

WORKPLACE STATISTICS TRAINING MOVED ONLINE

Angie Wade and Eirini Koutoumanou

Great Ormond Street Institute of Child Health, University College London, UK

awade@ucl.ac.uk

The COVID-19 pandemic forced (or quickened the advent of) online short course statistics training for non-statistical professionals. Participants in traditional statistics programs generally form a cohort who progress together over some protracted timescale, forging support networks and friendship groups, some of which will be maintained throughout professional careers. By contrast, short courses for professional purposes are often standalone and half a day to one week in duration. Participant focus lies with obtaining skills for usage within the foreseeable future, such that creating social networks with other participants is of little or no importance. We present our experiences with two years of online, examination-free, short course statistics training for the period from March 2020 to 2022.

BACKGROUND

The Centre for Applied Statistics Courses (CASC) at University College London (UCL) has been providing an average of two short courses per week for over 10 years. These courses, which are all aimed at non-statisticians, cover a range of introductions to statistical analyses and allied software. The courses are atypical of the usual university courses, being examination-free and with the aim of directly benefitting local researchers or wider non-university-based participants. Students attend because they require knowledge for immediate application or general understanding. We make use of university facilities, but the courses do not form any part of a wider curriculum and are standalone entities. Participants come from a wide range of backgrounds and levels of seniority. Our one- to five-day courses before the COVID-19 pandemic were all face-to-face (f2f) and classroom based, and it was felt that students benefited greatly from the informal interactions during tea breaks and lunches as well as from direct contact with lecturers (Smith, 1996). Due to the pandemic, there was a sudden but necessary switch of planned f2f teaching to an online and distanced format with no physical student interactions with lecturers or other students. Although there were brief periods during the two years from March 2020 until 2022 where it was permissible within our university to conduct some f2f sessions, the rooms were limited. Priority was given to undergraduate and post graduate students, not to short courses of our type. Hence, we have delivered short statistics courses that are not a mandatory part of any qualification entirely online for more than two years. Participant often enroll in the courses at the last minute so that the courses require an inherent flexibility of instructors.

IMPLEMENTATION OF ONLINE COURSES

There was little warning of the move online. We were half-way through one course that was being run over a series of evenings (10 evenings on five consecutive weeks), and at the last f2f lecture, we all were unaware that from then on, we would be teaching online. Those first online lectures were delivered using Microsoft Teams, and feedback was mostly positive, although several students mentioned connection issues and poor sound quality. As also noted by Parkes and Barrs (2021), there was a general appreciation of the speed of response to the pandemic and efforts to maintain teaching quality. For everyone involved, this was their first experience with online teaching and learning.

After a gap of a few weeks (we had hoped that f2f could resume for most courses), we held our first one-day training fully online with an *Introduction to R* course. This was ambitious because it entailed hands-on software experience for the participants in addition to theoretical content. The first platform attempted for this was Blackboard Collaborate (BbC), as advised by the university, but BbC soon proved to be inadequate for the technical demands required by a software-based course. As a result, the course was transferred to Microsoft Teams. Previous ratings had been 'good' or 'excellent' (4 or 5 on a 5-point scale), and this particular course had noticeably more 'ok,' or ratings of 3. Most of those who expressed a time preference for the course thought that five hours (10:00 AM to 4:30 PM, interspersed with breaks) was not enough time, and the course length should be increased. Ease of navigating the steps necessary for attendance at the online course was consistently rated as 'ok' or better, although one person rated the sound and video quality as very poor.

The following feedback quotes summarise the early problems encountered. This participant gave their immediate thoughts regarding the platform used and how teaching fellows could augment the main teaching within an online environment:

The course was meant to be one day, but had to be over two as the first day the online presentation became impossibly slow. So we did not get through all the material on the first day. Microsoft Teams was much more effective and useful than the first platform that was being used. My suggestion for improving the material is to have the main presenter (Eirini, in our case) do the teaching materials, and for the other teaching fellows to address any questions raised on the chat, as Eirini trying to answer all these questions slowed things down considerably. I think if the other teaching fellows tried to answer questions individually while Eirini continued on, that would help with the pace. If multiple questions on the same topic were being raised, the teaching fellow would then raise this to Eirini to cover the same topic again.

Issues regarding the platform being used and online messaging were also noted:

Microsoft Teams worked so much better than the blackboard app. The only problem I had was that once we broke in to small groups and then came back to the main group, messaging became obtrusive and I couldn't work out how to turn off the prompts other than logging out and back in to Teams. Otherwise, using Teams was a great way of presenting the course.

