

Moving from Traditional to Virtual/Online Anatomy – benefits and challenges

This case study describes the process of moving from traditionally taught anatomy to a purely online version (due to COVID-19), followed by a move back to virtual anatomy and face-to-face workshops. Colleagues will be able to appreciate the role of technology and how to foster student engagement and participation in different learning environments. In addition, the case study highlights the importance of being proactive and creative in terms of responding to challenges to ensure continuity of learning and enhanced student learning experience.

Anatomy has traditionally been taught (outside of lectures) with cadavers, prosections or specimens of some description. At the University of Bradford, since we have no dissection facilities or prosections, and an extensive collection of pathological rather than “normal” tissue specimens, hands-on anatomy (dissection) for Clinical Sciences students has been taught off-campus at the University of Leeds. The reason for this was due to the programme being mapped to the first year of the MBChB (medical degree) at the University, necessitating detailed anatomy resources (in this case, dissection).

In 2012, we invested significantly in the Anatomage Table – a method of teaching anatomy virtually.

This method is in fact being used in numerous medical schools around the country, to supplement or to replace cadaveric dissection classes, but at the time there was only one other university in the UK who had an Anatomage Table, putting Bradford at the cutting-edge of the anatomy discipline.

Whilst relevant for Clinical Sciences and exceptionally useful for other degree programmes (Biomedical Science, Paramedic Science, Physicians Associate, Pharmacy, etc), the opportunity to carry out cadaveric dissections was a USP for the programme and provided the “gold-standard” of anatomy teaching - and so it continued until March 2020.

As a result of the Covid pandemic in March 2020, all face-to-face teaching (including dissection) ceased, and moved online. Luckily, by this stage, the students had finished the cycle of dissection classes, and only revision sessions were left. The Anatomage, housed in the Integrated Life Sciences Learning Centre (ILSLC) was likewise inaccessible, so new methods for anatomy revision had to be found at short notice.

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The cadaveric dissection class contents were based loosely around the Grants Dissector textbook, which also had online dissection video resources (which we did not at this stage subscribe to). We requested and were granted free access to the Grants Dissector video resources, as revision aids for our students, until the end of the supplementary examinations, and assumed that everything would be back to “normal” for the 2020-21 session.

In September, in response to the pandemic and the move to partially online teaching, we were granted Faculty funding for two licences for the new Anatomage Table on Cloud – a purely online resource – in order to prevent the loss of anatomy teaching due to lack of access to the physical table and the timetabling problems caused by social distancing.

However, as the Clinical Sciences students were due to start their dissection classes in November 2020, everything moved online again, and all dissection at the University of Leeds was cancelled, without any real possibility of being reinstated during 2021-22. Cue an unexpected shift to a completely online anatomy syllabus...

The students were required to actively engage with the materials and resources in a directed manner, on a weekly basis (as they would for the dissection classes).

In order to provide the appropriate materials and information, without access to cadavers, the following resources were developed/utilised:

- **Weekly release of materials via Canvas** – in order to encourage a steady progression through the materials, the “dissection” timetable was maintained, and all materials were released on a weekly basis. Weekly Canvas pages were designed to provide informative and straightforward repositories of information and resources.
- **Dissection workbooks** – original workbooks were re-purposed to form self-directed study resources (available as Word documents for students to complete, linked to the specific video resources and other information) and converted to Kuracloud digital workbooks. This platform allowed students to complete their workbooks online, annotating and uploading images, etc, and printing out or saving a completed version at the end for checking or revision.
- **Grant’s dissector video resources** - funded as an institutional resource, in response to a business case request for supporting teaching materials.
- This allowed our students to access high-quality cadaveric dissection videos, to take the place of the dissection sessions – the benefits of these were primarily flexibility and the opportunity to watch and re-watch multiple times. The obvious downsides included the lack of interaction and engagement, a reduction in experiential learning, and the loss of the hands-on format which many students find more instructive than being passive observers.
- **Online Anatomage platform** - also key to the teaching, containing not only digital models which could be used to demonstrate and practice dissection, but also prosected (previously dissected) organs and regions of the body, which again are key for demonstration of anatomy. This was available in online teaching sessions but

also as a tutor-led resource for students to access at a time to suit them, for self-directed learning with tutor/technical support available if needed. The online Anatomage access was extended to weekends and vacations, to allow students as much flexibility in their learning as possible.

- **Tutorials and drop-in sessions** – to recap material, provide more detailed explanations, and to cover any questions or queries raised by students during the course of their self-directed learning.
- **Asynchronous videos** – video recordings were created to talk students through expectations of their self-directed learning, to explain how to access and make best use of the online resources, and to create additional explanations and content for study outside of tutorials, to support their learning and answer their queries.
- **Self-assessment resources (Xerte platform and Canvas quizzes)** – a key point is that answers to the workbooks are NOT made available, in order to ensure that students complete the workbooks and **check** their answers, rather than using the answer booklets as a revision tool and not engaging with their own studies. In order to provide students with a means of checking (for example) labelling of anatomical diagrams, the Xerte platform was utilised to create drag and drop quizzes, one per session, covering every diagram in the worksheets.
- Canvas quizzes were used as checklists, to ensure that students could identify the required anatomical structures on cadaveric images (often difficult to interpret without practice) as well as on textbook diagrams (which are generally extremely clear and straightforward).

