Higher Ed Rewired
Season 1, Episode 6
Students Get "Real-life" Experience through Virtual Reality Simulation
Host: Oliver Wong
Guests: Dr. Jamie Hannans and Dr. James Frazee

Using virtual reality (VR), CSU Channel Islands nursing students learn beyond the boundaries of the traditional classroom. Students rehearse and are provided feedback on their helping skills through VR simulations further developing their skills. San Diego State University Virtual Immersive Teaching and Learning (VITaL) promotes experimentation with curriculum design with the scholarship of teaching and learning with a number of courses providing students real-life experience through VR.

Dr. Jaime Hannans, Associate Professor, Nursing, CSU Channel Islands

Dr. James Frazee, Chief Academic Technology Officer and Associate Vice President, Instructional Technology Services, San Diego State University

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Oliver Wang:
What does the classroom of the future look like?

[POST MUSIC - KEEP UNDER FOR BB]

AMBIENT SOUND
"Good morning everyone. Very good to see you… Good morning!"

Oliver Wang:
Actually, this is the classroom of the now.

[POST-MUSIC FOR ONE BEAT AND UNDER]

We're in Dr Jamie Hannan's nursing class at California State University, Channel Islands -- where Dr. Hannans and her students are gathered around a large television monitor.

AMBIENT SOUND
"My name is Bennett. I'm here to introduce you to the simulator."

Oliver Wang:
Bennett is an animated avatar and he's part of augmented reality tool that about two dozen students will interact with to help them get ready for some of the challenging tasks they'll face as professional nurses…

AMBIENT SOUND
"Think of this as the bridge from the classroom to your career."

Oliver Wang:
Once the simulation starts - another avatar appears… and this time, it's a patient named Claire… She's been recently diagnosed with diabetes -- and she's nervous. The nursing students have an important role here: how to counsel Claire on managing her disease. The students are arranged in a horseshoe in front of the monitor. One of them takes the lead, talking to Claire while the others offer advice.

AMBIENT SOUND
"STUDENT: We can proceed with your lab results and you sharing with me…
AVATAR: That's fine, yea. You look a little unsure about that. Is there something I should know?"

Oliver Wang:
The students quickly realize that the simulation can observe them… and it's highly sensitive to everything they say and do. Amber Lampman found the experience challenging.

AX - Lampman
"I would just kind of, you know, catch myself not being in a professional manner because we are still in a simulation. And if I like, you know, maybe like to just kind of chuckled at myself because I didn't know the answers or something, she was like what was that? So she knew exactly what was happening, which is really cool"

Oliver Wang:
The augmented reality experience might share similarities to a video game but it's much more than that. Students are using these tools to gain experience on how to deal with difficult situations they'll face later in their careers. Dr Hannans has found tools -- such as augmented reality and virtual reality -- to be invaluable in helping students learn how to take on complicated scenarios.

AX - Hannans
"Such as when do you think my mom's going to die if she's on hospice now. I'm not prepared for that as a new graduate necessarily, because I haven't been able to have those conversation with live people for obvious reasons. I don't want to send out nursing students to have those conversations without any preparation. And really the technology used for mixed and virtual reality allow us to do two things. One, they can practice some of these really difficult situations and conversations. And, they can see it from the patient or family perspective."

Oliver Wang:
On this episode… Virtual reality makes a real impact in the college classroom. I'm Oliver Wang. This is Higher Ed Rewired.

[POST THEME MUSIC]

[PROMO]

Higher Ed Rewired is a production of the California State University--the largest, most diverse four-year public university system in the country, an engine of social and economic mobility. Higher Ed Rewired examines exciting innovations taking place across higher education that have the potential to improve student success and to positively change the environment in which we teach, learn and discover.

INTRO

Oliver Wang:
This is Higher Ed Rewired. I'm Oliver Wang. Professor of Sociology at California State University Long Beach.

