

-: Hello everyone. My name is Anna Voelker and I'm so excited to be here today with all of you, to talk about science accessibility. The last year I served as the Astronomy Outreach Coordinator for the Department of Astronomy at the Ohio State University and I'm now transitioning into a PhD program at the Open University in the U.K as a student studying inclusive astrobiology education.

I'm the founder of SciAccess which is an initiative, we'll talk a little bit more about today. And with me today are two of my research students, Caitlin and Michaela. So Caitlin, would you go ahead and introduce yourself next?

-: Absolutely, so thank you so much Anna. Like Anna said, my name is Caitlin O'Brien, I use she/her pronouns and I am the second year at Ohio State University as an undergrad studying astronomy astrophysics and physics. I've been working with Anna since March of last year and have collaborated with them on several outreach projects including SciAccess and Making Space for All webinars in the Zenith Mentorship Program, which we're all going to talk about today.

I'm also the President of Ohio State's Astronomical Society and a planetarium presenter at the Arden squat about planetarium. I am a white female with glasses and mid-length brown hair.

I am wearing a silver sweater dress and my virtual background has our Astro Society logo from OSU, I'm very excited to be here.

-: Awesome, thank you so much, Caitlin. And next up is Michaela.

-: Thank you Anna. My name is Michaela Deming, my pronouns are she/her and I am a fifth year undergraduate at Ohio State studying astronomy and astrophysics. I've been working with Anna on Accessible Astronomy Outreach since last May and I am now the President of the SciAccess genius mentorship program. I am a white female with shoulder length brown hair and glasses and I am wearing a dark purple shirt and a gray blazer. Thank you so much for having us here today.

-: Thank you so much and to add my image description as well, I'm a white person with short brown hair, uses they/them pronouns and I'm wearing a black blazer with a Whirlpool Galaxy as my zoom, a virtual background.

So on this first slide, you have the text SciAccess Making Space for All and it's accompanied by a series of photos that we'll describe as we get into the content of the presentation today.

First off though, I'm going to turn things over to Caitlin to tell you a little bit more about the background of SciAccess and to provide me with some context for the program.

Caitlin, the floor is yours.

-: Thank you so much. So like I mentioned, during my time as a student working with Anna, my experience has most extensively been with the SciAccess Initiative, which was founded by Anna in 2018. On screen right now is the SciAccess logo, which features a glowing blue star in the center of an atom, on each side of the atom or two dark blue hands making the symbol for sign language interpreting.

We know that there's a lot to do in the world of accessible STEM and this initiative is bringing together those who have a passion for inclusion in science, by promoting accessibility.

So SciAccess is just a sort of initiative of folks that brings together students, professors, researchers and members of the public who have disabilities, all of this kicking off with the inaugural Science Conference.

On this next slide is a flyer from SciAccess 2019 which was an in-person conference hosted at Ohio State University over that summer.

Beside the flyer is a collection of photos of just a fraction of speakers we had at that event. SciAccess 2019 featured over 60 speakers in total with our keynote presenter for the event being Dr. Temple Grandin, a renowned Autism Advocate and Professor of Animal Science and Anousheh Ansari, the first female private space explorer, first astronaut of Iranian descent and the first Muslim woman in space, both of which are also featured on this slide.

Then this year leading up to SciAccess 2020, we decided to take advantage of the widespread transition to online learning by hosting the Making Space for All webinars, which highlighted speakers from diverse backgrounds on varying topics in astronomy.

On this slide, we have the Making Space for All logo, along with 13 images of our speakers we featured as part of the program. This all began in early April and each of our webinars had live captioning and an ASL interpreter on screen, with the focus of introducing astronomy to as wide an audience as possible, with featuring diverse speakers so that underrepresented students and members of the public could learn from accomplished scientists that look like them. When too often this isn't the case in the greater STEM community.

Like I mentioned, this led up to SciAccess 2020, which was hosted virtually on June 29th, 2020. The event featured speakers returning from SciAccess 2019 to give updates on their work as well as many new speakers we introduced to the community. SciAccess 2020 culminated with a keynote presentation from Dr. Soyeon Yi, who is shown at the top of this slide along with Anna and our ASL interpreter during the event. Soyeon gave a keynote presentation on her experience as the first and only South Korean astronaut.

