

 **March Theme of the Month: Webinar Panel**

March 24th at 3PM EDT
Including Individuals with Disabilities in STEM Courses, Research, and Careers

The webinar will bring together four leaders who will share promising practices in their sustained projects that help make STEM fields more welcoming and accessible to students with disabilities.



Richard E. Ladner (Moderator), Sheryl Burgstahler, Jeanne Reis & Emily Moore

<https://multiplex.videohall.com/pages/march2021webinar> 

Webinar Transcript

Joni Falk:

All right, welcome everybody. I'm so honored that we're all here and that you've come. My name is Joni Falk. I'm the principal investigator of the [STEM for All Multiplex](#), which is hosting this webinar today. And also of the [STEM for all Video Showcase](#). And these are two very related efforts. And I just want to speak about them very quickly.

Joni Falk:

Each year, hundreds of leaders of federally funded grants present their work on the video showcase by creating short three minute videos and discussing them online. In the playlist that you'll see today as part of this webinar, those videos were presented in previous showcases. The showcases here will take place May 11th to 18th, and we hope that you will join in the showcase by coming, viewing the videos, commenting on them and voting for your favorites. We anticipate there will be many on disabilities.

Joni Falk:

After the week of the annual video showcase concludes, each year, all the presentations are reposted onto the Multiplex. So you can see here on this slide, the URL for the multiplex and also for the video showcase. And the Multiplex style contains over 1,000 video presentations, which you could filter and sort and look for those on disabilities. It's a very rich treasure, and we hope that you will use it.

Joni Falk:

Okay. Each month the Multiplex explores a theme in depth by presenting an [introductory blog](#), [a video playlist](#), a [webinar panel](#), [a discussion](#), [resources](#), and a synthesis document. This month theme is including individuals with disabilities in STEM courses, research and careers. We hope you will view. And here I have on this slide, what it looks like on the site. So please come to the site and we hope that you will access the related videos and look at them and read the excellent [blog](#) that was written by [Sheryl Burgstahler](#), and take the time to review the resources that have been posted.

Joni Falk:

Last, after this session, we will continue to share our thoughts with each other through an [online discussion](#) on the Multiplex and our panelists will join in. So if you don't get your questions answered during the session today, please, please post them there. At this point, it's my pleasure to introduce our moderator [Richard Ladner](#), who

for years has impressed me with his passion, his advocacy and projects that have had a great impact on expanding access and opportunity for disabled people.

Joni Falk:

In 2020, the National Science Board awarded Richard with its public service award. We provide a [link to the video](#) that was posted in which he tells his story. It is very inspiring and worth having a look. And you'll find that on the Multiplex page. Richard is professor emeritus of computer science and engineering at the University of Washington. And after a long his distinguished career at Theoretical Computer Science Research, he transitioned to accessible computing research.

Joni Falk:

His projects have brought many with disabilities into computing fields. He leads or co-leads two NSF projects that help students complete their degrees in computing and prepares K through 12 teachers to include students with disabilities in their computer courses. We have closed captions today and an interpreter as Kim mentioned, please mute your audio and place your questions in the chat. And I will look for them and try and insert them into the conversation.

Joni Falk:

I now with great pleasure turn this over to Richard, who will introduce our fabulous panelists, Emily, Jeanne and Sheryl. Thank you. Richard.

[Richard Ladner:](#)

Thank you, Joni. I forgot to unmute. Yeah, we have three great panelists today. [Emily Moore](#), [Jeanne Reis](#), and [Sheryl Burgstahler](#). Sheryl Burgstahler is the director of Accessible Technology Services and the [DO-IT center](#) which stands for Disability Opportunities Internetworking and Technology at the University of Washington. She and I have worked together for, I think more than 25 years. Jeanne Reis is the co-director of the [ASL ed center](#) in Boston. Emily Moore is the director of research and accessibility for [PhET](#) interactive simulations in the department of physics at the University of Colorado Boulder.

Richard Ladner:

Now I gave short introductions because I really want to hear from them and what they're doing. And the first question will be for all three panelists. I'm going to start with Emily. Here it is. Please describe your project and how your project helps to include and empower more individuals with disabilities in the STEM enterprise? Emily, and you have about five minutes.

[Emily Moore:](#)

Thank you, Richard. Yes, I'm Emily from the PhET Interactive Simulations Projects at the University of Colorado Boulder, that project is at its core. A research group investigating the design implementation and use of interactive STEM learning tools. I lead a sub-team within PhET of about eight people that focuses on advancing knowledge of how to create the most inclusive, interactive STEM learning tools possible, using existing widespread technologies.

