From the KVSC Studio at St. Cloud State University. This is MINNovation, a higher ed podcast for innovators and educators. I'm Sarah Clark, Director of Online and Distance Learning at St. Cloud State University. And I'm here with my co-host, Chris Stanley, who is the Director of Educational Technology Innovations at St Cloud State. Visualization engineer Mark Gill has three decades of experience in visualization and development of experiential learning environments. He's worked in government, private, and academic arenas, finally, landing a position where he can help the next generation grow up to be comfortable with the ideas it's taken his entire life to develop. As the current director of the St. Cloud State University visualization lab, he's able to explore, pioneer, and even evangelize for the newest visualization technology and concepts. Part of the lab's mission is to expose students to a wide range of subjects, from visualizing the Earth's magnetosphere to developing a game to help caregivers deal with Alzheimer's sufferers. He teaches classes and leads student research teams in their areas of virtual and augmented reality, video game development and scientific engineering visualization concepts. So, welcome Mark and thank you for being here with us today. We know this topic is a conversation that can, will and should continue beyond today's episode. But we want to do our best with the time that we have today to better understand virtual reality and its application in higher ed. So, before we dive in too deep, help us first to understand what virtual reality is and what it is not. Well, thank you. Thank you for having me here. It's great to be here today. First of all, virtual reality, when you look at the term virtual reality, the, the operative word is reality, right? That's, that's what I'm replacing is your reality. And a person's sense of their reality is not just what they're doing or what they're looking at. It's, it's their entire environment. The stuff that's going on around them. The, the, the other, the sounds, the smells, everything that goes into your experience of being in a place. That's what we're trying to manipulate or replace. Now we can't do everything right? So we can't, we can't change the way a thing smells easily, or are we can't replace a lot of the environmental stimulus, but we can replace, the site. We can replace a lot of the things that you would touch. And that's what virtual reality is, is sort of, putting you in a different environment, taking out of the reality that you're used to and putting you in something that we create. So, tell us more about the difference then between virtual reality and augmented reality. So augmented reality is, I allow you to see your own reality. I allow you to see the room around you and the spaces near you and the other people with you. And then we put virtual objects. We put the activity in that space. You're usually looking through a camera or maybe like a pair of glasses or a hollow lens or something. But you, you retain your awareness of where you are and who you're with. Tell us more about the rich learning experiences virtual reality can provide to students that go beyond traditional learning experiences or traditional assessment strategies. So, with virtual reality, I can make a presentation that's completely impossible. I can take you to some place that's impossible to go. I can show you things that are impossible to see, experiences that are normally impossible to have and you experience those things. Now, earlier on in education, we didn't know what it was about virtual reality that made it such an effective teaching tool. We had scores of researches that says that experiencing something in virtual reality has a positive impact on cognition, retention, understanding. Though we didn't know exactly what that was. Over the past couple of years, there's been a lot of research that has come out that says that the human brain stores these experiences differently, whether it's an environmental experience or an episodic experience. So, an episodic experience would be like watching a movie or reading a website. You do that inside of an environment. When we replace

that environment, that episode has a whole lot more meaning now, because you're experiencing that entire new environment instead of just something that's happening inside of the environment that you're used to. So, tell us then, what does the virtual experience grounded in pedagogy look like? So grounded in pedagogy, I'm assuming that you mean that it's an educational virtual reality experience. Virtual reality, if you're an educator and you're interested in virtual reality, you should think of it as a media, right? So it's a tool like watching a video or playing a movie or reading a book. And it's a useful means of conveying the information that's important to your, to what you're trying to teach. So, the virtual reality experience that's grounded in pedagogy has a narrative to it that would fit in with your whatever, whatever lesson you're trying to teach, whatever the discipline is. And it could be different things for different disciplines, right? So, a virtual reality experience, say for a STEM discipline, would look considerably different from a virtual reality experience, say for a liberal arts discipline. A lot of it depends on the subject matter. And, then a lot of it has to do with the design of the experience itself. One of the challenges with virtual reality is, these days is that there's not a lot of educational content. It, it's actually, so far, it's been one of the smallest markets in virtual reality, but it's also expected to be one of the fastest growing as new techniques and new devices come out, especially when you see businesses adopting virtual reality for their training. So, developing those experiences and making those available to the workforce. That's going to be a big segment of the virtual reality market going forward for the next few years. I'm curious too. So as players are users of virtual reality or all coming into the experience with our own kind of cultural