Virtual reality technology has crossed over from the realm of video games and into academia. We're going to tell you about a number of creative uses later on in this episode but first, we're headed back to Dr Jamie Hannans's classroom at Cal-State Channel Islands. She's at the forefront of implementing virtual reality into the nursing curriculum… She's also working in mixed reality -- that's when elements of the virtual world are MIXED with the real world.

An example of that is the animated avatar we heard at the beginning of this episode. Behind the avatar is an unseen human actor, able to listen to and respond to a room-full of nursing students in real time.

AMBIENT SOUND
"Begin session. Hi my name is Leah"

Oliver Wang:
The actor can see the students off-site through cameras in the classroom. But the students only see the avatar.

"STUDENT: Uhm. Can you tell me your name?
AVATAR: uh yeah. Yes, I'm Claire. I hope that's in the notes, I wasn't sure."

AMBIENT SOUND

Oliver Wang:
Dr Hannans picks it up from here.

“Hannans: So this is for second-year students in the nursing program, it's a three year program, so they have had some medical surgical based content and they're starting off into their second year. And we're asking them to engage in a conversation that really has a focus of patient education and health promotion.”

“STUDENT: Claire, I just wanted to asked you about how you're feeling.
AVATAR: Well, I don't know if I can do this.”

AMBIENT SOUND

“Hannans: Claire is a newly diagnosed diabetic and she's coming to meet with the diabetic educator, which is the student, for the first time to talk about some of the strategies and information she may need to manage her new diagnosis. And so students really have to learn to engage in a conversation where they immediately start to build trust”

“AVATAR: I have to do shots at least once a day. And you know I could probably die from this.
HANNANS: Pause. What are you hearing from Claire?
STUDENTS: She’s scared. She’s scared.
HANNANS: What did she just end with?
STUDENTS: I could die.”

Hannans: as it unfolds, just like in reality, there's all of these other dynamics that happen in life that will affect this conversation and how it goes. And so that's what they're navigating in each of the scenarios may slightly. End up differently, depending on what path they go down or what things the students decide to prioritize.

Oliver Wang:
It's like one of those old school choose your own adventure novels.

Hannans:
Exactly. I loved those books and that's exactly what I think of when I run these simulations.

Oliver Wang:
Those often ended with someone dying, though. So hopefully that's not one of the outcomes that you have in your simulation.

Hannans:
Not unless we want it to be a positive end of life.

Oliver Wang:
There you go. We also notice when you were in the classroom that you were very careful to not directly tell your students that there was a human actor behind the simulation and you didn't give them the details of how this works and why is that?

Hannans:
So there's something really interesting that I think happens in mixed reality, where as soon as the students see the computerized avatar, I think they anticipate a very automatic response. And I thought that might create this space where they may not feel that the situation is as real with the lacking of human standing there. But there is something magical that happens with having a conversation in a safe space where they can essentially pause time to look to their team to decide what to do and still have the reality of being put on the spot and being asked some pretty hard questions, as you would in a regular conversation. So I actually avoid telling them there's an actor, and if they ask, I actually refused to tell them until they graduate, because I think if we come out upfront and say, by the way, the avatar on the screen is an actor. I think it doesn't become quite as intense or real. For some reason. They're not as immersed if they're already thinking that there's an actor behind the scene. It's like The Wizard of Oz. It's the magic behind Oz that doesn't exist at the end. And you don't want that level of, I think, disappointment. But it also creates a space to really navigate the conversation, as you would in practice in a real way. A lot of times I've been asked why don't we use a standardized patient, which is really the nursing kind of simulation world term for an actor. And the problem is, is you can't always get an actor of a certain age or ethnicity or background in a certain space. And so using the mixed reality avatar allows you to change that and navigate that differently.

Oliver Wang:
At the end of Hannans' class, we asked student Amber Lampman to describe what it was like to go through the simulation.

