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. Bill Gorcica is a professor of Art at St. Cloud State University, where he teaches in the integrated media and graphic design areas. He has a bachelor's degree in biology from Virginia Tech and a Master of Fine Arts degree in Visual Art from Rutgers University. Over the course of his career, Bill received number of honors, including a Fulbright scholarship to work in printmaking in Poland, and the Bush Foundation Artist Fellowship in three art. He created an interactive work collaboratively with other faculty and students from St. Cloud State University for the Twin Cities Northern Spark Festival in June of 2015. For Northern Spark 2016, Bill worked with colleagues in science and engineering to create sim RVR, VR movie that was juried and showcased at the Sundance Film Festival, new frontiers program at our Walker Art Center. Bill also creates underwater simulations for educational 3D software project, sim river and mushy river with Dr. Shigeki Mayama in Tokyo, Japan that addresses water quality issues by studying populations of microbes and aquatic invertebrates. In 2019, Bill received an innovation funding grant entitled Making the Digital Physical from the Minnesota State, to setup a small makerspace in the art department at SCSU. Throughout his career, he has worked across disciplines and has often made art about how we as humans engage with the natural world. Currently, he's exploring the possibilities of mixing the ancient techniques of acoustic wax printing on wood reliefs designed on an iPad carved with a CNC router machine. Welcome Bill and thank you for being here today. You're welcome. It's great to be here. So, in 2019, you received Minnstate Innovation Grant for your project entitled Making the Digital Physical. Can you share more about that project and what the makerspace looks like today? Sure, I would like to say first of all, that it was great to be able to work with Minnstate to get some support for the art department. We have had a successful computer lab in our department for both studio art people and also graphic design people and even art educators. And most times when people were using the lab, they would be stuck outputting to paper. And there's, or maybe possibly, creating a website. And the idea of this grant was to make the digital physical or to make physical material in the computer lab that normally couldn't be done. So, we invested in some 3D printers and also a CNC routing machine. That's a Computer Numerical Controlled machine that could cut wood or plastic or various materials wax to manifest a form in 3D. So, this was really kind of one of my particular interests because I've explored that in my art and thought it would be fun to see how it would work in the art department itself. And in our first experiment, we had a number of students sort of take this on as their own independent projects. And over the course of a few years, we've started to incorporate such projects into different curriculums so that you can see a little broader perspective in the department. It's not just a few individual projects, it's a number of courses that are using the makerspace. And in fact, after the seed grant that we received, we were able to have the department invest a number of their funds, their budget, to expand the makerspace and make it a broader reaching, larger format footprint project. So now we have a laser cutter, and we have three instead of one, a 3D printer, we have three. And we also have a larger scale CNC router. So, all of those investments have led to a broader reach in the department. That's awesome. So, I mean, what do you think for as far as the future holds for the makerspace? What are your plans? I would say like for the future, a few things that I could see happening would be expanding

the scale of things. That would be the easiest thing to have happened as like where students are becoming more comfortable making little models or little carvings. They start to realize, oh, if I wanted to make a sculpture out of this, I could scale it up to a larger version with these larger tools. Besides scale, the other thing is incorporating what they make in the makerspace with other mediums that they traditionally use. So, some of the successes we've had been students that have done printmaking. And traditionally they would carve a block of wood or block of a linoleum and it is very labor-intensive. And now with things like iPads, they could draw right on the screen at home or anywhere. And then casually take those drawings that are digitized already, convert them into a format that could be carved on a CNC machine. And that would follow the pattern and they would get pretty easy results versus carving by hand. And I know it's not a substitute for forehand work, but it's an accompaniment to handwork. And so, they can use that as a new technique in their art making process. Can you share with us some of the student projects that have come out of the makerspace? Sure. I guess the first, the most tangible results in that first innovation grant time in the first semester was a student who decided to learn 3D modeling, which is kind of rare in our department. We're not only were they making say, a logo and graphic design, they were translating it so that it can be looked at in three dimensions on the screen and 3D printing all of these images and came up with this idea. They were actually working in the visualization lab with Mark Gill over across campus and engineering, which is something I love to see is interdisciplinary work. So, this particular student designed an entire chess set with not only the look of a chess, but also aquatic themes. So, there were porpoises and all sorts of ocean life atop the chess set pieces. And then, they produce the entire set. And it was an award winner, I think, tied for first place in the juried students show at the end of the first season of that grant. And they use the CNC router machine to make the chess board. So, they've carved out icons for each of the squares of the chess set and poured resin into aquatically themed colors, blues and grays and whites, and built the entire game. And so that was one success early on that I think of in terms of student projects. And another thing we explored was, I mentioned printmaking. So, the idea of carving into a piece of wood and then rolling it with ink and making multiples. So, this is becoming very popular with students. We had one person do it and it caught on like wildfire and they were teaching other people the process. And I started making Zoom recordings of the process which made it even better during COVID on D2L, where you could sort of develop a method that students