

Reviewing the use of bespoke lab skill videos – stage 1 of creating a flipped lab

Lana Mahmoud & James Harvey

Department of Chemistry, King's College London



[@drjamesharvey](#)

Abstract: With increasing student numbers, limited lab space, and restricted access due to COVID-19, it has been more important than ever to make sure programmes that include core practical modules (such as Chemistry) are maximising the use of the lab time available to them. Inspired by the flipped classroom model, we aim to create a 'flipped lab' where students can use synchronous lab sessions most efficiently by arriving fully prepared (using a combination of pre-lab quizzes, simulations and skill videos). In Summer of 2020, a collection of bespoke skill videos, for use by years 1-3 in the 2020/21 academic year, was created based on student feedback of current resources. Now that these videos have been available to all students for the full academic year, the usage data, as well as staff and student reflections and feedback have been collected to review the effectiveness of the resources and to help direct the next stages of the project.

Introduction: In the Easter of 2021, students were surveyed on how they used the current lab resources to support advanced practical skills. The resources supplied were in the form of written instructions or externally produced videos (e.g., YouTube videos). Although students found the resources helpful, they reported the written instructions were hard to follow and videos were not totally applicable as they contained different equipment/apparatus. To increase student preparedness for labs, a collection of bespoke skill videos was created. As with the flipped classroom, these videos would allow students to prepare in their own time and at their own pace before attempting the skill at in-person labs. The videos were all designed to include features we believed would maximise their effectiveness; *filmed from user point of view, filmed by a demonstrator (indicated by the red lab coat), made with a consistent style, background music, filmed in and using items from the teaching lab, voice-over instructions, written instructions, animations to highlight important items and safety points.* A total of 18 videos were created (Fig. 1) and embedded into the teaching as pre-lab activities and in-class resources for years 1-3 (about 320 students). Now that the videos have been available and used for an academic year, their use has been reviewed to see how they are being used and if they can be improved. The results from this review will direct future videos are created and improved.

- Using FT-IR
- UV Jenway
- Needle safety
- Creating nitrogen balloon
- TLC
- Pyrophoric transfer
- Analytical balance
- Volumetric flasks
- Filtration
- Rotary evaporators
- Separatory funnel
- Recrystallisation
- Schlenk techniques (intro, dry & degas, solvent evaporation, glassware cycling, Schlenk NMR, safe shutdown)

Figure 1: List of bespoke skill videos created.

Video usage: All videos that were made available to students were viewed by at least 55% of the students enrolled in the module, with some being viewed by 79% of possible students. Although this number seems low, when looked at based on level of study, the completion level for first year students is close to 100% (for the TLC video, 117 of the 120, or 98%, first year students watched the video). This is not surprising as most videos are aimed at first year students, and so second and third year students should already be competent at the skills. This was confirmed in the student survey in which students commented they already felt confident in completing the skill, when asked why they did not watch all available videos.

The way in which the videos are provided to students may also have an impact on how they are used. In the first year practical module the skill videos are embedded into the teaching as part of the lesson on the VLE (Moodle)(Fig. 2), whereas for 2nd and third year modules the videos are simply provided as a linked resource on the module page. Although the higher number of views for first year students may be because of the lesson set up, the plays per user has an average value of around 1.6 and average completion of 75%. This means that students are watching videos multiple times and watching the majority of videos when they do.

CHEM > Introduction to laboratory techniques > Measuring solids and liquids

Measuring solids and liquids

3. Use of balances

3.1. Step-by-step guide for using a balance

Below is a step-by-step guide to the use of balances. Be sure to follow it exactly, every time you weigh a material. You can also [watch a video for using an analytical balance here.](#)

Please be careful with the use of the balances, they are expensive precision instruments and easily damaged

1. Consider the quantity of material you need and how accurately you need to know the mass and select the balance with the most appropriate weighing range.

Figure 2: Examples of how videos were embedded into the module lesson.

By looking at when the videos are viewed we can also see how the students are using them and if they are indeed using them to prepare for labs. By looking at one skill video in particular we see that only a small number of views are completed as soon as the lesson. Instead we see a peak of activity during our bootcamp practical sessions (Fig. 3). This suggests that students are using the videos as a tool to prepare for labs, or possibly while in lab session. Although we know that students are engaging with the videos around the time of their practical sessions, it is not clear if they are first being viewed before or during labs – the former being our aim.