"Amber: This type of stuff does happen in a clinical setting and you aren't able to press pause, you know. But this is nice, because it's preparing us for like actually having these conversations and being that educator and being that person who needs to have all of those resources available. And I'm not going to have, you know, twelve of my classmates behind me telling me, you know, things to do and what to say and how to say it. You know, this is all important stuff for me to learn. And I learned a lot just in that 15-minute window that I got to talk to Claire: on how I speak to her and how my communication kind of helped calm her down towards the end and make her feel a little more safe and secure."

Oliver Wang: Nursing students like Amber are not the only ones using virtual reality and mixed reality tools. At San Diego State -- Dr James Frazee -- is overseeing the use of immersive technologies in some 30 courses that span every one of the university's seven colleges. It's a campus-wide initiative called Virtual Immersive Teaching and Learning.

Frazee:
Students are much less comfortable learning in passive ways. The old model of more didactic kind of one way transmission of information isn't working as well as it once did. So we're encouraging faculty to embrace more active learning whereby students are engaged in authentic, complex tasks that require them to work

interdependently with other students, often in a team-based project that exposes them to a broad perspective and in many ways prepares them for the world outside of school. We're trying to build environments that support those types of learning experiences and activities. Here at San Diego State, we're focusing on historically challenging courses because this is a way for us to help reach the targets we've set with the California State University Graduation Initiative 2025, where each campus in the system has been asked to set targets for improving their four and six year graduation rates. We have focused on historically challenging classes with high, repeatable grades. So a class like Astronomy 101 which is a principal's class. The five year average for repeatable grades. These are students who do not pass the class and may have to retake it is 24 percent. So almost a quarter of the students who take that class have to repeat it. We're working with faculty to use virtual reality technology to learn about the phases of the moon. It turns out that the phases of the moon is something that students really struggle with using something called Universe Sandbox.

Frazee:
They can immerse themselves in ways that would never be possible otherwise. So the way it works is a faculty member actually uses virtual reality in a large lecture hall. They have a head mounted display on that's being mirrored on a large 16 by 20 foot screen over their shoulder. They can demonstrate what a waxing gibbous looks like on the earth, staring at the moon. And then they can transport themselves to the moon, staring at the earth to see what that waxing gibbous looks like in that perspective. And then the students are given a homework assignment whereby they go to the library in pairs or triads to experience that technology themselves as part of a homework assignment. And we're also partnering, I should note, with Sonoma State University to do some research on the impact of this relative to those repeatable grades. And so we're looking at how well they're realizing those learning outcomes. But we're also looking at are they paying more attention? Did they perceive the content to be more relevant? These are important things that we're studying. It's still very early days with these technologies. But I think that VR, AR, mixed reality -- the whole experiential reality continuum -- can help us as we think about promoting students success.

Oliver Wang:
I don't mean to put you on the spot with this, but there's a tendency to think of any kind of technological tool used in teaching as being somehow it's specific for STEM disciplines. But as someone who teaches in the social sciences, I'm wondering, are there examples in which people in the humanities or social sciences might be able to make use of this same technology for our teaching?

Frazee:
Absolutely. Some people have referred to these technologies as empathy machines. So you can imagine in the humanities, social work, hospitality, tourism management, putting people in scenarios whereby they're essentially given the opportunity to walk in somebody else's shoes. You could also imagine anthropology examples or other examples where you're able to take people to places to j = experience cultures that would be otherwise out of reach. We're seeing people in journalism and media studies, in art in particular using these technologies. So it's certainly not constrained to stem disciplines. We have people, for instance, in religious studies trying to give people the experience of going on the Hajj or taking people places that they may not be able to go physically because of, let’s say -- it’s somebody who’s in a wheelchair, or somebody who has some other challenge that may prevent them from taking a field trip to visit a place that may be important for them to study as part of their coursework.”

Oliver Wang:
Dr Frazee mentioned virtual reality tools being so-called empathy machines. And at Cal-State Channel Islands… building empathy is one of Dr. Jamie Hannan's goals… Case in point: she's also using a virtual-reality simulation in which students walk in the shoes of a patient with chronic illness.

