It is just about time to head over to Yerkes Observatory for adventures in accessible astronomy. We're going to learn about SOFIA and JWST with the Wisconsin School for the Blind and the Wisconsin School for the Deaf. Lots of really cool stations and activities to check out from GLAS Education. Lots of ways that are going to be accessible to learn about the universe without the use of sight or hearing being essential to the experience.

So one of the things that can be a challenge at any event is if you have a name tag like this one. There's the possibility that I put it on, and I put it on upside down except not really because I can flip it either direction, and it still says my name in the right orientation so that sighted people--

You can read it, too, then when you want to.

Exactly. And sighted people can read it. Everybody wins.

So what I wanted to show here is what I have dubbed, I don't know, cane roads, cane highways. This is a really neat way to show how you could adapt to a space with something that doesn't necessarily cost a lot and also allows you to put down a path that could be navigable. So I'm going to have our helper here demo. And it makes a lovely noise. But it also makes it so that you can choose where you're going. So cane highways are definitely a win.

With all of that being said, let's head over to the observatory and talk a little bit about accessibility in astronomy. Here's to our adventure.

One of the biggest things you have to consider when you're doing an event like this is the accessibility of the venue itself. So for a place like Yerkes, for me, it took two drivers and a train to be able to get here in one piece to be able to attend. And for the kids, it's working out today because this event is being held in collaboration with both the Wisconsin School for the Blind and the Wisconsin School for the Deaf. And so the kids are able to be brought here by transportation provided for the event.

But sometimes, places like Yerkes or some informal education spaces can be hard to access. And so when you, as the venue, either have an understanding of the transportation around you so that you can give guidance to somebody. Or if you have the ability to give someone pointers on local public transit, it can be a difference maker that allows people with disabilities, whether it's blindness or deafness or others altogether to attend your event in an accessible way.

So we talked about one of the most important pieces in at least the initial steps for accessibility being the potential for a welcome or a pre-orientation. And so Kate is going to come out and give a welcome to the students who have come to attend today, give us a little bit of a walkthrough of what to expect, and potentially do that with the use of some models and things like that.

And so you see some of the teachers who are giving some orientation to their students about things like how many stairs there are. And each student is going to have different needs for what their orientation is going to look like. And so with this event being more specialized, it makes it a lot easier for everybody to get the orientation that they need to be successful.

Got to get a wheelchair.

Olivia is currently passing out some tactile maps and models to the students from the School for the Blind so that they have a chance to orient to the building before we go inside. Not only does this convey a sense of scale for the building, but there's also a 3D-printed model so that they can actually understand where in the building different stations are going to take place relative to where they are now. And this allows the students to get ahead of the orientation mobility of what is very likely a new space.

And so for a lot of events, it's really helpful to have models of buildings and spaces so that they have the chance to explore those models. And I can say from personal experience, it's really helpful to have models to be able to understand more about the space I'm going in, especially if I can do so ahead of time.

As Olivia continues her orientation, if your space is small enough, it can be really helpful to do what she's doing now, which is essentially a auditory walkthrough of where the stations are as well as where they can be expected to navigate from one to the other. And again, this just helps the kids to orient to the space. And if your space is larger, that can be a little bit harder to do. But Yerkes having only a handful of destinations today for both groups of students, it's helpful to give them an auditory walkthrough. And so Olivia is walking them through on the map or the 3D model that they're engaging with with the experience that they're going to have today.

Good to see you again. My name is Kate, and I work at GLAS Education. We have spent many months getting ready to have you here at Yerkes Observatory.

There is some ASL interpretation going on right now as Kate gives her welcome. This allows the students from the School for the Deaf to be included in the process of orientation in an easy way for them. And also, Kate can just give her spiel so the interpreters definitely can help make that process a little bit more seamless.

So Kate is handing out some pictures in different formats. Like she said, some of them are tactile, and some are visual. And this allows for a wide amount of access for both the students from the School for the Blind as well as the kids from WSD, the School for the Deaf. Multiple formats of these pictures are available for the kids. And that way, they can have what they need.

Use your map and the model, you'll forever remember how big this place really is.