On this next slide, we have a map of the world with countries in blue highlighting countries we had participants from. In total we had over a 1000 registrations for SciAccess 2020 and 555

participants on the day of the conference who called in from 46 different nations in all seven continents, including several neutrino-scientists in Antarctica.

This allowed a wide range of individuals to participate in a diverse discussion of not only signed to the topics but also how those topics can be made more accessible. If you're interested in getting involved in any of this, there are several ways that you can do that. If you're interested in a high level of involvement, you can join the SciAccess Working Group which is a collective of professionals who meet virtually once a month, to discuss the latest in accessible STEM.

On this slide, is a screenshot from the SciAccess website, which features these SciAccess logo and a rendering of the sun in various wavelengths. This group is open to those working in astronomy and other sciences as well as disability and accessibility backgrounds.

If you're at all interested in a more casual level of involvement, you can also get involved in our SciAccess community group on Facebook, which shares news about accessibility and science as well as updates about SciAccess. We plan to hold the next SciAccess conference with GLAS education, which stands for Geneva Lake Astrophysics and Steam and is a nonprofit led by Kate Meredith.

We'll be hosting SciAccess 2021 virtually, similar to that of SciAccess 2020, most likely in the autumn of 2021. On this slide, there are several photos from the conference including a woman looking through a telescope, a child playing wheelchair basketball at SciAccess 2019 and a group photo.

Also featured on this slide, is the sciences logo and a quote from one of our 2019 speakers and our gracious hosts for the event Dr. Mahedeo Sukhai. And this quote says, "The importance of an event like this "is that it sends the message, we are not alone."

If you're an interested in donating to support the conference in 2021, we will be providing a link to our GoFundMe after this presentation.

I'm now going to pass things over to Anna, in order to talk a little bit more about how you can make your event, whether that's a conference or otherwise more accessible.

-: Thank you so much Caitlin, I really appreciate that. So as Caitlin shared, we've done virtual and in person and we've collected here's some of our tips, for best practices for both of those different environments. So for folks doing an in-person program, we highly recommend having a quiet room or a sensory friendly space, for your participants to escape from the chaos and the noise of the conference.

SciAccess 2019 had service animals actually in our quiet room, which is why our slide is graced by the wonderful presence of two puppy dogs, featured on the right hand side here. These are service animals from 4 Paws For Ability which we had accompany the quiet room, so that folks could have a calming space.

This is initially designed as a neuro-diversity accommodation but it's something that we saw was widely appreciated by all attendees. It's something that, again is something you'll see as a theme of accessibility benefiting all.

Another thing that we've seen from the neuro-diversity accommodations, but again, that really is a useful thing for all of your attendees, are color communication badges. And this is a system designed by the Autistic Self-Advocacy Network or ASAN, which is a fantastic resource for anyone looking to hear about information by autistic individuals, for autistic individuals.

Color communication badges are strips of paper, that you can put in the name tags, for all of your participants, to non-verbally communicate their communication preferences. So you have red, yellow and green strips of paper that we put in our main tags for our 2019 event.

Red indicates that they're taking a break from socializing and would prefer to not be approached by anyone right now, so please don't engage or initiate the conversation. Yellow means I'm only looking to talk with folks I already know. So you're welcome to come up and say hello if we know each other, but I'm not really looking to meet new people right now. And green means I'm really excited to meet new folks, please come up and say, hello. I'd love to meet you and I'd love to connect. And again, we see here that you're, you know specifically this is designed to be a benefit for neuro-diversity but it's really useful if you're nervous about meeting new people at a conference and they have their green badge display you know, for a fact that they are there to network and that's their preference and that you're not, you know overstepping any bounds by going up and saying, hello.

Another thing we'd strongly recommend our pronouns and all of the name tags. This can also be done in virtual settings, by having folks put their pronouns in their zoom name, which you can edit on your platform. But what we've actually did for our in-person program was have pronouns be a default that you set when you register for the event itself. And you give folks the option to opt out of it. But if selecting the pronouns is the default, we found that over 95% of participants just selected their pronouns and in that way, on the day of the event, you know 95% of folks have their pronouns displayed on their name tag and this is normalized as that process of asking pronouns and respecting people's pronouns, instead of assuming someone's pronouns and assuming someone's gender.