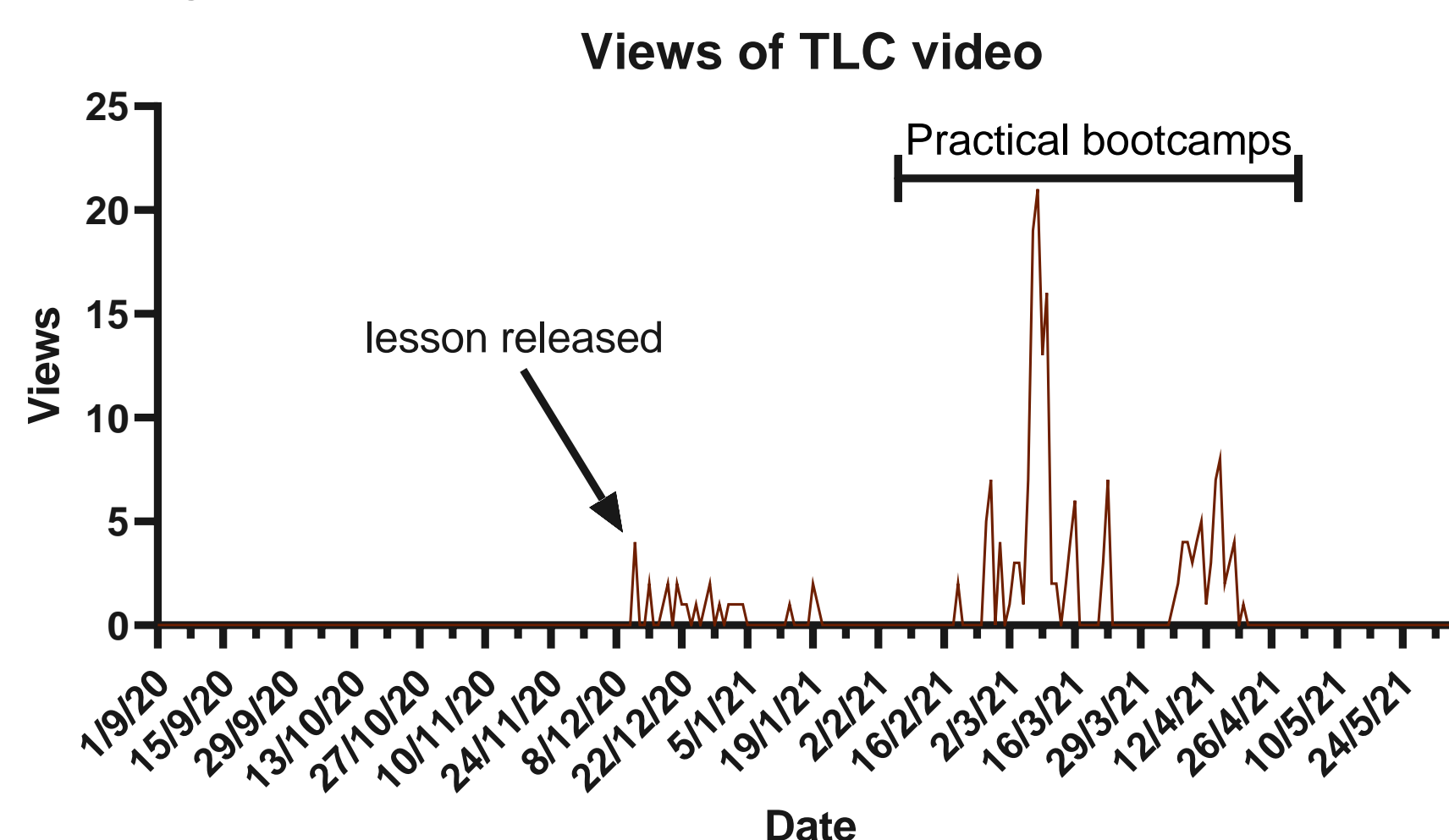


Figure 3: VLE usage data of TLC skills video throughout the academic year.

Student surveys: To gain more information on how the videos were being used, and get feedback on how effective they were as a learning resource, students who had access to the videos were surveyed. 84% of participants reported that they had watched all or the majority of videos that were available to them. No participants reported watching only 1 video and only a single participant reported watching no videos – this was due to their specific practical project not having any specific videos associated with it. Importantly, 96% reported that they watched the videos in advance of the labs (Fig. 4). 87% of respondents then reported that they had rewatched the video one in lab, with some reasons given as “to go over parts I did not understand/remember”, “make sure I understood the tricky bit” and “because I had forgotten”. The rewatching of videos in that lab is encouraged as it allows students to double check independently, before having to ask for help.