So each student, when they go home today, is going to get a model to take home with them. And not only is this just cool in general, but it helps the students to have something to convey to other people in an accessible format what they experienced here at Yerkes. And models like this that can be taken home are an amazing remembrance, not only of a cool trip and accessibility done right, but can serve to really help the kids enhance the experience of being able to tell others about just the experience itself.

Because if you're a sighted student, you can just describe everything you saw that day. But if you can't see, and you still want to tell your parents how huge this giant refracting telescope is, it's hard to do that without some kind of help. So the model helps do that.

--telescope in the world.

And so at this time, the kids are breaking off into their individual groups that they're going to be in. And with that, I'm going to be carrying around my camera, trying to get as much footage as I can of the event and what kind of stations we're working with. Let's do it.

Some of these kids have been here before to work on various projects. And so Kate is doing a quick review with them to see if anybody remembers anything from previous experiences before getting started on the walkthrough. So the first thing that Kate is showing is that the visible light spectrum is actually a really small part of the electromagnetic spectrum as a whole. And using this model, there is tactile things that the kids are getting hands on with to demonstrate different parts of the EM spectrums in the telescopes that capture the light.

Invisible light.

Or the invisible light.

So the reason we put a telescope in an airplane was because infrared is blocked by the atmosphere. And so if you put an infrared telescope into an airplane and fly it up into the sky, you get less of that interference. And so the kids are learning about that concept and then learning about what makes each telescope that's modeled in this particular station unique as compared to the other telescopes. So we started with SOFIA. Now, we're talking Hubble.

So we're going to take a look at a bunch of different telescopes and tell us which ones they think are on the ground and which ones are in space. And models laid out on this table are tactile. Right now, I will try to insert some B-roll with descriptions of which models are which.

These are [INAUDIBLE]?

Yeah, this one and the airplane are to scale, whereas the other one is not to scale. The big one is. The one that I pass around to let people really feel the surface is it's easier. It's got a little more maneuvering room here.

So we're to scale with this smaller model here.

This is to sit and where does the pilot hang out, scientists.

Maybe back here.

Yep, and then that is the part of the telescope that is accessible in the fuselage. Now, this model is the original version from NASA. And it's really great because it's sturdy. It's thicker. You can have people handle it. It has even gotten dropped. So having different models for different purposes, even of the same thing, is really handy.

[INAUDIBLE]

Awesome. Are you from the Chicago [INAUDIBLE]?

Yes.

Hello. OK.

[INAUDIBLE]. We're going to talk with Kathy. We just got down from another station, and we're going to talk a little bit about infrared. So now, Kathy is using a infrared thermometer to take the temperature of the student's hands, tactile demonstration of how to read temperature.

83.

Infrared.

Look at that. [INAUDIBLE] to a solar cell. So when I turn it on, those annoying lights are very annoying. But what if I point this at it?

[BUZZING SOUND]

See, all this, the TV, has to know what you're pressing. Am I pressing in two or am I pressing in three? And so different remotes will sound a little bit different. So that's my infrared [INAUDIBLE].

Now, the SOFIA, plain. And this one comes apart. I'll pass it around.

So there's a 3D model of SOFIA that's getting passed around. And what Kathy is talking about is that different instruments on SOFIA would collect infrared from different parts of the infrared spectrum.

So this group is about to meet with Connie. And this is an outdoor station. So we've migrated to the north steps here at Yerkes. So what Connie has is a parachute like you might have used in gym class. And it's got markings on it to convey the scale and the size of different mirrors. And so she's grouping the kids up and having them grab the first mirror scale they get to experience.

So they're grouped up. And now, everyone's taking a hold of the parachute.

And stretch across this [INAUDIBLE].

So they're reaching across.

This is the size of [INAUDIBLE].

Right now, we are at the Yerkes 40, which is up here. And they have created that size of the 40-inch. And there was a few guesses that this was the biggest telescope. But apparently, we have bigger to go.

--right hand and then go to the next strap.

So now, what they're doing is there are straps on the parachute. So now, they are going to the next one, which is going to be SOFIA. And for those who may not be able to see it, everyone is spreading out just a little bit.

So now, from SOFIA, we get even bigger, this time to the size of the James Webb Space Telescope. And now, the group is assembled, like you might have seen, like I said in gym class, before, you're going to play popcorn or mouse and cat or any of the number of parachute games you might have played. And so now, the group is spreading out. So 30 feet around for the James Webb. And I'm walking around the group.