could see and then they would break through their insecurities, which was one of the challenges of the grant, is like, oh, do I really want to work on that machine and see the value of it and just the realization that they could do it too. And then that whole success rate increased. So, I would say that was a second feature of the early part of student success. And then following that, we had an advanced class last spring, I guess, almost a year ago were some people that knew nothing about these techniques were in a multimedia art class and realized, hey, I could like download something off the internet, which is what I expected them to do first, is to download a model and print it. But they were finding unique models that would help them in their art making as tools. So, one example that I remember was someone who, if you've ever seen basic photography curriculum, they teach how to make a pinhole camera and where you could take a Quaker Oats box and put a pin in it and expose light to it and then create your own little camera. So, someone actually found a model of an old Pentax 35-millimeter camera that was made as a 3D form that they could print. So, they printed the entire camera in black and they put film into it. And then from a 3D model they actually printed camera

imagery. So very interesting directions that people started to use that word and unexpected and uncontrolled on my part. So, I guess those are some student projects that come to mind at this particular time. Transitioning a little, can you tell us about the collaborative projects you've worked on to help bring to life the experiences and environments that students would normally not be able to explore? Sure, this is, this is a whole, another aspect of like teaching because it's not the makerspace that we're talking about here. It's the experience of like bringing together students in interdisciplinary approaches to art making and we have a course entitled Combined Media in our department. It's a sophomore level foundations course where students learn to experiment with mixing mediums together. And during the course of me teaching this course in 2015, I realized the power of these experiences and at the same time realized there was an open call for projects to, for Northern spark, our installations in the Twin Cities. So, stepping back, what are, what is Northern Spark? It's, it's in the tradition of Neue blank, which is like art in the dark experience where it starts at dusk and goes till dawn. And in the world that we live in with light sculptures and capabilities to do things in interactive ways. They, in northern spark in the Twin Cities, have been held from maybe June 21st or summer, summer solstice. They actually have at dusk, a number of art projects happen, and they go until dawn. And during that 12 hour they sometimes have had 50 thousand people experience these number of art projects. So, we came up with an idea and a proposal to have a virtual experience of the four seasons where you could sort of sit on a chair and move the chair in space and it would direct this projection so you could travel through different times of the year and people waited in line for this thing. So, that was the culmination of maybe six months of collaborative work with students, with Mark Gill and myself and as faculty mentors, working with maybe a dozen students in art and engineering. And the engineers got busy with their senior project. So, it ended up being more art students at the end. But we add sculptors and graphic designers and painters and 3D modelers. And they were all there at this event running the show to make sure it operated for all these people to use it. And it was just a very successful collaborative project. The other thing I think about collaborative is working in the viz lab itself where I've done projects with scientists at SCSU, but also in Japan where we've needed software written and Mark Gill, who's the software engineer at the Viz Lab, has been happy to write software, but he has interns who have been in engineering that have worked with us to generate projects. So, it's great to see the merger of like the science student on campus and the art student on campus working in the same space, maybe in the keel building or in the makerspace, or in the viz lab across campus. So, these are some collaborative projects that I didn't really know what would happen but was excited to see the results of. Continuing down that conversation of collaboration and can you talk more about your international projects and the impact of cross-cultural collaboration on the creative process? Sure. So, a little background about this international project that's a decade long. I was collaborating with Matt Julius who's in biology here on campus. Asking him while I was on art, art residency in Banff, Canada. I was asking him what could I collect in the environment that would be cool just to collect? And he said, diatoms and diatoms are microscopic organisms that are really good indicators of the environment and its quality and water quality. And you could study diatoms and realize how clean or dirty your water is. And they're crystalline shelled there, their glass coated so they don't decay like regular organisms would. And so, they could be held in the soil for hundreds of years and so you can go back in time and study diatoms and realize what the health of the planet was in different places. And with that knowledge, I started to do an art

project in Canada, collecting water specimens and measuring diatoms and making an interactive rowboat. And from that experience, I came back here and happened to be running an international diatom Symposium in St. Paul and he invited me to show a prototype of this rowboat. And I brought it down there and it was just like a little model of thing that you would find like the kind of shelf units you could buy that look partly like a canoe. It was kind of one of these things and it had some dowels on it and you could draw it with your fingers, and it controlled the simulation of a river. And I didn't know it, but the person looking at it at this symposium became enamored with the idea of like, we could use this for a project to create an educational tool. And it was Dr. Shigeki Mayama from Tokyo, Japan. And without me knowing it, he wrote a grant to invite me to Tokyo to study rivers, to understand what microbes live in rivers, and to understand water quality. So, while I guess it must have been around January 2nd. I can't remember what year. 2011 or something like that, 2012. Matt Julia said, hey, Dr. Mayama has written you a grant to come to Tokyo. So, before you know it that summer, I was in Tokyo with him in the reverse in waiters near septic systems