Materials were released weekly on a Monday morning, and students were encouraged to ensure that they completed each week's materials in a timely manner, filling in their workbooks, working through the videos, and posting any questions or queries in the discussion board. This was particularly important, as these queries formed the basis for the direction of the tutorial sessions set up to support the self-directed learning – normally questions would be asked, and answered, in the dissection room.

Over the course of the module, the majority of students engaged well with the resources, posting questions by set deadlines in order to direct the content of the tutorials, and manage their workloads.

There were inevitably some students who chose not to engage, preferring to leave it to the few weeks before the exams in May. This may have been due to personal choice, or may have been due to a lack of appreciation for the amount of work needed to work through the materials and so gain a good understanding of the anatomy. The release of the formative examination before Easter will almost certainly have provided impetus for some students who had not hitherto engaged!

The online tutorial sessions were highly interactive, utilising polling through Zoom and keeping a very active chat window to answer questions throughout the sessions.

The engagement with the Grants Dissection videos was very good, and from student comments, was an extremely useful resource. The online Anatomage was used to very good effect in online teaching sessions and to produce pre-recorded content, but student engagement could perhaps has been higher in terms of self-directed use. However, those students who did use it were very positive and found it aided their understanding, and being able to work through the virtual anatomy at their own pace and at a time to suit them, as well as being able to work online in a group, was beneficial for them.

The re-purposed workbooks in the Kuracloud platform were not as popular as expected – possibly because students found it just as easy to work through an online Word document, pasting and annotating diagrams and simply typing in their answers to questions.

However, if the Kuracloud resources were enhanced to provide more diagrams and images in a format where students could check their answers and receive feedback, this may encourage more use. The reason for not doing this initially was the requirement for the student to research and find their own information (i.e. labels) rather allowing them to choose from a small subset of pre-prepared answers (as well as the time–cost associated with this preparation).

In terms of assessment, whilst not directly comparable due to the change in format of both the teaching and the assessment (same content but online with images rather than in the dissecting room with cadavers) the students performed at a level equivalent to preceding years, demonstrating that there was no detriment to the students, and students had successfully engaged with the material.

The biggest hurdles faced in this change were: the disappointment of the students to have lost the opportunity to carry out actual human dissection (which had been until now a USP for the Clinical Sciences course); the time needed to convert the teaching resources to online materials, producing new materials and directing students to existing sources; and ensuring engagement with the online materials by the students.

The change happened very quickly with minimal notice, meaning that materials were often being prepared right up until the time of release on a Monday. The self-assessment materials were all produced during the Easter vacation, and the time-cost associated with their production was substantial.

This year (2021-22), the teaching remains online, as the dissection facilities are still not available, and are not likely to be again. However, the time-cost has decreased as the resources are available from 2020-21, and could be refreshed and re-used for the new cohort.

Rather than producing a set of resources each week, and struggling to produce self-assessment opportunities at the end of the year, all materials have been released at the start of the Anatomy section of the module, including pre-recorded videos and the self-assessment resources. This means that students can work through all of the materials at their own pace and are not limited to weekly releases.

This does create the issue of a less-structured format to the anatomy, but once again the content has been divided into weekly sections, with one Canvas page per week, and clear instructions to the students for managing their work to ensure that it is once again completed in a timely manner.

The issue of engagement is perhaps even greater this year, as last year there was no choice BUT to teach online, This year it is a deliberate decision, and it remains to be seen whether the students will manage their workload and engage with the content, and with staff in the tutorials. Tutorials are face-to-face, this year, to help gauge engagement and understanding directly, and it is hoped that this will provide the students with accountability, and some extra impetus to keep up with the work.

It is difficult to track engagement with resources such as the dissection videos, and the online anatomage. Whilst the access to the Anatomage has been extended (access is now 7am-10pm 7 days a week, on a booking system, except for teaching times) it remains to be seen whether the students will take up the opportunity to utilise the online dissection as much as, or more, than last year's cohort.

Anatomy teaching within the higher education sector is moving, possibly inexorably, towards virtual models rather than cadaveric dissection. The cost implications and sustainability issues associated with a dissection facility make this method of teaching untenable for all but the larger medical schools, and yet many non-medical schools and courses require anatomy teaching.

In successfully moving the content to an online format, we have demonstrated that it is possible to effectively engage students with anatomy learning, not just in a non-dissecting room setting, but actually in a completely online environment. We have integrated different virtual and online resources into teaching, allowing students to recognise these as useful learning opportunities for their future studies, and demonstrating to colleagues that this provides a highly effective alternative to hands-on dissection classes.

This has been shared with colleagues who also have an interest in teaching anatomy, but not more widely at present. In terms of dissemination, the proof of this particular "pudding" will be in the effectiveness of this move to online anatomy in an environment where other teaching has moved back to "normal". If the method proves effective this year, then we will certainly look to disseminate this practice more widely, with other organisations and programmes in a similar situation – requiring high-level anatomy teaching and learning, without dissection facilities.

Key words: themes and topic

Anatomy; learning and teaching; virtual anatomy; self-directed learning

References:

Tank, PW Grant's Dissector (2013) 15th Ed Lippincott, Williams and Wilkinson