--what this feels like in your body, is I want you to turn just slightly to your right. And then--

So now, we are back to the Yerkes 40. That's one more shot at reconveying just how far they've come to go all the way back to the big dome here at Yerkes as a point of scale.

We're back to SOFIA. That way, again, reinforcing. Because sometimes that first runthrough is really cool and awe-inspiring, but you're focused on how neat the experience was. And so going back through the material one more time, especially when you're using a model, can be a really useful way for the kids to understand and cement what they have worked on. And it really lets you let this sink in just a little bit more.

Just a short preview of what the kids are going to work on with musical filters. And one of the things about using haptics or sound to convey something is that the vision becomes a non-factor. So it doesn't matter how much vision you have if something is represented in a haptic kind of way. And that's what Adam is demonstrating here with the kids [INAUDIBLE] that is something that allows for haptic feedback when a star is [INAUDIBLE].

So it's like accurate. It's very precise. So here's one.

Mm-hmm.

And so that you can be here.

Yes. I mean, yeah.

Because we repeated, like, mile sections. [INAUDIBLE]

He said there's eight roughly.

Correct. So was it two? OK, got one here. One-- yeah, here. And then here.

Mm-hmm.

It was. Because when downtown [INAUDIBLE]--

I'll trade the other one.

--Lincoln.

Yes.

[INAUDIBLE]

You can always [INAUDIBLE].

A little light sensor in here, takes the light that's coming in and outputs it at that frequency to make those notes. So you can hear one of our high school interns this summer did a really good job making this not sound terrible. Because when I first made this, it was hard to listen to. Now, it kind of sounds like a fun arcade game noise, and it's a little harder to pick out all of those individual pieces unless maybe you're a music person and you've got that trained ear. For me, it all blends together, and I just hear the music.

But what we can do in astronomy is we put our blue filter on. Yep. So now, if you use the blue, you can tell. And so now we have just the blue lights getting through to our light sensor. And so you're only hearing the blue. Now, we're going to go to our red. What changed?

You can see--

[INAUDIBLE]

It matches the slowness.

Right? You can visually match it up now. And so what's happening-- now, did you notice that the-- what happened to the pitch? Did it get higher or lower?

Lower.

Is it faster or slower?

Slower.

Right. So red light has less energy. And so it's going to have that lower frequency. And so you can of hear that. So with the blue light being the higher frequency, the red light, lower frequency, now what happens if we-- so would you expect this to be a longer wavelength than red light or a shorter wavelength than blue light?

Longer.

Longer, right? Because it's lower. It's slow. So what's past red light?

The orange light.

Infrared.

Similar to the music concept, this is combining the music with the use of a laser, applying the different filters. And now, you can visually see what can be heard, which makes it more accessible for the DHH students.

[MUSIC PLAYING]

So no trip to Yerkes would be complete without a trip to the great refractor. And we have a few groups throughout the day who have had the opportunity to head up there. So we're going to do the same. Let's go check out the big 40.

So I want to talk about that. Opposite grand staircase, we shall go. Go check out the Great Refractor. Lots of stingers. And there is not too visible [INAUDIBLE] step on. To the giant elevator, world's largest indoor elevator. There's a treat fact for you. And here we are.

There is the money, the Great Refractor. We're going to forego the tripod for a second so I can actually try. And this. We all sing in a one shot. So presenting in a space like this can certainly present auditory challenges at times. And Steve is telling me about the dome and has an interpreter with him who is giving a presentation to the students from the Wisconsin School for the Deaf.

And presenting in a space like this can be challenging. One of the things that can help, again, is pre-orienting people to what the space is going to look like. I would actually suggest a indoor model of the elevator and the telescope and all those things. Would be really neat. But when you present in a space like this, it's just special to be able to be here with the telescope and these guys are getting the chance to experience that firsthand by coming up here to the Great 40.

Thank you for checking out this look at adventures in accessible astronomy. We had physical models that represented scale. We had people moving around to convey the size of mirrors. We had sound and light representing different astronomical concepts for BVI and DHH students. So thanks to GLAS, the Wisconsin School for the Blind, and Wisconsin School for the Deaf for a successful event.