Virtual Reality in Health Sciences Education

There is a desire to shift from instructor-driven rote learning and progress toward more clinically relevant and practical teaching that puts the student at the center of their learning. Problem-based learning, communication skills training and simulation-based learning have all entered curricula. With the increasing drive to provide clinical learning experiences, and the inherent difficulties in doing so, simulation has gained momentum as a method of delivering experiential learning.

Virtual Reality (referred to as **VR**) has been adopted across medical and nursing fields. VR involves the user putting on a VR headset to become completely immersed in an interactive virtual environment. When used with appropriate educational software, this allows the user to learn from experience in the virtual world. (Oxford Medical Simuation, 2019)

VR definition

What is Virtual Reality? Merriam -Webster defines it as *an artificial environment which is experienced through sensory stimuli (such as sights and sounds) provided by a computer and in which one's actions partially determine what happens in the environment.* (https://www.merriam-webster.com/, 2022)

Virtual Reality differs from *Augmented Reality (AR)* in that AR amplifies real-world surroundings by adding virtual features that users interact with.

Artificial Intelligence (AI) has also gained popularity in education. Although the two can complement one another, AI differs in how the user responses affect the environment. AI relies on computer algorithms for user experience. VR is a human-driven environment. It can include AI, but the concept is human interaction centered, as opposed to computer-generated interactions.

The state of VR at MCW (Medical College of Wisconsin)

The Medical College of Wisconsin is new to Virtual Reality in Medical Education and the Acadicus platform. This is an ongoing implementation, led by Instructional Designers and Technologists from the Office of Educational Improvement.

Technically, we started small – 3 VR capable laptops with Oculus Rift S and HP Reverb G2 headsets. All hardware configuration and setup processes are documented for ease of end-user setup as we progress.

In our first year with Acadicus, our core team worked to understand how the interactions take place. Through meetings and practice time, the core team can now add assets and edit scenes in the MCW Pro spaces, as well as create videos, and we can aid in writing scripts for VR scenes that tie to the learning objectives of the course. Our current focus is teaching each other skills we have learned, so we can work with the faculty to help them create an immersive experience for students that not only focuses on cases they will see in clinic, but also on communication between other professionals and patients.
The Emergency Medicine Department at Froedtert Hospital is partnering with the Office of Educational Improvement, creating a scene to train medical students and Interns on diagnosing gastrointestinal

bleeding. This project is late in the design stage and will be available in 2022. Development on this scene will advance as our VR skills become more advanced.

Our other VR plans in 2022 include the expansion of the tool into Pediatric Simulations, the Regional Campus adoption, and Standardized Patient Adoption. Early pilots of meditation apps began in Fall 2021 and will continue.

Uses

VR scenarios are built out of assets, and within the Acadicus platform students have access not only to those that MCW creates but of other similarly minded health science universities. For a complete list of current assets and scenes that are available now, please see the Content Library Index.

Clinical skills are the main use for virtual reality at MCW. Students in any of the health sciences can rehearse simulations as needed. Beyond things such as open labs or remediation exercises, there is some growing evidence that the immersion of VR settings helps students remember information better than reviewing similar content on a computer or tablet. Offering additional modalities to our learners should always be an educational goal and we understand that faculty may be interested in studying the efficacy of established educational tech versus VR.

One of the scenes that is ready for use is the Multi-Sim Patient Scene. This is intended to replicate our STAR (Standardized Teaching and Assessment Resource) Center, so students have a psychologically safe space to practice integration and communication with patients. The scene is a typical clinical exam room with a patient and a nurse. In this scene one person would manage Sofia - her appearance, her vitals, and her condition. Students would practice clinical assessment skills to diagnose and treat Sofia. The extent of Sofia's medical issues would be outlined in the script being followed by the scene manager.

Figure 1

The patient in this scene is named Sofia. The person who is managing the scene can change Sofia's look, vitals and interaction at the tap or click of an interface.

