Teaching Anatomy using VR

**What is the project and its pedagogical focus?**

The project investigates the use of virtual reality technologies as an educational tool in the study of human anatomy within the context of a practical lab space.

We often see VR being used within classroom settings but we wanted to see how well VR works in a practical space, especially in a lab space where students engage in learning experience with multiple other students.

At IHSE, anatomy is taught for 1st and 2nd year students, undergraduate medical students. The anatomy team teaches in a lab session with around 50 to 60 students. We want to see how well VR works in such a space.

In this study, we recruited 92 Year 1 & 2 MBBS students to participate and roughly half of them would investigate the upper and lower limbs. The other half would explore the abdomen and the thoracic regions of the body.

They took part in a station-based setting. Students rotated around six stations and they alternated by either looking at a prosection or they looked at a virtual anatomy model, using an immersive VR headset and anatomy atlas. They were also given a booklet of very short answer style questions to work through. We tried to assess if VR can perform as well or better than prosections in terms of student attainment of knowledge. If students enjoy the experience of using VR, we can offer it as an adjunct tool or another avenue to learn anatomy.

It was particularly important for us to see if VR works well as it would be a great accessible resource for learners when they may not have access to cadaveric resources or don't have access to learning anatomy in the way where most traditional teaching and learning happens, where using cadaveric material from a donor.

VR could prove to be a great alternative method. *Our goal was to address this lack of data- the empirical data on the effectiveness of immersive VR technologies for studying human anatomy compared to more traditional methods of learning through cadaveric tissue.*

**Can you share with us about the collaborative aspect of this project? How you introduce into your teaching and how you brought students in?**

We partnered with the Learning Innovation team at the IHSE. They provided us access with the VR headsets, as well as sourcing and procuring the virtual anatomy software from some virtual anatomy app lists.

We did some preliminary research to see how VR is currently used at other medical institutions and had some informal chats with colleagues who have used VR.

The anatomy team didn’t have much experience with VR and we worked with some trial and error, trying to figure out how we can use VR most naturally and how we should design the study.

So we designed the study to replicate how we naturally taught, and that's through station based anatomy.

The session was designed as a timed session. Students went through the lab with10- 13 stations. They were assigned 10 minutes at each station. We designed the study to mimic the traditional way of teaching and to check how to fit in VR.

We closely replicated our usual way of teaching, using the content that we would usually assess them on in their regular assessments.

We got a good intake because we offered it as a revision session for students. Students usually want more time in certain labs and certain practicals. So I think we had a high uptake because students wanted to spend more time to stay within the anatomy lab and have access to the resources that we offered.

**Can you share your findings in terms of the impact on the student experience and your own reflections about this project?**

Our findings showed us that VR performed just as well as prosections when we're assessing student understanding or content in the abdominal region, the upper limbs and the lower limbs. However, prosections tend to perform better for the thoracic region. We see some regional variance and this tells us that VR may be empirically a viable alternative as a learning resource for certain parts of the body.

This is particularly important when we take into consideration that students may not enjoy or do well using cadaveric tissue or learners who may not have access to labs where they can engage in categoric based learning of anatomy. In these scenarios, VR may help them just as well or may serve as a great alternative to learning anatomy.

The informal feedback I received from students regarding their experience was mixed. Many students enjoyed the novelty of being in the virtual space, especially having the opportunity to immerse oneself, being able to hold on to structures, dragging them towards you, moving them around and zooming in and out.

This is not necessarily something they can do with prosections. However there are also some negative experiences, such as constantly putting on headsets and taking them off to answer questions in the booklet and trying to regularly adjust the headsets while rotating at stations.

We had a few students who reported feeling dizzy. I think there are some research that suggests that there may be sex-based differences as to why some students might feel more dizzier than others.

As a teacher, it was a great opportunity to reflect on my own teaching practices.

This new learning experience brought up a lot of questions such as why we teach anatomy concepts in a certain way or how best can we optimize a lab space and design this new learning experience with VR helped me reflect on my own teaching. Going forward I'd really like to explore this kind of regional variation that we saw in our study where VR technology works great for certain regions of the body whereas prosections may work better for others.

\* Prosections are human anatomical specimens that have been previously dissected by anatomists to showcase specific structures, relationships, systems, and regions. This allow medical students to learn anatomy efficiently and view anatomical variations in several specimens.