Emily Moore:

Developing inclusive learning tools means creating learning tools that have a design and architecture that supports multimodality and flexibility. So not just designing and building visual displays, but also auditory and haptic and tactile displays. And not just supporting mouse and touch input, but also alternative inputs, gesture tracking and object tracking. And doing so in a way that enables teachers and learners flexible use, accessing

different features in different combinations for individuals in collaborative groups, in-person and remotely. As an example, I'll share about some of our work in auditory display.

Emily Moore:

About five years ago, we began developing first non-visually accessible simulations, adding to existing simulations text description, which is texts read aloud by screen reader software, which is assistive technology often used by learners with significant visual impairment. To do this, a designer needs to create an interconnected system of dynamic text strings. And from this set of text strings, provide description for all of the essential information of the STEM in any state dynamically as the learner interacts.

Emily Moore:

So learners can hear about what is available to them. What is the current state, and be updated about important changes that occur as they interact. The description provided to the learner in any moment must support the learners inquiry while also being clear and concise. And this is a very challenging task. In designing these systems of description across multiple simulations, we identify common categories and information, and created a description design framework, and associated design patterns that can be used to design description for essentially any interactive learning experience.

Emily Moore:

In 2019, we began building on the description design framework to create voicing simulations. Simulations with voicing, provide description directly to the browser without requiring any additional assistive technology and allow teachers and learners to adjust the amount and type of information provided to meet their needs. Voicing supports non-visual access, but since it does not require specialized assistive technology, and the amount of description provided can be easily modified, voicing can benefit learners with a wide range of needs, including students with low vision learning disabilities or cognitive disabilities.

Emily Moore:

In parallel to our work in texts description, we've also advanced knowledge of the use of sonification for interactive learning tools. Sonification is the use of non-speech sounds to convey information. Our research over the years has found that the use of sonification can serve as an important compliment to the visual display and description display, providing additional context and cues to support understanding for the conceptual relationships being explored in the STEMs. For example, we have a simulation called resistance in a wire, in this STEM learners can change resistivity, link an area of a piece of wire and explore how these changes impact the resistance in the wire.

Emily Moore:

Changing these variables results in visual changes to the piece of wire. And described changes if you're listening to the description. If you have sonification on, you'll also hear a marimba tone representing the resistance that changes in pitch as the resistance has increased and decreased. By expanding the ways interactive learning tools, display information, and expanding the ways the learners can interact with the learning tools. We're increasing access for teachers and learners with disabilities and empowering learners through that access. And also by enabling each person to customize their learning experience.

Emily Moore:

We share the resulting simulations for free with the world, and we share our research process, inclusive design practices, simulation code, STEM architecture design, everything is openly licensed, all moving towards a goal of supporting more STEM interactives being developed that can flex and adapt to meet the needs of all teachers and learners across the full spectrum of human diversity. So that's where we're up to it.

Richard Ladner:

Thank you, Emily. I encourage everybody to watch your video in the Multiplex that describes a lot, more visually what you've done. So Jeanne, is there any question? Okay. Unmute.

[Jeanne Reis:](#)

Unmute. I really like how Emily described the work that she does in that she's just working to meet the needs of all the wide range of human diversity. And that is how I think of it as well. I don't think of my work as serving the needs of a disability as much as I see it as serving the needs of a language minority population. And in serving the needs of many who don't know that they will eventually become hard of hearing or become deaf across the lifespan. So many of us are currently having access to a range of sensory information and that changes across a lifespan.

Jeanne Reis:

So I think of all of us as somewhat temporarily abled or disabled in various categories in our lives. So the work that I do is to bring some additional resources to the STEM fields, allowing the information in the STEM fields to be more readily available to a language minority population that have the ASL signing deaf community. And in the development of ASL Clear which started about 15 years ago, we found that technology and systems had not really caught up to the affordances of American sign language or signed languages across the world.

Jeanne Reis:

There are sign languages in every country, in some cases in regions of countries that vary from one another. And video technology and the design of user interfaces, and the design of our educational materials for learners and teachers just do not offer deaf people in ASL signing individuals the same kind of availability and ease and flexibility, and user-friendliness as it offers those who are either working in a written or a spoken language.

Jeanne Reis:

So in developing ASL Clear, it started as an effort to identify some specific vocabulary for STEM concepts in ASL, with the idea that perhaps if we were to more consciously come together and in panels of deaf STEM experts think about ways that concepts like photosynthesis or Adam or fraction are presented in ASL, we could perhaps if you will force the process of language development in a lab environment and then release those terms out to the broader community and see if they were adopted or not.

Jeanne Reis:

And so along the way, there have been many realizations about what does it take to release signed vocabulary in a contextual format rather than an individual signs, presenting it in sentences or in a full short lecture or a presentation about a concept. How do we design a user interface to make that possible? And then what linguistic principles emerge along the way? What do we find in terms of signs that are being adopted by the community? And signs that are not being adopted by the community?