experiences. How do you build really rich multicultural perspectives into a virtual reality environment? Okay? So a lot of that has to do with the design of the experience itself, right? It's not virtual reality, doesn't necessarily have anything intrinsic to it, right? It's like, it's not like you get more information just by virtue of having to wear a headset. You have to design that experience, or you have to curate that experience, so that is has the right thing. They're, they're not all created equal. And it's, it's a consideration. There's, there's a lot of considerations that you have to you have to keep in mind when you're deciding if you're going to adopt virtual reality or not. And that's really the question you have to answer for yourself isn't right for me? Right? Is it something that I can adopt to my class is it going to, is it going to disrupt my class beyond my ability to teach? Right? It's, there's a lot of questions that you have to sort of evaluate for yourself. And when I visited you in the visualization lab, you showed me like a conference space that was developed in virtual reality. And you as a user, is that what we're called users? Yeah, the user is fine. So as a user, you kind of go through that space and you experience each of those elements of the conference, you know, as your avatar, but then as your own individual person too. And I'm just wondering, are there opportunities there as a user, and thinking about the social piece that's involved in VR? Is there ways as a user that you kind of shape your own cultural experience through the lens that you are navigating through the virtual reality? So, in an application like that, like we were talking about, a social virtual reality application where you've got a bunch of people coming together in a virtual space. They can see each other; they can share that experience. They can sort of generate that cultural experience themselves. The space can be designed to facilitate that cultural experience. I'm sure if I, if I build a space around a certain cultural experience, I'm going to market that and attract users who are interested or part of that culture. Yeah, that's all, that's, that's all a big part of it. And once again, it goes back to the design, right? I mean, you're not going to have a very great cultural experience if the virtual world that you're in is just a plain

white box, right? So, the person that's putting that together has to keep the use in mind, of what is this space going to be used for? What does this experience supposed to deliver? So, you tie that Mark, then you're talking about the experience and what, what's being built and crafted. So, when we hear about the metaverse, I mean, how does that relate? Tell us about tell us about the metaverse. Alright. So, the metaverse is getting a lot of attention lately. And it's actually a fairly old concept. Basically, it's a global distributed virtual environment where you can just move and transition from one application seamlessly to another. The company formerly known as Facebook Meta, would like to be the one that delivers all of that experience. Right? They're trying to marketize that, stake their claim to it so that they have the metaverse. But there's not going to be a metaverse. Right? There's metaverses, right? Metaverse by nature of the meaning of the word means its multiple universes. It's above the universe. So, what Meta is trying to develop that may be a part of what eventually becomes the metaverse, but they're not the only ones working on it. Microsoft is working on their own version of it. And Google actually is probably closest to a true metaverse, but it's an augmented reality, not virtual reality. I'm sure you've heard of Niantic. They did. They did the Harry Potter AR game, and they did PokemonGo. And they've got another one coming out. You can walk all over the world and the game is played right there in your environment. While they're releasing their SDK, they're releasing the tools so that just anybody can create an application and plug it into this worldwide augmented reality framework. And in my mind, that's, that's closer to be in metaverse than what Facebook or anybody else is trying to sell. Especially since what they're promoting is 5 years down the road, 10 years down the road, may not ever happen, really. When implementing VR, AR in the classroom, what are some things that should be carefully considered? Accessibility is something that you definitely want to consider. Not everybody can wear a headset. Not everybody wants to wear a headset. Not everybody gets the same thing out of wearing the headset, whether they've got claustrophobia or they're subject to motion sickness. So that's sort of accessibility is got to be key, right? You have to accommodate for the people that can't or don't want to wear the headset. And fortunately, there's a lot of experiences that have a two-dimensional option that you would play on a tablet or a notebook or something like that. The other thing that you need to consider is the actual hardware itself. Where you're going to get it, how are you going to maintain it? And if you're going to share the headset, if I have enough for one class, but not enough for all of my students, then you have to come up with a plan to safely do that. Because you can easily communicate a lot of diseases, not just COVID, a lot of diseases can be spread through a headset that hasn't been cleaned off. What does one of those headsets go for? So that's the good news, is a barrier to entry, at least from an economic standpoint, has gotten lower and lower over the, over the past few years. You can get a standalone VR headset and Oculus Quest 2, which I don't guess it's Oculus quest anymore. It's the Meta quest, right? That's still the device that I recommend for anybody that's interested on a consumer level, just getting into VR there, they started about $300. And you don't need a computer or anything, really, just the headset. And you're good to go. They range from there, they go up to about 5 or $600. But once you start getting in that price range, and then you start having to have a computer that drives the VR as well. There's always new devices coming out, right? So the device that I tell you to buy now may not be the device that you should buy in six months or a year or so, which is another consideration. You've got these headsets and you have to plan for their eventual obsolescence, which is probably going to happen in a year or two. And if you buy in at the end of

