

# Education during COVID-19: Ready, headset, go!

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The recent outbreak of COVID-19 has derailed the conventional methods of delivering medical education, forcing educators to reconsider how to continue training their students in order to secure the supply of future doctors. The temporary closure of medical schools and suspension of clinical placements have forced an increased reliance on technology to deliver teaching remotely.<sup>1</sup> Virtual reality (VR) is an emerging technology which allows users to explore and manipulate artificial three-dimensional (3D) simulated environments delivered via computer software in real time.<sup>2</sup> As two senior medical students with a keen interest in VR technology, in this article we offer a vision of how it can be used to provide distance learning to students during this pandemic and beyond.

As educators around the world grapple with how to continue providing education, many schools have reverted to traditional didactic lectures, either pre-recorded or streamed live through videoconferencing platforms.<sup>3</sup> From our experience this method has worked relatively well to deliver the aspects of pre-clinical curricula such as physiology and biochemistry where teaching normally consists of a predominantly lecture-based approach, but less well with anatomy.

Anatomy is a visual science that cannot be delivered purely through lectures and two-dimensional images in textbooks. Thus, anatomy lectures are complemented with cadaveric dissection and the use of prosection, which enable students to visualise the spatial relationships between structures and reinforce their theoretical understanding. In the absence of such practical sessions, VR can be used to enrich anatomy learning. Using VR, students can interact with dynamic 3D views of anatomical parts through magnification, rotation and even 'virtual dissection' to remove layers and reveal underlying structures.<sup>4</sup> A recent meta-analysis of studies evaluating the effectiveness of VR in anatomy education found that students exposed to VR simulation obtain significantly higher test scores compared to their counterparts using traditional methods alone.<sup>4</sup> Having used both VR and traditional methods to revise anatomy, we

found that when applied as an adjunct, VR fostered further knowledge consolidation. The power of VR lies in its replicability which cannot be accomplished within the time, space and faculty constraints of in-house teaching.

In comparison to pre-clinical curricula, it has proved more challenging to transition clinical education to online platforms.<sup>3</sup> This is due to the fact that during this stage of training students rely heavily on bedside patient interactions, which are crucial for the practical application of theoretical knowledge and the cultivation of communication and clinical skills.<sup>3</sup> VR can be used to mitigate missed hospital-based teaching by providing fully immersive and highly realistic clinical simulation to students whilst at home.

By putting on a VR headset, students can enter a virtual clinical environment and interact with virtual patients (Figure 1). Presented with timed clinical scenarios such as a patient complaining of shortness of breath, learners can work through taking a basic history, carrying out a respiratory examination, ordering and interpreting investigations, formulating a diagnosis and establishing an appropriate management plan.<sup>2</sup> Virtual patients can be programmed to emulate clinical signs and observations which adapt in real time and change in response to intervention.<sup>2</sup> Feedback can be generated automatically once the scenario is completed and a detailed group debriefing can be delivered over a video call. Notably, the generation of performance data is also valuable for educators to monitor student engagement and progress.

Further, the advent of multi-participant VR allows different users to partake in the same scenario regardless of geographical boundaries and can be used to facilitate interprofessional education at both undergraduate and postgraduate levels.<sup>2</sup> A recent example includes the use of VR to retrain 14,000 American health care professionals of various disciplines by more experienced colleagues so that they can work together to combat the COVID-19 challenge.<sup>5</sup> In the United Kingdom, there are plans to adopt this technology to upskill the thousands of retired doctors and nurses



**FIGURE 1** A user's view through a headset when asked to examine a patient in a VR scenario<sup>2</sup>

and fast-tracked final year medical students who have volunteered to join the frontlines.<sup>5</sup>

Whilst there are a number of different applications for VR in medical training during this pandemic, the biggest barriers to its adoption are the associated costs, software development and the hesitance to change among faculty members. We propose that a basic VR experience can still be provided to students relatively inexpensively using a smartphone application and a Google Cardboard headset which can be purchased online for around £5 (approximately 6 USD). Whilst this headset is most definitely a no-frills option, its low cost and the ubiquitous use of smartphones amongst medical students would ensure wide accessibility and uptake.

Despite its challenges, this pandemic has the potential to be an inflection point that revolutionises how medical education is delivered. Educators must begin to think more innovatively about how they can continue training students in the absence of face to face teaching. The 'anytime, anywhere' aspect of VR technology offers an exciting opportunity to keep students on track to graduate no matter where this virus disruption takes them.

#### AUTHOR INFORMATION

Manahal Mateen is a final year medical student at Brighton and Sussex Medical School (BSMS) with an intercalated BSc (Hons) in Management from Imperial College Business School. Peony Kan is a recently graduated doctor from BSMS who will soon begin her Foundation Training. They both share research interests in human factors and the application of innovative technology in medical education.

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