as fully featured, and does not have the same functionality.

[10] Download from Blackboard -> My Units of Study area -> Recorded Lectures Help tab -> Echo360 personal desktop capture link. See https://staff.ask.sydney.edu.au/app/answers/detail/a_id/149/.

[11] Download from Blackboard -> My Units of Study area -> My Media link -> Add New button -> CaptureSpace Lite option. See http://sydney.edu.au/education-portfolio/ei/news/pdfs/Using_Installing_CaptureSpace_Lite.pdf.

[12] Institutional licence, see https://staff.ask.sydney.edu.au/app/answers/detail/a_id/809/.

Distributing your video

You can make your video available through different channels (Table 5). The channel you choose will affect the video's accessibility, availability, the audience that it can reach, and the level of central support available.

Table 5: Some of the more common platforms for distributing videos to students.

Platform	Centrally supported[13]	How students can access videos	Privacy controls
Kaltura	Yes	Embedded in Blackboard	Only enrolled students logged in to Blackboard
Echo360	Yes	EchoCentre within Blackboard; link from Blackboard	Only enrolled students logged in to Blackboard
YouTube	No	Embedded in Blackboard; link through to YouTube page	Public; secret link
Vimeo	No	Embedded in Blackboard; link through to Vimeo page	Public; password; (domain; secret link)[14]

Encouraging (and making sure) your students watch your videos

It can be disappointing to create videos but not have students watch them. There are some approaches to encouraging video usage:

- Make the videos **relevant, succinct, and useful** – this comes down to good planning and understanding what your students need.
- **Advertise** your videos – e.g. post an announcement when the video becomes available, with a direct link to the video; and mention it in class (you can even play a snippet from the video to show your students how useful it is).
- **Incorporate** videos as part of the weekly curriculum cycle – e.g. make pre-class videos that relate to a concept or skill being covered, and give students a simple online quiz on Blackboard that needs them to have watched the video to answer.
- **Embed interactivity** directly into the video – a number of platforms have this ability built in, like Kaltura[15] and YouTube[16].
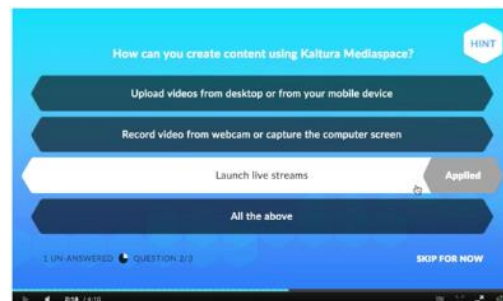

Figure 7: Example of Kaltura Interactive Video Quiz. Source: kaltura.com

EXAMPLES

- **First year chemistry at Sydney** – explosive experiments and voiceover PowerPoints – https://www.youtube.com/fycsydney
- **First year biology at Sydney** – screencasts of software and screen annotation, interviews, and equipment demonstrations – https://www.youtube.com/fybsydney
- **Veritasium** – high production value science explanations combining interviews, animations, on-location shoots – https://www.youtube.com/1veritasium

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[13] Institutional support through the Educational Innovation team.

[14] Domain-level privacy (e.g. embedded on elearning.sydney.edu.au) and secret link only available on paid plan.

[15] Kaltura has the ability to embed very simple 'Interactive Video Quizzes' into videos. See http://corp.kaltura.com/Products/Features/Interactive-Video-Quizzing for helpful resources.

[16] YouTube has a 'Cards' feature which allows you to add polls, links, and other content. See https://support.google.com/youtube/answer/6140493 for more information.

- **Chris Tisdell (UNSW)** – recordings of narrated handwritten maths solutions – https://www.youtube.com/DrChrisTisdell
- **Bozeman Science** – screencasts of slidedecks with talking heads – https://www.youtube.com/channel/UCEik-U3T6u6JA0XiHLbNbOw
- **Minute Physics** – narrated videos of hand-drawn diagrams – https://www.youtube.com/minutephysics

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