Jeanne Reis:

So in this process, I'm not a representative if you will, of the community that has worked with me to develop this resource. I'm not a deaf individual, but I have worked with many, many panels of deaf individuals. So I see myself as somebody who co-designs and co-leads this effort. And it would simply not be possible without the collaboration and the engagement of the deaf community. So in that way, including individuals is more like in my case, it's being led by or collaborating with, or learning from individuals who are in the deaf community, who are ASL signers.

Jeanne Reis:

And then making sure that they have the opportunity to contribute and shape and extend any of the work that we do in the development of ASL resources, from the sign, lexical vocabulary level, all the way up to the design of technological resources such as an online application or a website, whatever it may take to deliver those materials to the end learner.

Richard Ladner:

Thank you, Jeannie. That was fantastic. I really admire your work, because I've looked at this problem of sign language and science intimately already myself, and hopefully make some progress myself. But thank you. By the way, there is another video about ASL Clear. So please watch that video to get more details. So Sheryl, last question for you.

[Sheryl Burgstahler:](#)

Sure. I'm Sheryl Burgstahler again still. A lot of things have changed with the pandemic, but I think we can say solidly that people with disabilities have experienced disproportionate impact now because of the COVID pandemic. Maybe in health issues, but basically in participating in online learning most of which is not fully accessible to many people with disabilities. So it has impacted our work as well and moving a lot of things that were onsite online.

Sheryl Burgstahler:

So I'm going to tell a little bit about the DO-IT center we've been funded since 1992 long time by the National Science Foundation and later by the state of Washington to offer some specific activities for students, which I'll share with you in a minute. And we get other NSF grants as well, including access computing, I'm co-PI with that particular project with Richard Ladner, his PI and we have a couple other co-PI's as well.

Sheryl Burgstahler:

So we basically have two approaches in everything that we do. One, we work with students, we work with individual students with disabilities, all types of disabilities. We typically target students who are college capable but that could be a community college or even a tactical school. So that sort of thing we do, because we're concerned with transition. So we're talking about transition to a post-secondary school, maybe to graduate school, maybe to a career, hopefully. And it's a longitudinal sort of approach where we connect ourselves with the students and they never get away from us.

Sheryl Burgstahler:

And so these we'd have students in our program now they're like 40, they're not my students anymore, but they mentioned the aggregates. And so it's much of a bootstrap approach. But we also work with faculty and staff and institutions and companies, and there approach is universal design where proactively we help them make whatever they're developing, born accessible and then providing accommodations, but that the accommodation should be substantially reduced, because of universal design.

Sheryl Burgstahler:

This is underpinned by the social justice model of disability. And also an ability focused model. So universal design is used as an approach to solve these accessibility problems. But let me talk a little bit about our program for kids, that's for students with disabilities and they do at scholars program, which there's a short video on it and I'll fill in some gaps. So there we work as I said, in transition steps, but with continuous and encouragements and so forth and support.

Sheryl Burgstahler:

We promote self-determination, which is just a broad term of skills and knowledge for a person to make their own decisions. In another might help with some of them, we work on that a lot. And one particular area is self-disclosing and their disability and advocating. In the K-12 environment, there's a law called IDEA that, or a faculty member in the K-12 environment totally revamped their curriculum for a student. And the parents are involved in the schools and school's involved.

Sheryl Burgstahler:

When you look at higher education, we're just providing accommodations to create a level playing field. And so we're restricted in adapting... We can adapt the curriculum and we can't lower the standards. And also the student has to advocate for themselves. So we work on that a lot. There's drop-off in success from high school to college and what we're trying to do a lot of work in that space. So what do we do? Well, we head up onsite programs that now are online and we have exposure to STEM fields. They get access to the technology, both on assistive technology, mainframe technology.

Sheryl Burgstahler:

We have year-round online mentoring and support from peers and near peers. We have internships in industry and research, we get these students into. And as I said, the older participants become the mentors to the younger ones. We've been having an international program involved in a couple of the countries for that new scholars program. And then again, the universal design and helping faculty members teach inclusively, including the accessible technology and so forth.

Sheryl Burgstahler:

Some projects we have besides access computing is a similar project access engineering. [inaudible 00:20:36] engineering faculty access advanced, helping women with disabilities be more successful in post-secondary academic positions, access cyber learning, which was a research project and so forth. So that's enough for now.

Richard Ladner:

Thank you, Sheryl.

Joni Falk:

Actually, there was one question that came in for Emily.

Richard Ladner:

I can read that. I can read that Joni.