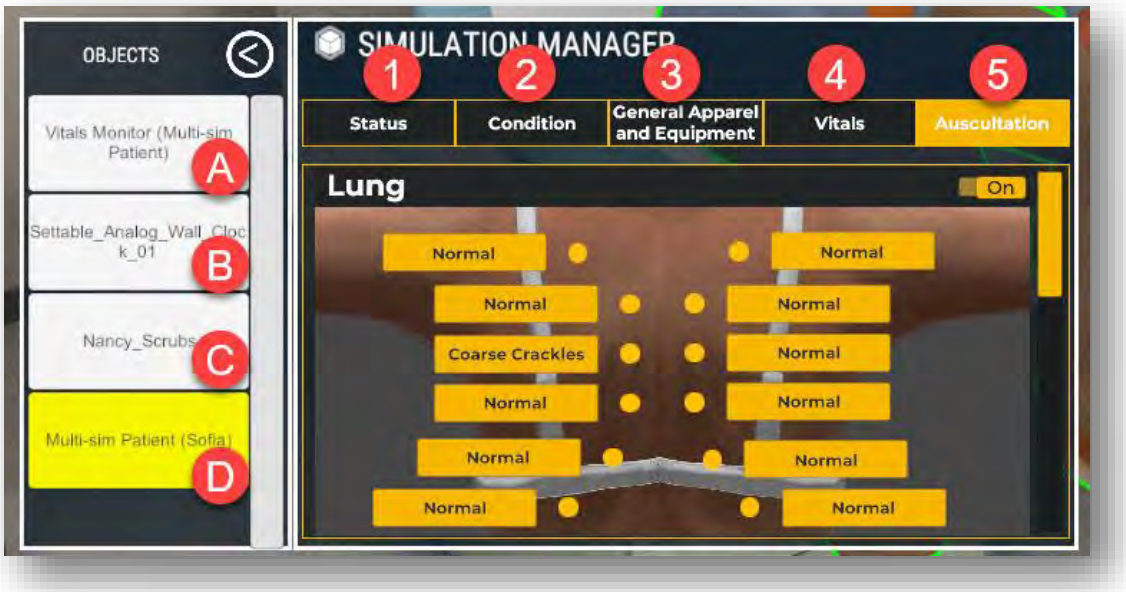

Figure 2

Figure 2 shows simulation manager controls. With Sofia, you can change her status, such as conscious or unconscious, eyes open or closed, talking or not, and others. Points 1-5 are top menus that open to be able to adjust her appearance, condition, and interaction. Steps A-D show all the assets in the room that can be adjusted. The yellow color on Sofia (object D) tells us that Sofia is the object we are interacting with.

Examples

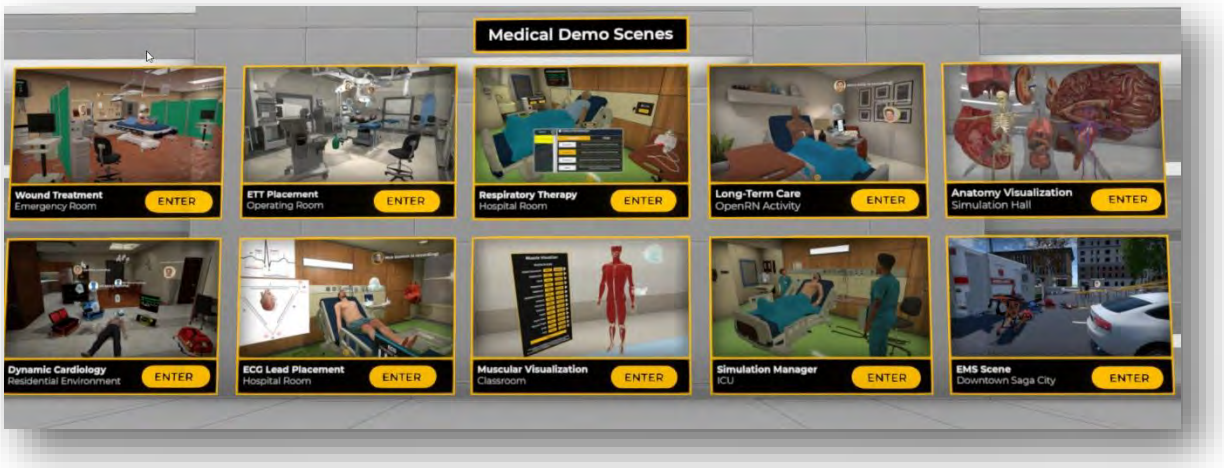

Figure 3

Acadicus has many medical demo scenes that are available for teaching or editing in our Pro Space.