Although some participants had difficulties, there was sympathy with teaching staff:

The circumstances were very exceptional. The course was designed for face-to-face delivery and the facilitators did their best to adapt to COVID-19 social distancing. As I have zero experience with R, this format was a bit hard to follow and I honestly don't think I got much out of it. Doesn't help that I was unable to join for day 2. Still, I absolutely feel that everyone did their best and am quite happy with how things went. Stay safe.

As instructors, we all knew, as did everyone involved in education at that time (Afshan et al, 2020), that we had a lot to learn (and needed to do so quickly). Things improved a little by the time of the next course (five-day *Introduction to Statistics and Research Methods* course), and we received some positive suggestions in our feedback questionnaire. For example, a suggestion was made to verify that participants' sound worked before the class commenced.

...perhaps having music on in the background in the mornings whilst people are joining Microsoft teams, so there is no confusion about whether the sound is working or not when it's quiet.

Another person suggested possible advantages with using a personal chat feature.

Would be good to have a function in the chat (if MS teams allows) like other software like Zoom do, where you can message or chat with a specific teacher while the course is going on especially during break or lunch time as I would feel hesitant taking up too much air time on a general chat group especially if my problem is too basic.

But there were still difficulties noted, too, but overall, these were less than in the previous two courses:

Sometimes, I lost interest because I've lost the track due to technical difficulties. I'm not sure how to rectify that but, it seems it's not an uncommon problem.

A couple of months and a few more courses later, ratings had pretty well recovered, and feedback was largely very positive. Both we and our audience appeared to have adapted. The following comments come from courses run in May 2020, less than two months into the lockdown online period.

- *It was excellent and teams was easy to use. Worked well being delivered remotely. Thank you.*
- *This is the first time I have done an online lecture and I was really impressed (I had been dreading it!)*
- *It worked much better than I expected!*
- *As much as I would want to add value, I cannot think of anything else to suggest because this delivery session was highly impressive. Maybe change the top end of your ratings from 'Good' and 'Very Good' to 'Excellent' please. It is well deserved.*
- *I really enjoyed the course - I have only attended the in-person courses before so was not sure how it would work online, but was really good. Very informative and well-organised.*
- *Keep doing this great work, the Zoom on line course are a major milestone. I used to do a course once a year, now I can manage to do 2 or 3 courses every year.*
- *The presentations worked well online and the use of annotations was fantastic!*

- *Loved that it could be done online, otherwise I would have to travel plus all the expenses associated.*

At the current time, feedback is similar to pre-pandemic. Most criticism, where it exists, is about content, and the problems of online delivery receive minimal, if any, consideration.

Changes Made

Apart from the obvious move to an online environment, some specific changes were made over the two years to reach a point where we feel the teaching experience online is as positive as it can be for both teachers and students. The platform most commonly used by us currently is Zoom. Zoom allows us to do the following.

- Facilitate student instruction without using university-based accounts and with ease
- Display one of the largest numbers of live camera feeds simultaneously alongside presentation slides and the presenter's own camera feed
- Easily use breakout rooms
- Use a chat feature that allows for correspondence with individual staff members and students rather than needing to always message the entire group
- Use a breadth of choices for reactions such as hand raising and thumbs-up (which is greatly helpful in an online environment)

We tried to mimic the community supportive atmosphere that we could create in the classroom as much as possible. During f2f sessions, it is generally easier to identify those who are struggling and initiate a chat at a coffee break or during a practical to try to bridge any gaps or make the student feel at ease discussing any problems they have. So that each person did not feel isolated, we tried to encourage chatting prior to the start of the course, asking where individuals are based and encouraging them to post brief introductions in the chat. During breaks and lunch, we asked for pictures of lunch, pets, houses, etc. Some individuals enjoyed this participation, but others did not engage. Further work needs to be done to identify ways in which we might involve more participants in a positive fashion (Davis et al, 2019).

Some students said that they actually found it easier to participate in an online environment and ask questions due to the chat facility (Rahayu, 2020), enabling them to be less obtrusive than needing to raise a hand and speak within a f2f classroom.

Both teachers and students found that a full day at the screen could be tiring, and concentration and enthusiasm were noticeably lower by the end of the day. Originally, our typical day consisted of four sessions of 1.25 hours between 10:00 AM and 4:30 PM, with 15-minute breaks in the morning and afternoon and an hour for lunch. This timing worked well when participants were travelling to London for f2f courses, and they would not have appreciated needing to stay overnight for a split course. Online, however, was a different matter, and we decided that changes to the timing of the courses would be beneficial. Online day courses have been split into two consecutive days each from 9:30 AM to 1:00 PM with one 15-minute break. Note that the overall teaching time has been increased from five hours (f2f) to six and a half hours (online) for the same content. This increase in timing was paramount to accommodate additional time necessary for questions and practical sessions.