Joni Falk:

Okay, great.

Richard Ladner:

I see it in the chat. Yeah. So, Emily, there was a specific question about the innovations that you mentioned, or the PhET simulations, I think is what they're talking about here. Who are the students? Are they elementary students? Elementary school, high school, college, which levels?

Emily Moore:

All levels. We have kids as young as five using the simulations all the way up to college students, graduate students.

Richard Ladner:

Yeah. And since you're on there, I'm going to ask you the second question. And the second question is please explain what general strategies can be used to include and empower more individuals with disabilities in STEM fields? So when I'm thinking about you, and the PhET project and making PhET accessible, I'm thinking well, making this system for doing simulations accessible means that blind students, for example, have the opportunity to learn from these. And so you are empowering them in that way.

Richard Ladner:

And I also know that you've brought in some blind students and consultants to your project to make sure that you're going in the right direction. So tell me more about how you're doing that inclusion and empowerment.

Emily Moore:

Sure. Yeah. So I wanted to bring up two big ideas in response to this question. One big idea is that innovation happens at the margin. So a colleague of mine, Nita Tavernas who directs the Inclusive Design Research Center talks frequently about the common use of the Pareto principle or the 8020 rule. So when we apply the 8020 rule, we create for the 80% first, the majority and leave 20% of the folks at the margins for later.

Emily Moore:

In reality, though, we tend to operate from a lot of assumptions or carrying forward of what was done before. So when we think we're creating for the majority, it's often that we're creating for an imaginary majority and the people that actually fit the imagined average person we have in mind may actually be a very small percentage of the whole community we want to reach.

Emily Moore:

So recognizing that you may be creating projects, papers, programs, whatever it is that you create for an imagined majority is actually a small majority or small minority of people itself can be a powerful perspective shifts. And one that I went through in my own work, but even more so, is it once you realize and start thinking about the actual community, your work is reaching and finding those truly at the margins, there's 20% who wouldn't be involved or participate.

Emily Moore:

Figuring out the needs of those 20% and how to meet those needs presents almost certain mechanism for incredible innovation. And so I'll share some of that in my own work. So I started doing inclusive design with simulations by trying to make the first non-visually accessible fits in. I had no idea how to do this when I started, but was determined to try because I had identified what I thought was the learner at the farthest margins for our tool, the learner, our current interactives at the time would be the most difficult for.

Emily Moore:

If we could do that, I was confident we can make the most inclusive STEM interactives because I thought probably everything else would be simpler. It turns out that's not the case, but I didn't know that at the time. But at the time I thought, if we couldn't make a non-visually accessible simulation, I've at least wanted to know why precisely we couldn't do that. So it turns out it is possible with time expertise and funding to make a non-visually accessible STEM interactives. Now we do this in our work.

Emily Moore:

And in the process of doing that, we started a virtuous cycle of innovation and inclusion, noticing how one new design feature positively impacts other learner communities. Anyway, as we expand our work to include other learner communities, we identify opportunities for new features and so on and around and around it goes.

We're even expanding our work to include investigations of new ways to co-design and collaborate with learners and teachers across different communities.

Emily Moore:

So we're setting up different partnerships and trying out different ways of co-designing in particular on the idea of empowerment, we're particularly trying to figure out ways to create co-design partnerships where it's mutually beneficial for everyone. So the learners are learning about technology. They're learning about design, they're learning about description and sonification, haptic interfaces, and they're learning about STEM content all while we're learning about how to make these tools better and more flexible and more adaptive. And understanding the needs of all the learners at the table.

Emily Moore:

So creating these mutually beneficial co-design partnerships and figuring out how to do that.

Richard Ladner:

Yeah, by the way, I've definitely experienced the same thing that I learned just as much from those students with disabilities I've worked with as they learned from me. So, Jeanne, how about you? Actually you addressed this question a little bit in your first answer, but maybe you could tell us more about your strategies for inclusion and empowerment and how they can be generalized and other people can do the same thing.

Jeanne Reis:

Yeah. I think once again, I'm in the position of saying ditto to everything that Emily just said. So I appreciate that very beautiful kind of summary of how the principles of design operate when you work on, what you might see as the margins, but in fact, really are contributory to everybody in society. I think that the very first thing I continually learn is how much I don't know, and how much fun that is actually to be in that space of learning all the time.

Jeanne Reis:

And how much we all don't know. How much technology doesn't know. How much our systems don't know about how to operate really for the benefit of all. And so I think that learning is always a really important element of being inclusive in general. So in the community that I work with, my collaborators, my deaf colleagues, we are often struck by the mutual benefit of this co-design process. So I was having a conversation just this morning with some colleagues about the fact that we don't think about user interface design in deaf community. We think about video technology.