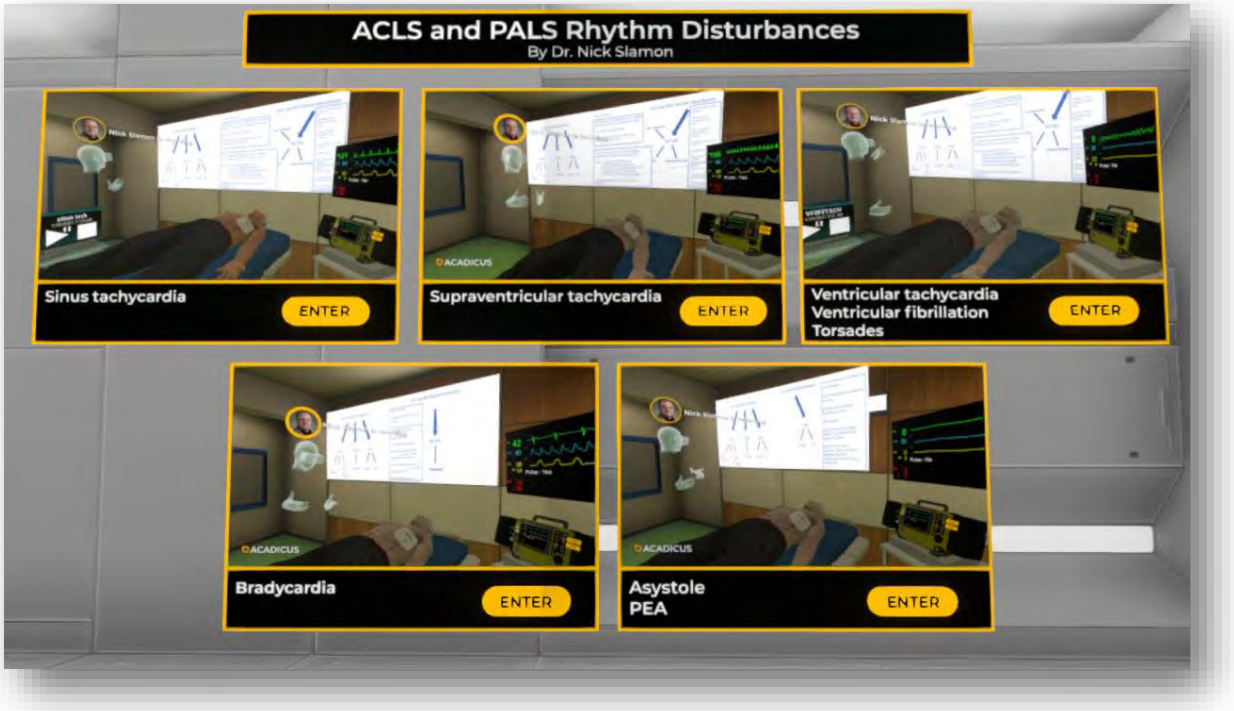

Figure 4

One of the collections is the ACLS presentations. Narrated by Dr. Nick Slamon, this collection takes a user through a variety of Cardiac Rhythm disturbances. All scenes have the Simulation manager menu available for practice and re-enforcement of the lesson objectives.

Links and articles of interest

1. Krokos, E., Plaisant, C. & Varshney, A. Virtual memory palaces: immersion aids recall. *Virtual Reality* **23,** 1–15 (2019). https://doi.org/10.1007/s10055-018-0346-3
2. Arch Virtual Acadicus. *Content Library Index*. https://docs.google.com/document/d/1vj0exuy6w4i1zGM-csC5i_NTigblsS1Sg3hrZikSvGw/edit
3. Acadicus Sim Pulse – a centralized site for information on VR simulation and development. Recorded examples of scenarios, scripts and how to manage VR training sessions.