We asked Dr. Hannans to demonstrate. And as the system booted up and she put on a V-R headset, she summarized one of the simulation's three scenarios. Each scenario represents a different patient.

"[computer sound] Hannans: So Alfred is a 74 year old African-American male who has macular degeneration, so he has a big black kind of blob in his vision that obscures his vision. And he also has hearing loss. And in about seven minutes he initially engages with his family and it's his birthday

Oliver Wang:
The objective here is to experience the challenges of navigating Alfred's world... through his eyes and ears.

Hannans:
And then it jumps to another scene where he's at a physician's office visit and // it's a real struggle."

Oliver Wang:
As Hannans goes through the scenario, what she's seeing through her goggles is displayed on a video monitor for the rest of the room.

Hannans:
And so now my family's singing to me, but I have a bit of an obscured vision for my right in the center. So if I look peripherally, I can see my cake and my family, but my vision's really blurred.

Oliver Wang:
As the scenario proceeds, Alfred knocks over a glass of wine that he couldn't see. And because of his hearing loss, he has trouble understanding his family's irritation and concern. Later, at the doctor's office, it's not much better -- as Alfred consults with his physician.

Hannans:
And it's frustrating because I don't really know what he's telling me, but he's handing me some hearing aids. So let me try to put those on. Well, I hope that sounds better. Clearly, it sounds a lot better.

Oliver Wang:
One of the takeaways is that Alfred needed hearing aids earlier on, during his visit with his doctor.
Dr. Hannans says after experiencing these simulations… her nursing students are better able to proactively help elderly patients in clinical settings.
She's also seeing results after the mixed reality scenario involving Claire, the simulated diabetes patient.

Hannans:
The student response is phenomenal. I have students talking about mixed reality and asking when will they be able to do it again? They want this type of simulated experience in all of their classes. They think it has value and really helps prepare them for the conversations and the roles that they'll be in in the future. We have collected some data about our virtual reality experiences and are just as excited because students seem to be better understanding the perspective of the patient. They better understand an older adult and what struggles they might have. We're hoping to come out with a publication about all of this, but really positive across the board about these types of experiences impacting their learning and better preparing them for their future role.

Oliver Wang:
And how about measurable outcomes that you've seen so far.

Hannans:
So one of the measurable outcomes that just stands out to me from the beginning is we have this pre and post survey that we did with the Alfred scenario that I was telling you about where he has macular degeneration. And we did a pre-survey and one of the statements was on a Likert scale of one to 7 from strongly disagree to strongly agree. The statement was, I understand the perspective of an older adult and from pre to post survey, we had a 22 percent more positive increase towards strongly agree, which I couldn't ask for better data. We had a large number of students in that from about 100 and I believe it's one hundred and eighty seven students that have done the pre and post surveys over the last year and a half. And so in a seven minute virtual reality experience to see that the understanding of the disease process. And really this particular question, the understanding of an older adult is so much more understood or at least perceived to be understood. That's really valuable in a short period of time.

Oliver Wang:
Changes have been coming fast since Dr Hannans first started experimenting with VR in 2017. Now, she’s expanding the use of immersive technologies into the entire nursing program at Cal-State Channel Islands.

Dr James Frazee at San Diego State says they’re collecting data to show the measurable impacts of virtual and mixed reality use in their classrooms.

Frazee:
We're using a variety of strategies in the STEM disciplines. Often there are nationally normed instruments that we can lean on. For instance, in geology, there's a concept inventory that measures students ability to demonstrate their knowledge of that content domain. That's always optimal. Nursing is another discipline where there are nationally normed instruments, often leading to licensure. Affectively, we've embraced a theoretical construct known as ARC's, which is an acronym that speaks to student motivation to learn. And the way motivation to learn is operationalised is attention, relevance, confidence and satisfaction. So there is an instrument that we've tailored depending on the use case that measure student's attention. How relevant they

perceive that simulation, let's say, is how confident they are in doing well and their satisfaction overall. That is kind of the theoretical underpinning for a lot of our work is motivation to learn. We feel like you have to have motivation to learn in order to realize those cognitive gains. And so that is a big part of it. We've also involved a number of qualitative tools. What we'll often do is have a focus group preceeding any kind of survey use that focus group data to inform what we may ask in terms of a survey instrument.

