National Academies of Sciences, Engineering, and Medicine
Leading Practices for Improving Accessibility and Inclusion in Field, Laboratory, and Computational Science – A Conversation Series
Transcript of keynote talk by Dr. Anita Marshall

NOTE: This is an unedited transcript of a keynote presentation prepared for the Accessibility and Inclusion in STEM conversation Series held on February 10, 2022. The transcript was prepared by Jane Epiles (of Purple Communications, LLC) and reviewed by Katalyn Voss (NASEM) and is not an official report of National Academies of Sciences, Engineering and Medicine. Opinions and statements included in the transcript are solely those of the individual speakers at the Accessibility and Inclusion in STEM conversation, and are not necessarily adopted or endorsed or verified as accurate by the National Academies.

>> DR. MARSHALL: Hi everyone.

Thank you for inviting me to speak today.

I'm going to talk a little bit about inclusive field education

from the interesting and innovative programs that are out

there.

And then leave you all with a few summary points and food for

thought for further discussion.

So this first image here is of one of my favorite field work

locations.

It northern Arizona in the San Francisco volcanic field.

It is absolutely beautiful geology but is not very accessible.

So, a little bit of an outline I'll talk about the need for

inclusive field work, some of the little steps that you can do

in inside of your existing programs to make things more

accessible for people with disabilities.

And then some innovative approaches with examples of projects

that have happened or ongoing.

And some closing thoughts.

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So in terms of the big picture I thought I would start by

setting the stage by talking a little bit about disability in

stem.

If you interview high school students about to graduate and go

to college, roughly 20 percent of the students that say they

would like to major in an STEM discipline also identify as

having a disability.

This is very good representation.

In fact it's slightly higher than the national average of the

number of people with disabilities in the general population.

So there's a strong interest in STEM fields for people with

disabilities.

However, as they move through the education system, you notice

significant drop-offs in their participation.

By time you get to surveying bachelor degree recipients only

10 percent of those with STEM identify as having a disability.

When you move to master degree level, only 6 percent of those

graduates identify as having a disability.

And when you get to the PHD level only 2 percent of graduates

with STEM degrees identify as having a disability.

So there is a significant drop off from that initial strong

interest in high school to actually exiting the other side and

into the S TEM workforce.

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>> DR. MARSHALL: So as I mentioned earlier roughly 20 percent

of a college students identify as having some type of

disability.

A strong emphasis on learning in field lab environments tend

to have lowest percentage of graduates that identify as

disabled.

For example in my discipline, geosciences, less than 5 percent

of bachelors recipients identify as having a disability.

This is a significant under representation of the disabled

community.

So lack of accommodations and viable pathways for are students

with disabilities impacts a recruitment and retention of all

other marginalized groups.

This is a point I always bring up in my presentations because

I feel it's really important.

Disability cuts across all other identities.

And when we exclude people with disabilities we are excluding

many other types of diversities from entering our classroom

and our field courses and/or workforce.

This picture be of me and my friend Jen.

We are some of the few faculty members with disabilities who

managed to make it through that pipeline and into faculty

positions.

So before I get into a quick survey of some really interesting

and innovative programs, I thought I would talk quickly about

some easy steps that everyone can take to make their field

courses more accessible and inclusive.

So I call these low investment low efforts.

These are things that you don't really have to try very hard

or change much about the systemic nature of exclusion in your

program.

So one thing you can evaluate your location and try to select

field locations that are more accessible physically to

everyone.

You know, you can think about why you're going on the field

force and what you're helping your students learn.

And take look at why you're visiting the locations that you're

visiting.

And see if there might be a more accessible option to learn

that same concept.

They are almost always is a more accessible option.

Many times we pick field locations because they are personally

interesting to us or because of the adventure of say 5 mile

hike through mountains but that doesn't really have anything

to do with the educational value of field experience.

Articulate a willingness to adapt your field courses ahead of time so before a student approaches you, put it in your advertisement for your field course or your syllabus, whatever you're talking about your field course ahead of time, make sure that you clearly articulated your willingness to work with students with disabilities.

Provide alternative ways of interacting with the landscape and the materials.

If you do have students with disabilities, who want to participate there are ways to make the learning materials and the landscape more accessible.

Easy things like tactile maps raised figures 3-D prints providing instructions in both audio and visual formats.

All of these are very easy ways to include everyone in the field activities.

I also strongly encourage people to move more from an individual student model of learning in field to one that focus on collaboration.

Collaboration can be a powerful method of breaking down barriers to participation.

When you have a group working on something there are more ideas, there's more flexibility and creativity and generally

it it's a great approach for fostering a more inclusive

atmosphere.

And then the last thing I suggest is you just be flexible.

Be flexible with how students are engaging with field

activities and how they are contributing.