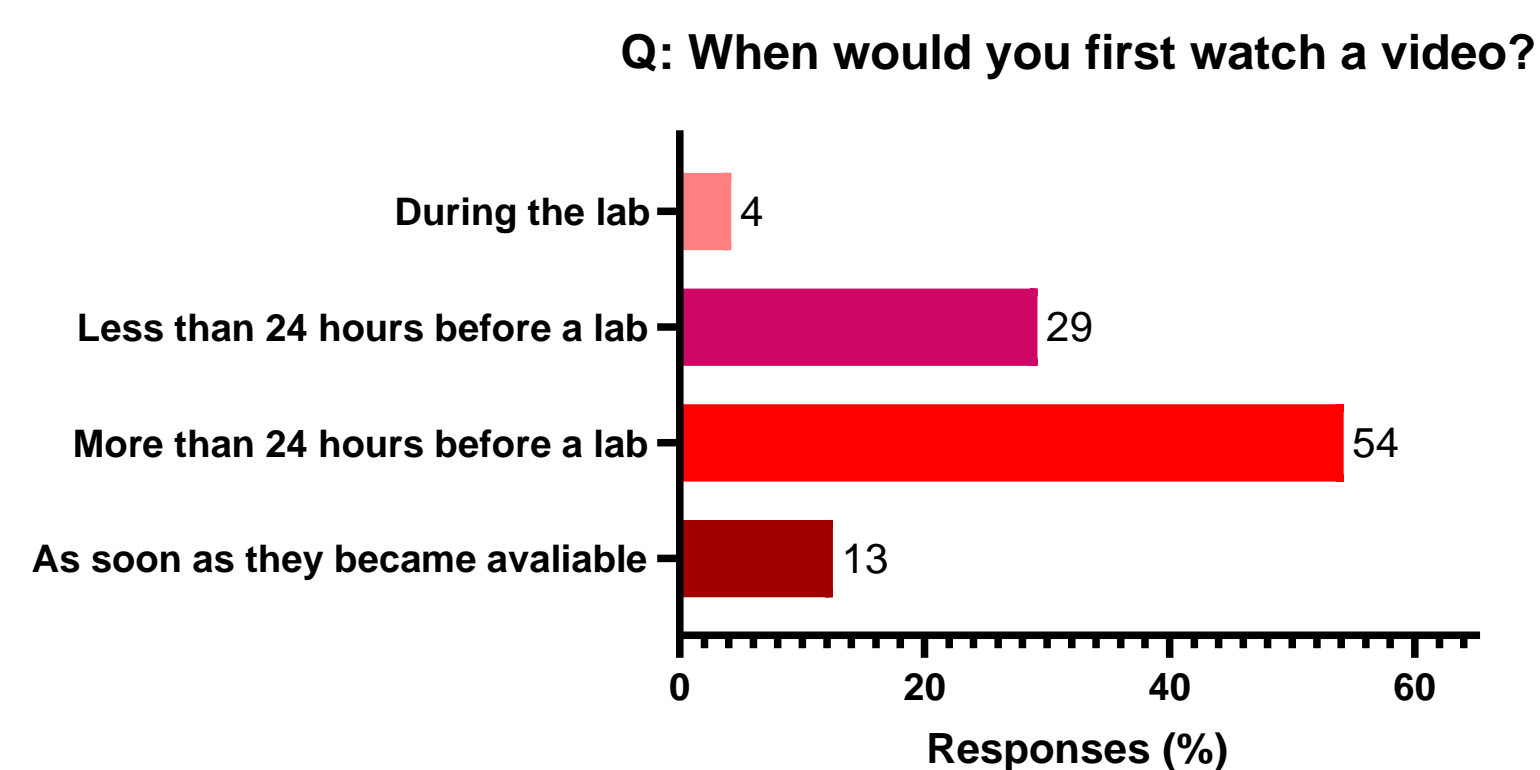


Figure 4: Survey response for how students used the videos (n = 25).

Finally, students were asked how important they felt each of the features (see list from introduction) was in creating an effective learning resource. Unsurprisingly the majority of participants responded positively to each feature, except for *music* and *written instructions*. The shift towards a slightly negative response to the written instructions is a surprise. It may be that because there are already voice-over instructions to support the video that the text is too much as well. In future we will consider the ability to choose if written instructions are visible – they must still remain an option for students with hearing issues and where English is not the first language. Respondents have been invited to take part in focus groups to get more detailed feedback. We plan to use the feedback to improve current and future skill videos. Usage data will be used to test how best to deploy the videos.