Another thing for in-person events is to have comfy arm chairs in each room, which was something that was requested by folks with chronic pain and again, something that was really appreciated by everyone to benefit. And then regardless of in-person or virtual, you'll really want to prioritize, setting aside some funding for ASL interpreting and CART captioning.

I wanna emphasize CART captioning, live captioning specifically, because in this era of Zoom there's a lot of, you know events that are using automated captions, but I, you know really you really do see a difference in quality when it comes to having a live captions. That's something we strongly recommend looking into for service for your event, regardless of the platform it's hosted on. And then braille and large print materials. That's something that you can have your

attendees select when they're registering. So you know how many you need to prepare in those materials.

And then for in-person program, we like to create tactile maps of the building. So for 2019, we had a thermoform map where folks come to the info desk and feel this tactile raised map that gave you a full picture of the conference venue.

We also had BLV or blind and low vision guide volunteers. So these are sighted individuals who have been trained to help any BLV attendees, find locations within the venue. So at any time someone could come up and ask for a guide volunteer to help find a specific place in the conference venue.

And something that you'll see today and throughout this whole conference are slide descriptions. So as Caitlin modeled for us, describing what is on your slide, so that folks who are not seeing the slides are not left out of the conversation. And what I always tell my speakers, when we're doing a Zoom Call is to pretend your Slide Share is broken. Pretend your Screen Share isn't working. What do you need to say out loud, to make sure that even though the Screen Share is broken, everyone understands the visual content and everyone's on the same page? So that helps put that into perspective sometimes for people.

And then last but not least, a lot of in-person events have social hours with high top cocktail tables. And that's something that's really easy to just avoid, not only because it makes folks with wheelchairs, using wheelchairs, not be able to be a part of the level of the conversation to reach the table, but it's also really accessible for anyone who for whatever reason, can't stand for long periods of time. So just avoiding those is another tip we'd like to share when it comes to making sure your event, whether virtual or in-person, is as accessible as possible.

Now switching gears a little bit, I'd like to turn things over to Michaela, who's going to tell you a little bit more about the SciAccess Mentorship Efforts and how you can get involved.

Michaela, the floor is yours.

-: Thank you Anna, for the success of SciAccess 2020, we organized a new completely virtual mentorship program, for blind and low vision or BLV students, interested in astronomy. The SciAccess Mentorship Program in partnership with Ohio State and Ohio State School for the Blind, involves BLV students in astronomy by pairing them with Ohio State undergraduate and graduate students studying space sciences.

Our mentors come from departments working in space science across Ohio State, giving us a mentor pool with a diverse mix of backgrounds, years of study and focus areas. Our students come from all over the world, from as close as our home city of Columbus to as far away as Australia.

During the program, the students and mentors attend weekly group meetings to learn about space science and discuss our ongoing projects. Each student mentor care also meets weekly to discuss everything from astronomy, to computers, to college advice.

One resource we use to engage our students are 3D models of astronomical objects created by our partners at Zenith 3D, a nonprofit organization that prints and distributes 3D printed models for BLV people.

This slide shows several examples of the models used in our program. On the top left, there is an image of a semi-serious dome created by the team of Amelia Ortiz Gil with raised lines and dots forming shapes of constellations and other objects in the night sky. We use these domes as part of an accessible, virtual planetarium show for the students.

In the top right, we have a model of the Whirlpool Galaxy, a flat square with a raised image of the galaxy printed on it, where the height of the image correlates with brightness. This model was designed by the Tactile Universe Project, and Dr. Nick Vaughn, a vision impaired astronomer working in the United Kingdom.

In the bottom left, there's an image of a black hole 3D print, a flat square with a mountain like raised portion in the center where the height of the image correlates with brightness. This model is based off the first photo ever taken of the black hole, which is shown in the bottom right is a ring of orange light on a black background.

Another resource we use to make astronomy accessible is data sonification, which turns data into sound that can be analyzed their hearing. Zenith's hallmark I activity involves our students in Transient Zoo, a citizen science project that uses Sonify data to identify supernovae light curves.