one of these development cycles, you may have a bunch of headsets that are pretty much obsolete in six months. So that's something else that you need to consider if you're planning on instituting some sort of VR in your class. Going back to the size, you were saying that they can be kind of heavier, uncomfortable to wear. I imagine that technology will get to a place where they're real sleek, you know? Okay, right, so the goal is to have a device that's no more obtrusive or heavy than a pair of regular glasses. But certainly, companies like Meta, you know, they want you to wear these things all day. They want them to be your productivity tool. They want them to be your entertainment tool. They, they want them to be on your face all the time. So eventually we're going to, we're going to be seeing headsets that are constantly getting lighter and lighter and slimmer and slimmer. HTC has just come out one, called the flow. That is, it's really not made for big interactive experiences, is made for sitting and watching. But it looks like a pair of mirrored sunglasses. And it's not much bigger than a pair of mirrored sunglass. Very cool. Yeah, it is really cool. It is really cool. Mark, for those who are interested in learning more about joining the community or getting engaged with others who are excited about this, where do they start? Well, if you're here on campus, you're welcome. You're welcome to contact me. I'm willing to answer any questions or give you any kind of advice or feedback or assistance. And then the system office supports a Extended Reality community of practice. So there's a group of people from universities all over the state who are interested in VR, AR. And especially how do I adopt that for my, for my own classes? There's all sorts of, there's a wide range of technical expertise in this community. So we've got people that are, they're experienced creators and they're experienced users, and they're comfortable with adoption. And then you've got people that are complete novices. Just, they've, they've heard the term and they're interested in it. And so they come to the meetings to see what they can pick up. Can you tell us what projects you're working on or what areas of the VR that you're currently exploring? So, since the pandemic, the nature of our work has changed, a lot. Our previous experiences involved a lot of people inside of spaces and milling around and doing a bunch of things that we just don't do very much these days. So since then, a lot of our focus has shifted towards social virtual reality. A lot of the partners that we partnered with, like the National Center for Autonomous Technology, Mate, which is a marine Advanced Technology Education Institute. We've been supporting them by providing spaces for their virtual reality events as their face-to-face events had been canceled or moved. We've done the same thing for the school. We did a graduation ceremony for the College of Science and Engineering, Preview Days an Academic Resource day, all in a social virtual reality platform. That people can engage from, from anywhere. And then another focus of the work that the lab is currently doing, involves creating our own search social virtual reality platform for education. Because there's, there's deficiencies and all of the ones that we've looked at. Either they're really expensive, really expensive, or they don't provide everything that we want to do. We had a question earlier about assessment. I didn't say anything about assessment because that's a big issue. If I have, let's say I've got 30 headsets in a classroom. And I've got a really nice VR experience and I got offline, and it works on all the headsets. When the students come in and they put the headsets on, it's likely to be 30 different individual experiences. And as an instructor, I don't know what any one person is doing or what they're experiencing, or what that's like. So, we're developing a platform that will have that sort of shared experience. And we'll be able to take the assessment and build it into the, into the experience as well. So, the platform that we're working on can do things like track how long I'm looking at an

object, or how long I pick something up, or how long does it take me to complete a task? How accurately do I complete that task? And you'd be able to collaborate with other people on this lab experience. And we're focusing on, on lab experiences, biology, meteorology, are the two areas that we're looking at first, to try and try and adopt these to. And the whole idea to sort of get more assessment tools into the environment so that the environment itself is doing the assessment as the experience is going on. And then make that experience collaborative so that other students can work together. Or maybe the instructor can be in that space and watching the students go through the experience. Hopefully that works out really well. I'm tremendously excited about it because it solves a lot of the problems that we have. The example I use all the time is welding. We can go into a social VR platform, and I can have a seminar and I can teach you all about welding, everything you want to know about welding. I can't teach you to weld. That's where, that's where it gets challenging. So, we want to, we want to build an experience where yeah, I can teach you how to weld or scuba dive or build an ROV or whatever you want to do. That's really cool and really exciting. The future of higher ed is virtual reality, it sounds like it. Part of it, part of it, you know, I'm, I'm cautiously optimistic about the future of VR in education. It definitely is taking off in the high schools. And for that reason alone, we as a higher