in Tokyo or near trout streams in the mountains and I was learning about all of these features of water. And then I would come back to the States and start to investigate how rivers work and try to make a simulation of them. And so, I was doing it singlehandedly. And then I met Mark Gill and we made it into a broader project where it became a true 3D simulation. And that has led to all the spin-offs. So, one of which was the sim RVR which was mentioned earlier. Sim RVR was a virtual reality experience in two minutes where you could see electron microscopy from SCSU campus that Matt Julius had collected that showed wireframe models of what diatoms look like. And then you would put on a cardboard headset and look around in virtual reality in the early days and find yourself spinning down into the depths of water and learning about how we can protect the environment if we pay attention to how much plastic isn't it or what we eat, and that things move down the food chain to a diatom level. So, it's kind of a complex idea distilled to a two-minute video that people could experience that was shown at another Northern Spark without students, with just Matt, Mark, and myself, where it was juried by Sundance film festivals, new frontiers project. So, a lot of press showed up for it and a lot of audience. So, it was a good experience and a good spin off from this. And since that time, I've worked with Dr. Mayama and gone back to Tokyo maybe a half dozen times over the years, over the decade. And he's just recently retired. But before his retirement, we showcased mushy river and mushy river was an extension of his sim river project. Sim river, you would study diatoms to understand water and we moved it to another level. So, diatoms are what you would call indicator species. Indicator species of you see a certain shape diatom you could learn from it that your water is healthy or unhealthy. And you could do collections and numbering and data analysis and find that out. And you could do the same thing at aquatic invertebrate level, like if you were looking in water and you are collecting, say, leeches and collecting mayflies and collecting bloodworms or whatever that would tell you the quality of your water as well or whether it was polluted or healthy. So, we made a version of his sim river project that featured not microbes, but aquatic invertebrates. And that had more 3D models that I had to create myself and learn how to do the finishing of realistic models and such. And that kind of filtered me back to teaching where I could start the makerspace and know enough about making 3D forms to really bring it back to making the digital physical. So, it all kind of ties together as a big circle. So now that doctor Mayama has retired, I hope to continue to go back as a friend. And he has, you know, there is a legacy there. So, there are new faculty that

might want to explore these projects. But if I don't go back for that project, it'll still be fun to just go back to Tokyo. Again, kind of transitioning a little bit. So, a lot of this has been digital. So, in terms of digital art education, how do you approach and incorporate accessibility standards into that digital creative process? Are there certain things to consider? I guess I look at it as an opportunity. So, I could talk more from anecdote at this point. Right now, I have taught a multimedia class for a number of years, and I've had visually impaired students. And I just watch how they operate. And in this world, you have much more opportunities to succeed as a student. I have a greater range of students, a greater diversity of students now with disabilities. And for visually impaired students at this point in time, they can wear a headset and look at a computer screen. And even though they're practically blind, they could still operate as art students. Art is all about visuals and they could draw with a magnifier. They could view a computer screen with a headset. But not only that, they've been able to use a CNC machine because it's safer than if you were using a bandsaw. If you're using a bandsaw and you're visually impaired, you'd be destroying your body, cutting a finger off or something. But with the CNC machine, you can close the lead program on a computer screen, run a simulation, see what will become of your design, look at it with your screen viewer, decide that you're aesthetically satisfied with the result, send it to the machine and watch it from a distance. So that's a very powerful accessibility feature, I would say in the arts amazing for me to see that happening. Could it have happened 10 years ago? No. The makerspace movement has kind of allowed these things to be more price capable, not price prohibitive. And you start to see students using these things. And then with this visual impairment, during critiques, we talked about like not only accessibility for audience of people with vision, but people without vision. So, this particular student I'm talking about has been designing works that can be viewed by people that have no sight. That are literally blind, fully blind that can touch the surface of the carving and understand what that is as an art object without vision. That to me is a very powerful accessible feature. I love that with technology. Like you said, these things just didn't exist 10 years ago. But with technology and that natural kind of partnership with are in digital art. We're seeing, we're hearing opportunity instead of challenge, which I think is really great. We're seeing more inclusivity in the arts, which is great. Well, thank you again for being here and chatting with us today. How can our listeners view your artwork or your student's artwork and follow you or your groups as you continue to make waves in the makerspace? Well, I am currently updating my website. I mean, I have plenty of art on there, but unfortunately, technology changes. So, some of the works that I have on there that were interactive and were created in flash and then flash could they pull the plug on it? And then all of the work, maybe three years ago, five years ago is gone. So, we're formatting some things, but I'll definitely have a number of links to projects that are available already all in one place on my website, which will be listed on the podcast that BillGorcica.com. So, there are some recordings on Minnstate of student slideshows showing work that are recorded on Zoom that I have archived and, and other things that I did including Mushi river, I'll have a little video sampling of that, etc. So, check out our website specifically Bill's Episode for those links and resources. Thank you again for being here. Thank you. It's great. 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.