Jeanne Reis:

And when we bring video technology into the space of web design, then we realize that we kind of come right up against some principle that's at play, that is a historic barrier. The fact that everything's designed around spoken in print and content, and that inserting video into that element is so challenging that brings to life those underlying principles that nobody sees until you try to make a change or to do something new.

Jeanne Reis:

So, being willing to learn, being willing to use other senses to engage with new communities. So if a deaf student walks into your classroom, you really have to use the visual sense if you have it available to you to, to note when they are not signing anymore. And they're done with their thought. The temporal nature of engagement in a classroom has to change when you have students who are deaf in the conversation, or when you have students who are blind or any individual at the table in the workplace.

Jeanne Reis:

So I think that just understanding that you're going to shed light on some underlying principles and practices that are barriers for some individuals participating. And also, in that process I often find that when we wait a beat to make sure everybody's on the same page, we're more productive. When shift the rules a little bit, suddenly we just... I don't know, we engage with one another in different and more creative ways. And so I just have always found that that is fairly enlightening for all of us in the room. We have to learn to try something totally different, explore a road that maybe we wouldn't have ordinarily gone down.

Jeanne Reis:

And another thing that I say often is that many of my hearing colleagues will say, "Well, I really remember having met this deaf person through my work with you. And they really made a big impact on me." And frankly, I'm just going to say, this is pretty blunt, but my deaf colleagues don't often say, "Well, that hearing person really made a big impact on me." Because that understanding really is offered by the contact with the deaf individual rather than the hearing individual.

Jeanne Reis:

So so I think that we have to remember that our colleagues and our students and our collaborators who bring some difference into the room, some diversity into the room are the ones that are probably going to leave the indelible impression on us rather than the other way around.

Richard Ladner:

That's great. Yeah. There's something magical about sign language. And of course, I grew up with sign language with deaf parents. But over the years sign language it's really become, it's moving out of the margins and becoming more mainstream. If you look at the data for the Modern Language Association, the third, most popular language taught at universities and colleges in the United States is American sign language. So that's after Spanish and French. Number three is ASL. So it's exciting to see. Sheryl, what about inclusion and empowerment? What are some general things you can help our audience understand?

Sheryl Burgstahler:

Inclusion of course, including people. When we talk about universal design of something it will be something that is accessible and usable, but also inclusive. People with disabilities can participate side by side with other students, whether it's online or onsite. And then empowerment goes hand in hand with self-determination so that students can develop skills and knowledge so that they can maneuver in this world that's really not very accessible to them.

Sheryl Burgstahler:

So, those two things fold in with everything that we do and the do it practices and. And another specific thing them too, is they're often developed from the experiences of other under marginalized groups, which are the minorities, women. There's not enough research in the disability area. And so we adapt other promising practices in that way. We gather input all the way along and improve that way.

Sheryl Burgstahler:

So I talked about mentoring, a point we learned there is that sometimes the most powerful mentoring is a near peer, someone who is a year older. Maybe they're in college and you're in high school. And so we make sure that we provide that near peer support. Also, the peer that often is more social, but that's important too. And then the adult mentor. So we include all three and we mainly mentor them in an online community so that everyone can benefit from the conversations that take place. And they're very, very busy groups.

Sheryl Burgstahler:

Summer camps where you can be onsite and stuff I think is really important to improving the success rate of people with disabilities, access to technology. And that includes online technology that's designed in accessible way. And so it can interface with any assistive technology they might be using. I also feel I've mentioned earlier that it's important to have something in the transition space. Students in theory learn in their 504 plans or IEPs, how to transition to college, if that's a reasonable goal for them.

Sheryl Burgstahler:

But not a lot of that really takes place. And often the post-secondary school is not involved. So even if you're at post-secondary institution can offer a summer experience for people with disabilities before they actually start. That's the other thing too. It's longitude. We actually have a research study where we're tracking participants had access computing and other projects to see how they do and what might be related to the success rate in that particular area. And we really work a lot in the area of work-based learning.

Sheryl Burgstahler:

Students with disabilities are often get invited to do an internship. So sometimes we create our own. We've even resorted to paying the salary of a student with a disability to get into a good internship opportunity. I don't like that idea, but I have found that sometimes faculty and the people in the business world, the moment you mentioned, you could place a student with a disability. They're not probably not going to accomplish as much as I need. And so then if you pay for half their salary or even all their salaries, and all of a sudden they're listening.

Sheryl Burgstahler:

I'm also considering intersectionality. If you run a program for women and encourage them to participate in IT, fields or STEM fields, are you really welcoming women with disabilities? We work with students with disabilities, but we're very conscious of other identities that our students have. And too often, there are projects, many funded by NSF, where the project doesn't include people with disabilities in their target population. And so I think that's something to really promote that we could all do.