Instead of looking at graphs, our students listen to audio from Transient Zoo and identify which kind of supernova each data set is from. The sound's pitch is related to the brightness of the light coming from the supernova. So higher pitches indicate brighter light and lower pitches indicate dimmer light. Transient Zoo includes examples for both Core Collapse and Type 1a supernovae.

An image of Cassiopeia, a core collapse Supernova is shown on the right corner of the slide, as around cloud of blue, pink and yellow material. Core Collapse supernovae happen when a star runs out of fuel and its gravity causes the stars material to collapse inward before exploding violently outward.

(star exploding)

Meanwhile, at Type 1a supernovae happen when a stellar remnant called a white force, suddenly gains extra mass from another object in space and explodes.

(star exploding)

Students and their mentors also attend astronomy lectures from Ohio State professors post-docs and grad students, as well as astronomers outside Ohio State. An example of one of these talks is in the bottom left corner, which shows a photo of the top by Locke Patton, a Harvard graduate student who works with Transient Zoo and has been assisting Zenith.

If you're interested in being a guest speaker for our spring semester program, please reach out to us. We are always looking for new experts to share their knowledge with our students.

This spring, we may have the chance to participate in a NASA In-flight Education Downlink with the international space station, that would allow our students to participate in a live call with astronauts, ask questions about astronomy and lighting space.

The ISS is shown here on the left of the slide, as a vessel with large solar panels, floating above the earth and space.

After the pandemic ends, we are also interested in partnering with an aerospace company to launch research projects from our students into space. Our students would work with their mentors and faculty advisers, to design and develop their experiments.

One option we are currently looking at is blue origin who have an established educational payload program to send student research projects into space. A blue origin rocket is pictured in the center of this slide as a white rocket flying above the earth.

So how can you create your own mentorship program? It's important to start by building connections with your local community. You can begin by reaching out to schools serving BLV students in your own area, to ask if they're interested in a partnership. By connecting with your local schools, you and your organization combine your expertise in space science with the expertise of your partners and accessibility and the needs of their students. Together you can create something greater than either of you could separately.

As a next step, you can recruit mentors from within your own organization. Mentors can be drawn from the organization's interns or be open to any interested employ. You might even consider working with local universities to include their students in your efforts.

Last but not least, we would love to connect you with our resources so you can create your very own Zenith Chapter under the SciAccess Mentorship Program and take advantage of the content and infrastructure we already have in place.

So why does any of this matter? Improve to access to astronomy invites people from all backgrounds, to join in the process of discovery. This not only benefits underserved learners but the astronomy community and STEM as a whole, by welcoming new minds and perspectives into the field.

SciAccess is dedicated to inspiring and developing and promoting innovative approaches to equitable science access and we are excited to continue this work with all of you back to you.

Back to Anna.

-: Thank you so much Michaela, I really appreciate that. So we're gonna end here on this slide which has the text, Accessibility Benefits All and it has an image of me with some of the team members I worked with on a program at a school for blind students in South Africa. And I like to end on this note because I really wanna drive home the point that if you don't have access to 3D printing or you don't have the budget for high cost materials, accessibility is still achievable, because it's really about a mindset.

It's about a decision to include, you know inclusive resources and to work with students to respond to their needs. So when we worked with the school, I organized an astronomy outreach day for the students And while I did have some 3D models and some of the resources that Michaela highlighted.

I'll never forget that the thing that stuck with these students the most, were the Play-Doh planets that I had made to scale of our solar system the night before.

And so on this solar system scale, we had Jupiter represented by a basketball, Saturn as a soccer ball, Uranus and Neptune as oranges I got from the local grocery market. And each time I placed one of the tiny Play-Doh balls that were the terrestrial planets in the hands of these students.

They literally squealed with joy and jumped up and down because they were so excited that this concept was all of a sudden accessible and it was something that for the first time was presented in a way that they could grasp.

And again, we talk about accessibility benefiting all because the scale of the solar system is not something that visual learners can access either, it's simply too big. And so being able to provide these multisensory approaches to education really help all students learn in a more effective way.

And so I just wanted to end on that note of sharing that, you know accessibility is really something that's achievable and you know it's just something that anyone can accomplish. It's just you starting as Michaela said, with connecting with your local resources.

So with that, we wanna thank you all so much for listening to our talk today. It's been a real pleasure to join you all and we really appreciate your time.

Thank you very much.