

For advertising and inserts contact:

Marketing Department
 Biochemical Society
 Kemp House
 152-160 City Road
 London EC1V 2NX
 email: marketing@biochemistry.org

Production Editor: Nicholas Walker

Editorial team: Emma Pettengale and Natalie Tawney

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First Floor
 10 Queen Street Place
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 email: editorial@portlandpress.com
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Science Editor: Chris Willmott (University of Leicester, UK)

Editorial Board: David Pye, Shane Hegarty,
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Teaching and learning biochemistry in a pandemic (and beyond?)

by Chris Willmott, Science Editor



This will be the last editorial before the end of my tenure as science editor. I'm taking the opportunity to reflect on an experience that I'm sure has been shared by many readers of *The Biochemist* during the closing months of 2020, namely the demands of adapting to novel modes of teaching. Whether they are staff generating the resources, or students on the receiving end, there is no question that the experience of studying biochemistry in the first part of this academic year is very different to all preceding years. What lessons can we learn from the experience so far?

The first thing to recognize is that we ought to be cautious about making sweeping generalizations. As I will note in a moment, I believe there are common themes and experiences, but informal surveys amongst colleagues across institutions reveal that programmes have come to significantly different decisions about the percentage of face-to-face teaching they ought to attempt. Some have set out to deliver as 'normal' a curriculum as possible, whilst other universities elected from the outset to shift almost all of their teaching online.

This brings us to the new lexicon of teaching. Will delivery be 'synchronous' or 'asynchronous'? Will this be 'blended' or 'hybrid' (and, since these terms are disputed, what do they mean anyway)?

Live sessions

If an online session is 'synchronous', what platform will we be using? Academics have had to adapt to the use of Blackboard Collaborate, Microsoft Teams and/or Zoom. Some may even be using Skype. Each of these tools has its own quirks. The number of participants and the intended activities may influence the decision about which system to use, so you need to make sure that the student knows 'where' to find you if you are toggling between platforms within the same course or module.

Many colleagues have come to recognize the value of a 'co-pilot' for such sessions. It is not necessarily easy to keep up with questions coming in via the chat feature, especially since that window cannot be seen in some tools whilst you are sharing your screen with participants. One solution involves engaging a second academic or a PhD student as co-host. The more adventurous have asked student ambassadors to take on this role. With smaller classes, the luxury of two screens (or two different devices) allows you to get around this problem whilst flying solo (Figure 1).

If encouraging live chat is one way to bolster engagement, what other methods can someone employ? Whilst the core platforms may offer rudimentary polling options, many academics have supplemented

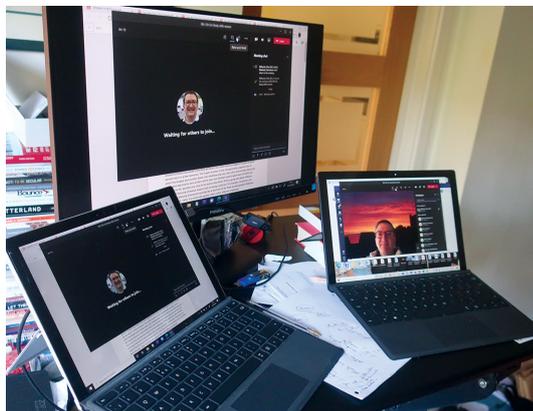


Figure 1. When two screens are better than one – logging in twice to some teaching packages allows you to monitor the online chat whilst your primary screen is used for sharing content

these by learning how to run live quizzes using voting packages such as TopHat or utilizing audience interaction tools such as Slido, which offers the capacity for students to pose questions anonymously and to ‘up vote’ queries from others that they’d also like to prioritize.

Elsewhere, improvisation and *Blue Peter* solutions have been at a premium. Tips have been circulated for making your own data visualizers (using e.g. your mobile phone). In the absence of any MolyMod kits at home, my own students were treated to an introduction to amino acid chirality using Liquorice Allsorts and Haribo fried eggs on cocktail sticks (Figure 2).

Asynchronous resources

What then of the asynchronous materials being provided for students? Merely pointing the class of 2020 at lecture recordings made the previous year is rightly frowned upon. So what do you offer instead? Lecturers have been encouraged to take a fresh look at their content, to



Figure 2. Improvised molecular modelling kits (available at your corner shop)

think about which bits might be delivered in a different format, for example, as prescribed reading, and to then re-record any necessary lecture material in more bite-sized instalments (we call them ‘episodes’). There was an additional impetus to do so in the UK, since accessibility legislation about colour schemes, the use of alt-text for images and closed captioning of presentations came into force in September.