education institution, need to be aware of it and need to be able to work with it. Because a lot of our classes we're not going to be prepared for the kids that are going to be coming out of high school and in five years or so. Yeah. I'm particularly interested in the implications of this, this social environment you can create in VR for your online learners. You know, a lot of students, they want a high engagement online program or experience. And so, you can deliver so much through D2L but, or any LMS. But there seems like there's a really neat opportunity that if built well, that could be like a social lounge, a social virtual lounge where students could go and mingle and network. Oh, sure! Within their programs. Mark, what are the opportunities or challenges, I guess, when it comes to asynchronous learning on the VR or AR Platforms? Actually, there's fewer challenges with asynchronous learning than there is with synchronous learning in VR. Because if I'm maintaining a collaborative environment, there's, there's a technical infrastructure that has to be in place in order for that to work. And I don't need that infrastructure if I'm just giving the environment out. And here's your headset, sometime over this weekend you go through it. And that's actually one of the use cases that we're looking at for our new platform, is for people who are, maybe they, they live in a rural area. They may not have the bandwidth to connect and collaborate. The software will be able to run in a standalone environment where they just put the headset on. And it's more like a traditional VR experience, where you're just going through it. But still, it would be able to do the assessment and do everything else that we're talking about doing as you'd be the only one in there. Will that platform be able to address a different challenge of like time zones? So, if we have students, if there are students in China and students in the United States looking to have a similar academic experience. But, but maybe not able to align their timing. I mean, does that same kind of value proposition hold? The time zone things really complicate things. I mean, if you're, if you're working on a project with somebody over in Europe or China, you're talking six- or eight-hours difference. We can bring everybody together in the same space at the same time. But it may still be 3am for a guy, some someplace. I'm not sure exactly how we can, that'd be an interesting challenge. Would be able to have one person do one part of an experience and then 8 or 10 hours later somebody else comes in and maybe they see an echo of the previous person that was in there.

Because we can certainly record that. I can record all of the actions, everything that somebody does, and somebody else could come back later and watch that happen. Almost like a, like a ghost, or an echo of that experience. That'd be an interesting project or a work. Yeah, I'm not sure how that would work. I mean, you did say, and I guess as I think about it, right. So, if there is a like a virtual lab that you can do, well, it doesn't matter when or where, it doesn't matter when as you don't have to have labs checked out. You can just drop into that experience regardless of your time zone. So that's certainly an opportunity. Yeah. Yeah. I would encourage anybody that's interested in virtual reality to certainly look at it, right? It's getting possible to, to adopt VR into your class, right? You don't have to tailor the entire class; you don't have to redesign your entire curriculum to accommodate VR. It could be something that you just introduce to the students, right? And that's, that's becoming more and more accessible all the time. The biggest complaint that I hear a lot of times from people trying to get in VR, especially from educators, is that there's not a lot of educational content. And that's true. Right now, most of the development is going in on the hardware in the base experience itself. And the content is sort of coming along at its own pace. But it is coming along. There's going to be more and more content coming up all the time. And if you're just, if you're just a content consumer, right? That some, there's lots of options that are available to you. A lot of it depends on the, the actual discipline that you're trying to teach in the nature of the course. But there's, there's lots of options out there. So, if I'm a nursing faculty here at St. Cloud State and I want to develop like an empathy training or something around VR. Could I come to the visualization lab, work on that with you and then the students could come and work? Absolutely! Okay, cool. So, there are opportunities for faculty on campus who are interested in learning more about VR, to come to the visualization lab, talk with you, work something out and create something really awesome for their students to experience. Well, yeah, it all depends on, you know if somebody wants to come to the lab and talk to me about introducing virtual reality into their, into their class. Probably the, the, the quickest and the shortest introduction would just bring the class, bring the class over to the lab. And we've, we've done that several times for lots of different, lots of different faculty members who just want to give their students an introduction of virtual reality. Maybe that, I don't want to transition the entire course over to a VR course because it's still a little early for that. But you can, you can get your feet wet without a whole lot of investment or experience and certainly would be welcome to help out anybody that's interested in doing that. Cool. Thank you again to Mark Gill for chatting with us today. We really appreciate your time and you being here with us. Absolutely, it was my pleasure! Support for this podcast comes from KVSC studio at St. Cloud State University, SCSU Educational Technology Innovations, SCSU Online and Distance Learning and of course, from our listeners. Know someone we should know about? Fill out the guest nomination form found on the MINNovation podcast web page located on the SCSU online and distance learning website.