The format of all our courses has been lectures interspersed with practical exercises to ensure all are following the content. Individual support for those struggling with content was made available in the classroom via the use of assistants where necessary. Online this has been replicated by always having a support person present who can be contacted directly via the chat.

Student Numbers and Finances

Throughout the last few years of CASC operation, there have been fluctuations in the numbers of courses run and their attendance, largely due to changes in staffing. Table 1 gives some summary numbers for courses run before the start of the pandemic until the present time.

The only full academic year of teaching during the pandemic represented in the table is for 2020–21, with 2019–20 consisting of approximately half pre- and half post-pandemic courses. Ascribing changes exclusively to the pandemic is not possible. There are many fluctuations that occur across time with or without a pandemic, plus there may be confounding factors. What we can note,

though, is that we expectedly ran fewer courses (as previously one-day courses were now split into two half days), and whilst external numbers appeared to hold, there was a fall in internal participants.

Table 1. Annual course summaries 2014-2022

Academic year (Sept-Aug)	Number of courses run	Internal (UCL) participants	External participants	Total (internal + external)	Total income (gross)	Medical illustration (printing)	Catering	Net income
2014–15	73	1052	447	1499	128,679	10,951	17,442	100,286
2015–16	63	651	400	1051	115,329	6,533	11,494	97,302
2016–17	75	769	598	1367	175,789	9,836	22,031	143,922
2017–18	93	619	503	1122	184,920	8,121	15,386	161,413
2018–19	67	794	426	1220	236,825	11,118	3,647	222,060
2019–20	76	771	396	1167	199,437	7,861	5,420	186,156
2020–21	49	589	438	1027	137,149	437	0	136,712
2021–22 (1 st 6 months)	33	227	241	430	80,462	0	0	80,462

The medical illustration costs listed in the table are for the printing of course booklets. This cost became zero (or minimal) with online delivery. (In later courses, we offered to deliver course notes to participants' homes, but there were few who took up this offer). Medical illustration costs utilized 4–9% of overall income until 2019. Catering costs covered refreshments during breaks plus lunch for participants. The catering costs fell to zero with online delivery but were typically 8–13% of gross income previously. For f2f courses, the net profit was between 78 and 90% of gross income.

The argument is often heard that online courses should be cheaper for participants because costs are less for medical illustration, catering, and heating and security within the building. However, this ignores the fact that it requires greater lecturer input with increased hours and increased need for support in the online environment. For f2f courses, we found that a lead teacher could run a classroom of 40 students with perhaps one helper (who often was not required throughout the class but may have been 'on call' for struggling participants). Within the online environment, we have found it necessary to always have at least one helper consistently present and ready to take over should there be, for example, any internet connection issues. This represents a substantially increased salary cost, and this should be investigated further in relation to the savings made before judgment can be made on appropriate pricing changes.

CONCLUSIONS/ THE FUTURE

Like others (Hollenbeck & Shi, 2021; Kim, 2020), we learned a lot very quickly as the pandemic took hold and have adapted to provide support remotely for our participants while using primarily synchronous online delivery of more or less the same content as used during f2f versions of the courses. Surprisingly, we realised that there were many advantages to this format, and it is unlikely that we will ever return to the face-to-face short course environment that we previously inhabited. Many of our students prefer to attend online courses because it removes the need to travel to London, saving their time and money. Students get the same teaching experience with regards to lecturer attention and input, are well supported by assistants when necessary, and have access to videos post-course to recap any areas of confusion. For the majority, it seems that they may never wish to return to f2f for short courses, the emphasis being on learning a skill of immediate need rather than forging networks with other course participants.

We can never be 100% sure that there will be no glitches or breaks in communication when using an online transmission for courses, and this can be daunting initially. However, we should remember that f2f teaching can have comparable problems—for example, students not being able to locate rooms, transportation being disrupted, and power outages on occasion. We have learned to adapt to the new 'normal' of short courses, and this has benefits for the audience.

Hybrid short courses, where the f2f lecture is concurrently transmitted live to an online (Zoom) classroom, are a very appealing format for short course providers moving forward; they certainly are for CASC. The requirements of both groups of participants will be satisfied: participants whose circumstances prohibit them from travelling to the classroom of the f2f class and also those that seek f2f training courses due to their own learning preferences.

IMPLICATIONS

A new genre of short course delivery has been established and will doubtlessly continue. We need to explore the balance required between f2f and online to provide optimum delivery now that pandemic restrictions have lessened.

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