Sheryl Burgstahler:

And then applying universal design pretty much everywhere to the technology, to the physical space to just everything that we do. There are established guidelines, there are universal design principles, they're seven of them and can help you make your physical spaces accessible and inclusive. And then some of you may have heard of universal design for learning that provides some assistance in providing multiple ways for your students to learn and to give feedback and to show what they have learned and to engage is a positive thing.

Sheryl Burgstahler:

But sometimes people in applying UDL don't make the other consideration, which is make sure all of those ways that you just talked about are inclusive of people with disabilities and the web content accessibility guidelines are there for that guidance in that particular area. So I think I'll stop right here.

Richard Ladner:

Thank you, Sheryl. Yeah. One thing that impressed me about your summer program is that, you'll have 20, 30, 40 students with all sorts of different disabilities and somehow they're interacting with each other, but also was empowering.

Sheryl Burgstahler:

Exactly.

Richard Ladner:

A couple of words about that.

Sheryl Burgstahler:

Sometimes as students, and parents, frankly are uncomfortable with that. Gee, my student has a learning disability has never interacted a lot with people who are deaf and hard of hearing or have other disabilities, but I find it to be a very powerful, it's definitely a growing up experience for these kids as it would be for other students. And they learn to intentionally make sure that they learn about other kinds of disabilities and how maybe some accommodations might benefit them. Even though the disability is really different.

Sheryl Burgstahler:

For instance, we have computer labs with assistive technology and they're many times different types of disabilities benefit from that assistive technology. And so often the students say, "Oh, I like this technology. I think that could benefit me." And because it's a funded project, I can allocate some money to get the assistive technology to them in their home. And so that they can experiment to see how it works. And so they're very much empowered in the program itself. And so they experienced that, and they give presentations of projects and so forth. So they get a lot of those types of experiences.

Richard Ladner:

Yeah. So Joni, there is a question in the chat that you sent me, I can read it from Lee Hoffman. It says, "If we're trying to remove barriers, why do we need to label folks as with a disability? But the 'with' in quotes, any comments about that? Maybe I'll answer a little bit myself.

Sheryl Burgstahler:

Okay.

Richard Ladner:

Growing up with deaf parents and my deaf parents, the being deaf was a label they chose for themselves. And they were proud to be deaf. And nowadays this concept of deaf has a capital D on it, just like when we talk about black people, we don't use a small b, we use a big B. Because there's a strong cultural element to be in the deaf community. So around the nation, there are at least 30 disability studies programs.

Richard Ladner:

And in these programs, the concept of word disability is not considered to be a negative term at all, but something about their identity, that's something they're actually proud of. So it's not that we're labeling people with a disability, it's that this is a label that they've chosen for themselves. So maybe Sheryl or Emily, would you-

Sheryl Burgstahler:

I think it's really important to as much suggested as we let people describe themselves with the terms that they want to use for themselves. But we do have time when we were talking about a group of people and disability is what is currently that term is used. And part of this is because of the legislation that if you have a documented disability as defined by that the American Disabilities Act, then you could get an accommodation. So there's some reasons to just define this group.

Sheryl Burgstahler:

But there are a lot of differences that have people like to be described, even in the case with disability. It used to be a couple of years ago that people, for person first language were really, really insisted on. A person with a

disability. And now, there's an effort to move toward identity language. Identity first. So a disabled person would be that. And in England to that has been the way they've done it all along primarily. And I agree with Richard that disability is not a negative term. It's just a descriptive term used in a particular context.

Emily Moore:

Yeah. I think just as a person who has never had a disability related label, tied to me, assigned to me by somebody else, I don't know what it feels like to be labeled by some external force, either legislation or an individual or university or whatever it may be. I don't know what it feels like to walk into an office store that has disability services on it and to ask for services. So I guess, I just continue to try to learn what the preferred identity label is among those that I work with and try to use that language as much as I possibly can.

Emily Moore:

And I'm in the dark as much as I am aware of that sometimes. So I do think, I think it's a challenge. I think it's a challenge. And I think that if it were possible to either use every identity group preferred in our titling, in our legislation, then that would be great. And, or to find something that is neutral that doesn't contain on or dis or incapable, just any language that makes people seem incapable is a problem. Is a problem because we're all incapable in some way or another.

Emily Moore:

And so, the question is, can we protect individuals rights and services and needs in a way that doesn't then label pejoratively? I don't know if we are able to do that just yet, to be honest.