Not everybody has to do everything in the field.

For example, if you're taking your students to the beach to

dig a trench and look, you don't have every student with a

shovel for them to understand the concepts.

So think about being a little more flexible in how students

participate.

All right.

So let's talk about a few innovative approaches that are out

there.

One the first ones I would like to mention is a program in

university in UK called enabling remote activities.

This was one of the first programs that really focused on

bringing students with disabilities into required field

courses.

They took a technology-heavy approach I took, past tense, this

is an ongoing program.

But it's been going for more than ten years now.

And they were really instrumental in developing an approaches

to using technology as a way to bridge the access gap.

Having students get as close as they can to the field site and

then using telecommunication tools to bring them into the

activities that were going on in the field.

>> DR. MARSHALL: A program that built on the engaging remote

activity project and sort of expanding on it is the geopath

projects that was 2016 to 2017.

This was a project that focused on developing options for inn

in-person learning for people with disabilities.

So it used a variety of approaches from careful site

selection, making sure that everybody could physically access

all of the site's interests and then later in the program

brought in tools from the era projects which I mentioned on

the last slide to bring in an additional layer of

accessibility through technology.

>> DR. MARSHALL: One of the things this we noticed as those

projects really gave traction is that there were other

departments that would, there were other departments that were

very interested in using technology to bridge the access gap.

But they didn't have the funds to buy all of that gear.

So we put in a grant and the lift kit library of inclusive

field technology was the result.

This is a lending library of tools that other field course instructors can check out from us and make their courses more accessible if they have students with disabilities who would like to participate.

We also provide support on how to use the equipment in a way that best facilitates learning for everybody.

>> DR. MARSHALL: In the last few years the pandemic has created a huge interest in a massively forward in virtual field work.

So I would remiss if I didn't mention virtual field work as a viable option.

You did, virtual field work can be everything from providing some photos and texts to describe a field site to really will advance, really cutting edge approaches.

One of my favorite that has come out in last few years is a 3-D immersive gaming platform that is an immersive virtual tour of a place called whale back anti Klein.

The way this was built, they went out and did a drone survey and built a 3-D model based on the drone images.

Put that go gaming software and built tools and navigation options in into this 3-D model.

So you can basically explore this landscape just like you do

in an advance video game.

You have tools for collecting data.

You have the ability to walk, jump and even do the jet pack to

navigate the field site and collect data digitally and build a

map and geologically interpretation of the area.

This is gives you an idea of really impressive option that is

are out there.

This is this is in a testing mode before they roll it out

interest a more formal format.

>> DR. MARSHALL: Some programs attempt to merge multiple

ideas together using techniques that facilitate in-person

learning for people with disabilities and also fully virtual

accommodation where people don't have to be anywhere close to

the field site.

They may be in another state or in another country.

One such program is the geospace project.

This I'm lead PI on this project, full disclosure.

This is a planetary geology field course that is launching

this summer.

And the idea is to build a flexible adaptable field course

where students can participate either in person or completely

virtually using technology to interact with the field site.

So our virtual participants will be integral parts of the

field team.

They will helping us interpret data, come up with research

questions, they will be very closely tied to what we're doing

in the field.

They just will be operating from very far away.

So we're using a model based on how NASA runs its operations.

And we've got some NASA employees on this project who are

going to really help bring planetary feel to that in-person to

fully virtual course.

This is technologically and logistically a very challenging

undertaking.

So will has this all work when we pull it together?

We will find out in a few months.

>> DR. MARSHALL: So some closing thoughts, the lack of

accessible field experiences is an insurmountable barrier for

people with disabilities when field work is required for

degree advancement.

Which makes it a really serious problem that needs to be

addressed.

We need more options for accessible field courses.

But there are other ways of gaining valuable experience.

Lab work internships, computer modeling there are many other

ways that geo science is done.

And so that needs to be reflected in our course work.

We shouldn't be too narrowly focused on one type of geology or

one way of interacting with a field site.

And then if accessible field courses or not available in your

department, then field work should not be required to

graduate.

That's it.

If you do not have an accessible path to your degree then you

need to reevaluate your program and figure out how you're

going to build accessibility into your degree.

And then you know, lastly, we focus an awful lot on students

because of course, as educators that's where our passions lie.

But very often in these discussions about disability

accommodation you forgot that there are faculty members and

professionals out there that have disabilities as well.

And we don't do a very good job of supporting them either.

So you know, in terms of innovative programs I would love to

see more emphasis put on supporting disabled faculty in their

ideas to move our disciplines forward, to reinvent the way we

do things and make our discipline more inclusive and

accessible from very personal lived experience perspective.

And I think I'm going to stop there.

Because I hopeful there will be plenty of time for

conversation and I look forward to your questions.