This brings us to another realm – the practicalities of recording your mini-lectures. Suddenly academics have had to ascertain which room in their house has the best acoustics, which may include consideration of where you are least likely to be interrupted by ambient noise such as traffic, building work, the neighbours’ dog, an Amazon delivery or a hungry infant. Can you download the institution’s lecture capture software for home use? Are you going to dictate over slides within PowerPoint or employ another third-party solution? Are you finally going to find a use for that screen-writing stylus that came in a bundle with your PC a couple of years ago, but has since languished in its box? Are you going to ‘go all Andy Serkis’ and invest in a green screen? Then, having made your recording, how are you going to edit it, upload it and curate it so that the students know where to find it? These are surely skills that many of us did not expect to have developed during the past 12 months.

The online organization of your resources, for example, within a digital learning environment, actually becomes another facet to consider here. The pandemic has heightened awareness that students need clearer sign-posting about where to find materials than we had previously acknowledged. Some institutions have switched from bundling materials by topic to delivering in clearly defined weekly instalments, with an indication of what needs doing, by when, and which aspects are provided as optional extras.

What about the labwork?

Hitherto in these reflections we have avoided the elephant in the room – the development of practical skills. Biochemistry is, as we know, a hands-on discipline. There is ultimately no substitute for laboratory experience, be that class practicals or final-year projects. How much, if any, laboratory time could we (or should we) offer during the current circumstances?

Different institutions have come to different solutions. I believe most have tried to provide a reduced, though not completely non-existent, lab offering. Some universities have bought into resources such as Learning Science that offer simulations and related data-handling activities to contribute towards many of the intended learning outcomes without needing to invoke hands-on tasks.

In the context of accreditation, the Royal Society of Biology indicated that lab experience need not be offered in every year of a programme, provided it was possible at some point during the course of a degree in order for it to remain approved. This was a welcome clarification, acknowledging the dilemmas universities have faced regarding the safe provision of as enriching an experience as possible.

One of the highlights of the summer was the emergence of the #DryLabsRealScience network, under the direction of Nigel Francis at Swansea, David Smith at Sheffield Hallam and Ian Turner at Derby University. Fortnightly Zoom conferences showcased potential alternatives to lab-based final-year projects which would retain as much opportunity as possible to develop a scientific mind-set. An accompanying website quickly accumulated briefing sheets and how-to guides in addition to recordings of the talks.

This was an archetypal 'community of practice' – colleagues from across different institutions pulling together, recognizing that in a time of crisis it was better to work together than buy into the rhetoric of rivalry. It is to be hoped that such collaboration will continue beyond the current pandemic.

Not all bad

Given the overall levels of investment, in terms of both time and money, are there other good things that could or should emerge from this whole experience? There is a growing feeling that there are some definite positives associated with the rise in self-directed or asynchronous models of study. Students have greater ability to adapt the specific times that they study around family commitments, part-time work and other lifestyle issues. Some have appreciated not having to commute to campus, especially avoiding the need to drag

themselves onto campus for a 9 am Monday lecture. In that regard, I am aware that the percentage of a cohort 'present' at certain of my online sessions has been higher than the equivalent face-to-face lectures last year (notwithstanding the fact that some students may have taken the opportunity afforded by having their camera and microphone off to be actively engaged in something entirely different).

The increased emphasis on students managing their own studies, rather than listening to academics talk at them, prior to a time-controlled opportunity to sit and regurgitate the contents to us later in the year has been acknowledged as a healthier form of study. We could also point to all those media-handling soft skills we have acquired as fruit of the lockdown.

Are there downsides? Of course there are. The lack of hands-on laboratory experience already identified is clearly a major weakness of the current situation. Alongside that are worries about the effects of isolation and associated harm to mental well-being. There are worries that elements of collaborative learning are being missed. Many of us have experienced long hours of screen usage unaware, yet, of the long-term detriment it may have to our eyesight.

I would not, however, be the first to suggest that we will never be returning to the exact model of teaching we had before Covid. I have also found myself trying to imagine what teaching would have been like if we have been placed under similar restrictions 10 or even 5 years ago. I suspect our experience would have been very different.

So, as I pass on the mantle of editorship to the next incumbent, I am very grateful to all of the Biochemical Society team who have made it such an enjoyable role. My best wishes to all of you for a 2021 that does not echo *all* of the teaching and learning we have experienced this year. ■