Sheryl Burgstahler:

Well, there's a great movement right now in the disabled community to really embrace their disability. And so that's what led to this identity first language, because their identity is the second thing that a person with a disability, they felt what that was, like they were ashamed of their disabilities. So these things continually move forward and changes, but no one is in agreement, total agreement on this. And so even deaf and hard of hearing, some of the times, it's the young people that kind of pushed back. And some of the teenagers we work with, who are deaf or hard of hearing, don't like that hard of hearing part.

Sheryl Burgstahler:

Because I think it sounds goofy, as hard of hearing, what does that mean? And that's the way they might talk, come up. And that's a traditionally acceptable label. So I'm not saying that it isn't, but you're never going to get 100% agreement. So you don't worry too much about searching around for the very terminology that will work for everyone, but it's good to get some... you can go to a disability related website, like AHEAD, Association for Higher Education and Disability. Look, the words that they're using.

Richard Ladner:

There's quite a few comments in the chat that are coming in with other terms that are used, for example, experiencing a disability instead of with a disability or differently abled or varying functional abilities, on and on. I guess, this is an area that's going to be up in the air for quite a while. In fact, maybe it'll never come down from the air to be on solid ground. But in my world, I prefer to use the label that people call themselves. If somebody is deaf or hard of hearing, they want to be called deaf. That's fine.

Richard Ladner:

And I can even remember when I was growing up once I described my parents as hard of hearing, and my mother scolded me and said, "No, we're deaf, not hard of hearing." And that was the 1960s. Anyway.

Sheryl Burgstahler:

Yeah. One of the challenges we all have is often we're around people with disabilities. It's not a practical thing to do to ask them how they'd like to be referred to. And it's even kind of awkward, frankly, when you are. It's like, why are you labeling them at all? Frankly, what's the context? Because most of the time we wouldn't have to label someone, anything, a disability they're just playing the piano or they're just touring around a campus. And also you can use words in functional terms and things that are not negative. So there's some things to avoid like a person is afflicted with a disability or they're confined to a wheelchair.

Sheryl Burgstahler:

And that's a good example because I've never met any person in a wheelchair who is confined in it. What does a wheelchair do? It liberates a person. It makes them mobile. They can go places, so why put this kind of a negative context on a device that's so powerful in doing that? Or even saying, suffers from our disability. It's not that none of our business if someone's suffering or not, they might be, but they have a disability or at least something kind of make sure it's truthful and reasonably acceptable by a large group.

Richard Ladner:

One thing I appreciate about all three of you is the amount of inclusion you've had on your own projects. Emily you brought in people who are actually blind to work with, and Jeanne you work consistently with deaf people. And I know Sheryl's office has a bunch of people that work or have disabilities that work in the, DO-IT center.

Richard Ladner:

So I think this is kind of having people with disabilities in your environment all the time really improves that environment and makes them better and more creative. So maybe that's a point you can make. Emily is, how has inclusion of people with disabilities in your work empowered, or made it more innovative? Or moved in a direction you didn't think it would move in the first place?

Emily Moore:

Sure. Yeah. So, the direction of my work right now, I've mentioned that I started by making the first non-visual accessible simulation. And that was where I started. But the vision that we're working towards now is creating tools that are flexible multimodal, but then enable collaborative hands-on learning experiences for learners with, or without disabilities. Learners with many different needs and preferences to work together. And then to have whatever strengths did they have, bring them to the table and have them part of the collaborative discussion.

Emily Moore:

And so, I would never have conceptualized that vision without having worked with many different learners, with many different needs and realized, hey, it's not enough just to have a PhET STEM that speaks to you so that someone who has a visual impairment can understand what's going on. What if they can move and actually experience an embodied learning activity and use proprioception, use strengths, bring those to the table and have that be part of their learning experience with learners, regardless of whether the other learners around them have a disability or not.

Emily Moore:

So that stemmed exactly from co-design with learners and realizing, hey, just looking at it as, we just add one more layer of a feature and then that's going to provide access. Well, it's actually, we need to reenvision what a collaborative, inclusive learning activity is, and then develop the tools that enable that, that just comes from working with lots of different people with different needs and different strengths.

Richard Ladner:

For Jeanne, just about ASL Clear. So you're trying to make STEM fields more accessible by maybe giving us a boost to the language itself, respecting the language, not just inventing crazy sign and things like that. So how does that work?

Jeanne Reis:

Yeah, exactly. Respecting the language of inventing crazy signs. I like that description. So as you know, Richard, I build on your work. I build on the work of Harry Lang at RIT. Others have tried to create just STEM lexicon, recognizing that with minority languages in general, it's difficult to, or you can have languages used by smaller populations, it's difficult sometimes to get shared, broadly shared terminology. So if you have a deaf community of users in say Georgia and a different community in Massachusetts and another one in California, oftentimes the assigned for photosynthesis that's developed within those three communities is quite different.

