'Goldilocks anatomy' – data-conserving anatomy video tutorials during emergency remote teaching

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Why was the idea necessary?

Anatomy forms part of the preclinical curricula of the Bachelor of Pharmacy (BPharm) and Medicine (MB ChB) degree programmes at the University of Namibia (UNAM). The focus of this report relates to the challenges and subsequent interventions during the onset of the second semester of 2020. The modules of interest involve the respiratory and cardiovascular systems. These modules are concurrently presented for both degree programmes and include the histology, embryology and gross anatomy of these systems.[1] Medical students are required to complete practical laboratory dissections while the pharmacy students are not.

Owing to the growing pandemic, the Namibian government announced a State of Emergency on 27 March 2020. This announcement was most inopportune as UNAM students were on recess the week before the national lockdown was announced and we were caught off guard. Institutional attempts to introduce blended learning and formal online learning were not achieved in time before our students went on recess. Our students (pharmacy and medicine) were at home and could not return to campus. They were subsequently restricted by whatever educational resources they happened to have taken with them on holiday. Many spent their recess at home in a rural setting (off-grid villages) with little infrastructure and without textbooks or laptop computers. The biggest challenges our students faced related to internet connectivity and reliability, and the availability of sufficient data. A Google Forms survey, distributed during the student recess, confirmed our concerns: 50.8% of students possessed only a mobile phone, while a meagre 4.1% own laptop computers. Students' internet connectivity relied on mobile data (56.6%) and 48.4% stated that they did not have internet at home. These findings correlate with an American report which found that 56% of students from low-income households reported reliable internet access. Only 45% stated that their home environment was conducive to remote learning.[2] Matters were made worse by a surge of users taxing the learning management system (LMS) and the limited server space.

Practical dissections were not feasible because of travel restrictions and social distancing regulations. We provided links to Essential Anatomy 3D, Kenhub, Acland's Anatomy and YouTube as a substitute via our LMS (Moodle) and cloud storage (Google Drive or G-Drive). These resources proved to be 'too much of a good thing' and the medical students were subsequently overwhelmed by too many electronic resources that exceeded their internet data availability. Furthermore, narrated PowerPoint (PPT) lectures proved challenging as a result of the 250 MB data restriction on our LMS server and the loss of narrations on mobile devices. The data and file format limitations necessitated a small file size alternative that addressed the educational needs of our students and aligned with the intended learning objectives. Here the authors report on a novel and content-specific approach to emergency remote teaching (ERT) – i.e. the emergency provision of access to instructional content as opposed to formal online learning (FOL), which is carefully planned in advance.[3]

What was tried?

We developed a feasible alternative to multiple electronic resources that accounted for students' lack of data in the form of short, to-the-point video tutorials, with an average duration of 3 minutes and a file size of 6 MB. The tutorials focused on cadaveric specimens, histological slides and medical images that could be shared via WhatsApp and other messaging services. The videos were deemed 'just right' by the lecturers in reference to the aims of the programme, intended learning outcomes, mode of assessment, duration and file size, and can therefore be considered as 'Goldilocks anatomy'. Freely available and user-friendly software programmes were selected to capture the video content of annotated images and allow compression of the rendered files. iSpring Free Cam (version 8) (iSpring, USA) was used as a desktop recorder and proved invaluable during the process. The programme allows screen capturing with audio recordings of any educational activity on one's desktop. The same can be done with an interactive virtual histology programme running in the background. The software permits customisation of the recording area and editing of the video after recording (trimming and noise removal). The generated videos were typically between 20 and 90 MB in size, but were compressed and converted to MP4 and M4V formats which ranged from 3 to 9 MB. We used HandBrake software to compress and encode the video files to the desired format. The file compression reduced the image quality but it was found to be negligible, with no noticeable loss of detail for their intended purpose. We also found that the audio quality was unaltered. The generated video tutorials were uploaded onto Moodle and G-drive and emailed to class representatives who then shared the material via WhatsApp.

Lessons learnt

The visual nature of anatomy as a subject lends itself to innovative approaches to its delivery. Various virtual anatomy and web-based educational systems exist.[4] Multimodal approaches, where didactic lectures and practical dissections are supplemented with clinical correlation, medical imaging, models, and team- and problem-based approaches, have gained much interest.[5] While the best pedagogical approach to anatomy continues to be debated,[6] we are faced with the realities of ERT where the majority of our students are confronted with resource-limited learning environments. We were completely cognisant in our approach and well aware of the impact of these limitations on students' learning. Anatomy's visual nature is also its biggest drawback during ERT, where online resources require substantial amounts of internet data.

Narrated PPT lectures can be substituted by video tutorials of smaller file sizes. Furthermore, the use of in-house resources such as prosected

specimens, donated medical images and digitised high-definition histology micrographs prevented copyright infringement. These short tutorials allowed for sharing on multiple messaging platforms such as WhatsApp. The benefits and convenience of WhatsApp as a learning tool are well known.[7]

Another tendency during ERT is compensation on our side, where we as educators try to provide as much information as possible. We subsequently lose sight of the students' challenges. As lecturers, we sometimes forget that students have other subjects that require additional data use in resource-limited environments. This is an extremely important consideration when providing students with web-based resources that consume their internet data. 'Less' in this context is therefore 'more'. The element of self-directed learning can be addressed in a similar fashion with the provision of essential reading material as opposed to too many supplementary resources. However, the primary driver must be constructive alignment. A well-structured programme guide with appropriate learning outcomes, specific unit descriptors, and assessment criteria and standards proved to be an indispensable resource during ERT. The inclusion of medical images was expected to facilitate learning in context, i.e. the integration with clinical medicine, to some degree.[6] The contextual aspects of remote online learning, such as time, content and server limitations, had to be addressed as far as possible. We have learnt that FOL is not feasible in a resource-constrained setting and FOL can only work when and where technology permits. This holds true for active and synchronous online instruction.

We have also come to appreciate the importance of feedback and explicit and frequent communication with our students. Communication can either be synchronous or asynchronous and allows for constant feedback.

Finally, the ownership of intellectual property (IP) of online teaching content needs to be addressed. To the authors' knowledge, UNAM has no clear IP policy that addresses the distribution of the video tutorials generated by the authors. It is therefore important for institutions to stay abreast with the digital learning revolution and implement the appropriate policies.

What will I keep in my practice?

In practice, the video tutorials serve as a viable alternative to the gold standard of narrated PPT and YouTube lectures. They were provided in synchrony with a scheduled timetable. These recordings are versatile and provide an auditory and a physical reference (visual) to anatomical structures. The provision of essential rather than supplementary tutorials, with selected web-based learning resources, affords an even wider learning experience. Considering that students mostly use smart phones and that PPT narrations are sometimes corrupted or inaccessible when diverse applications are used, these data-limited, pertinent tutorials provide a bespoke alternative. We will continue to facilitate student-to-student engagement on the LMS. Collaborative pedagogy through forum discussions proved very useful and helped to clarify difficult concepts. Constant engagement encouraged students to contribute towards their own learning.

What will I not do?

It is important not to overwhelm students with too many electronic resources in the hope that it will supplement what cannot be addressed through virtual lectures or online discussions. It is tempting to direct students to the wonderful array of electronic resources on the internet. Many are freely available, but it is important to remember that 'free' resources are never free and require internet data, more so in a resource-limited environment. Maintaining a balance between the use of an LMS and other modalities is essential, and students should not be dependent on only one.

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Evidence of innovation

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