Oliver Wang:
If I can pull the scope back for a moment too. I think when these discussions around any use of technology, but I think in particular things that deal with virtual reality is there is this concern about a loss of the human interaction at the loss of the human touch. So how do you address those concerns about people who worry about the technology replacing what used to be a more traditional direct role of person to person?

Frazee:
Yeah. You know, I mean, that's a major concern of ours. Is these tools essentially isolating or further isolating students? It's important for us to provide faculty with examples of ways that they can get students working with one another. Actually, just last week, I was in a class where they were using a head mounted display. It was actually an HTC Vive, which is virtual reality and a program called Keep Talking and Nobody Explodes. So in this situation, one of the students is wearing the head mounted display and they're relying on three other students who have a manual that essentially is their cookbook for defusing a bomb. And if these students aren't working together in a collaborative, cooperative way, the whole place blows up in the scenario. And so it's a lot of fun, actually. And of course, there's some game theory in it. So the students are in groups and they try and outperform one another, which is super fun and different levels. And it gets sophisticated or more more complex as you go on through the levels. But it's a great way to get students in a fun, inter-dependent way to work together to solve a problem. And the more that we can provide activities like that, the better and use this as a way to get students connecting with each other more deeply than they might in a more traditional classroom.

Oliver Wang:
It feels like we are really on the cusp, or maybe we're already past the cusp of these kinds of tools being adopted more and more in schools around the country. And I'm wondering, what advice would you give to a university or a university program that perhaps hasn't really explore this yet, but is considering it? What are some of the things that you think they should think about before diving into it?

Frazee:
You know, I think share data on the impact that is certainly going to resonate for many faculty members, provide professional development, connect faculty with instructional designers and technicians who can help them, who can essentially serve as the safe harbor or the safety net so they can continue to focus on their content and their subject matter expertise and not how to configure the head mounted display. I think one on one conversations with faculty to make it personal and to provide them with examples is important to keep in mind. Find a champion. I mean, one of the things that we've done here is we've found faculty in every college who have really embraced these tools and those are the people who are delivering the workshops. It's not staff or God forbid, an administrator. It's other faculty who are leading these workshops. I think that's really important. Partner with industry whenever possible. Industry needs data on the impact of their product that provides an opportunity. Industry needs people who can write software and do some of the content creation. So. Pairing up students with industry professionals, I think is a real win win for us.

Oliver Wang:
One last question here, and this is very big picture. What do you think will be the eventual place of virtual reality, augmented mixed reality tools in higher education? And how far away are we from achieving that goal or that reality?

Frazee:
I think they will contribute to experiences that will be more and more prevalent. I think they will be complementary. I don't think these tools are ever going to replace an instructor or the types of face to face interactions that are so important for learning. I think that for certain populations of students, online learners, people in places where they may not be able to have access to laboratory environments, these are going to be absolutely essential. And I think in 10 years we're going to wonder how we ever taught without this stuff.

Oliver Wang:
That's Dr. James Frazee -- Chief Academic Technology Officer at San Diego State University. Earlier, we heard from Dr. Jamie Hannans and her nursing students at California State University, Channel Islands.

[THEME MUSIC]

Oliver Wang:
And that's it for this edition of Higher Ed Rewired. We'd love to hear from you about innovations you'd like to hear us discuss on our podcast. You can reach us by email at graduation initiative at cal-state dot e-d-u. That address is also on our website at higher-ed-rewired-dot-com.

[THEME MUSIC]

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Oliver Wang:
I'm Oliver wang, and from all of us here at California State University -- thanks for listening!

[THEME MUSIC]