Jeanne Reis:

So what we're trying to do is not only capture those signs, but share them in a single online resource so that people can then say, "Oh, but I use this sign" So we can actually have a national discourse about these particular signs. In my other area of challenge work was to not only have the lexicon, because signs are signs, but they are only used in context. So you really have to see them used in context. And English happens to be, for example, a noun loving language, we like to make nouns out of verbs. And then we use them like, commodity, commodification.

Jeanne Reis:

Instead of I don't know, I guess I can't think of an example right now because I'm on the spot, of course, but the ability to add a suffix and create a noun out of any number of verbs or adjectives or adverbs is a strength in English. ASL is a verb loving language. So oftentimes instead of let's say signing photosynthesis, you might be signing photosynthesize. The process itself is the sign that emerges as the accepted sign. And one that's more functional in use. It's more productive in use.

Jeanne Reis:

In order to really share a lexicon, you also have to share it in a context, so we created these micro lectures and that brought up the question of how long can an ASL video lecture be? How long can we keep people's attention? And then, is it just a kind of signing torso, or should we add some other elements to it? Should there be images along with it? And so on. So every step along the way, the project has brought up additional questions and additional explorations. So, yeah.

Richard Ladner:

Thanks very much, I think we're kind of running late or running up. So maybe each of you could in one or two sentences, a takeaway. Sheryl, what would be the big takeaway for today?

Sheryl Burgstahler:

I think the big takeaway for me is the importance to deal with students with disabilities in two ways, help look at the self determination skills, but also included in there the accommodations that they might need to be successful. And I'm thinking more and more about how will you be more successful in getting campuses to apply universal design in their courses and other things?

Richard Ladner:

Emily, what's your takeaway for today for everybody?

Emily Moore:

Yeah, I would suggest considering what is the most impactful aspect of your immediate work and using that to start your own virtuous cycle of inclusion. So picking one thing, became by making that more inclusive, and you'll learn more talk with people more about that topic and get the ball rolling in a good direction.

Richard Ladner:

Yeah. And Jeanne, what would be your takeaway for today?

Jeanne Reis:

I think if you're exploring working with a new community or a new group of individuals, students, or colleagues or whatever it may be to really be led by that community. To really make sure that leadership at your table includes members of that community. I think that's really important. So, we're often like I'm a teacher I'm working with students from let's say I'm working with deaf students, but I don't have a deaf colleague to inform me and our students are not going to inform us in ways that our colleagues and other professionals will.

Jeanne Reis:

So I think to just make sure you have all the right people at the table, informing you and keeping you authentic [crosstalk 00:54:30].

Richard Ladner:

Thank you so much. I will pass the ball to Joni. And thank you all for coming today. Oh, you're muted.

Joni Falk:

Here we go. Thank you so much. You were all fabulous, but this is just the beginning of a conversation. Let's continue to [discuss this online](#). And I really appreciate all the different perspectives that were given. There is so much to go through and learn. And in fact on that topic, and Kim, maybe you could bring up that slide. There is in fact, a [webinar this evening at 7:00 PM](#), and I understand that Richard is somehow engaged in the hosting of this as well.

Joni Falk:

And it's teaching CS to blind and visually impaired students at 7:00 PM. And teacher Gina Fugate, will share about teaching computer science, to students who are blind and visually impaired. This is the part one of a four-part series. So if you are really interested in this topic, please take down this information. You could email us and we'll send you more. Actually maybe-

Richard Ladner:

Joni, that this is focusing on K through 12, but I think college professors could learn from this as well.

Joni Falk:

Right. And maybe that [URL](#) maybe Kim could copy it into the chat for us.

Richard Ladner:

And could we have in the chat, the link to the [Multiplex](#) where there's the continued conversation?

Joni Falk:

Yes. Kim will [post that as well](#). So now let's turn off the slides so I could see well yet again and just say we look forward to continuing working with each of you, learning from each of you and sharing what we know. And we

also hope that you will come and visit the video showcase as well as the Multiplex. So these slides will be sent to you. We're going to send out a newsletter within the next day or two.

Joni Falk:

It will have [a link to the recording](#). So you could share it with colleagues. It will have links to the discussion in the newsletter. So you don't have to worry about copying it off the chat because you're going to get it in the newsletter. So thank you so much. All of you and wishing you a great evening.

Richard Ladner:

Is the link in the chat? [There it is](#).

Joni Falk:

[The link](#) is in the chat and it's going to be also in the newsletter. And also, I just want to do a special thanks to our interpreters who were just wonderful. It really added terrifically to the event. Thank you very much.