

What is STEM Identity? An Interview with Shelly Valdez

On July 17, 2018, [Jamie Bell](#), Project Director and Principal Investigator of the Center for Advancement of Informal Science Education (CAISE), interviewed [Shelly Valdez](#) to understand her thinking and work on the topic of STEM identity. Dr. Valdez is the President of [Native Pathways](#), a consulting company with deep expertise in science education and indigenous evaluation processes based in central New Mexico Laguna Pueblo. Dr. Bell conducted the interview on behalf of the CAISE Evaluation and Measurement Task Force.



A video clip of Dr. Valdez's interview, as well as interviews of other researchers and evaluators, is available at [InformalScience.org/identity](https://informalscience.org/identity).

The National Research Council's 2009 report, [*Learning Science in Informal Environments*](#), stated that one of the things that people can do in informal environments is to develop an identity as someone who understands, uses, and does STEM. Since then, people have been designing projects, settings, and activities with the goal of helping people foster a STEM identity, or recognize a STEM identity that they already have. Knowing that you have worked with a number of National Science Foundation (NSF)-funded projects as an evaluator, and in a range of different settings and such, how do you think about identity from an evaluation perspective?

That's a loaded question but a good question though because I'm thinking about my involvement in STEM through the lens of this particular project that is focused on native undergraduate and graduate students in higher education. These students mostly come with a grounded understanding of their culture and living within those communities. And most of them that I have interviewed don't have a solid base of their language, though. So the languages that they're organically growing through this process of being engaged in an environment with STEM (and technology) is highly saturated with traditional ecological knowledge. Their science language is growing.

I always remember a focus group interview where each of the individuals, when I asked what their understanding was now that they were in this program for some time and immersed in TEK [or traditional ecological knowledge], what they felt about the knowledge base of TEK. It was embedded in their culture, and they didn't realize that there was a [separate] term for it or realize that that's what they were doing until they got into higher education. So with that said, their identity is internalized from a cultural lens; but when they got into the university science arena—the “western” science, they started learning all this science language that has shifted their thinking about TEK. In talking to them from that preinterview to where they are now, the language of [western] science was really prevalent. They were building their language skills, which means that they were creating their own unique identity of what science means to them from a traditional lens, and now deepening this understanding from a western science lens. I think [identity] it's individually based, because it's not a culture. It's not a culture that they're born into, it's a learned understanding. Through these students understanding, including my own, we're learning science identity in so many ways from that cultural lens, we just don't call it science identity. We don't have a term for science, it's what we do, it's our ways of knowing.

If I understand you correctly, for native youth or undergraduate students, in some ways STEM being part of one's identity is probably already there. It's part of an understanding of, and a relationship to, the world that isn't called out as a separate thing.

Right. It isn't defined by western wording or western understanding. It is defined and embedded in their languages, in their culture and their environment; it is the notion of being grounded in “place.” Even though they were separated somewhat from their language, it was still very active within that environment. And I think that for native, indigenous people that's explicit. We don't have any words that we call research, all the wording that you find in STEM, in a western institutional academic institution. There's not really any terminology in indigenous language, it's just the way of knowing, which is very deep and poetic if you truly understand. And I think that researchers and evaluators really need to understand that. When you ask a native student or person this particular question about identity, well it's who I am and is there a science identity? But it's a chance for them to rethink about their language use. And as I mentioned before, in pre- and postinterviews these students understood it as a way of knowing, while over time you can see the growth of western science literacy. I wouldn't call it a separate identity that they're building, they're just building their language. And so maybe there's a different word for that type of concept. I think it's embedded, and it depends.

Is there a concept, in the native language, of someone who is a science person or a music person or an arts person or, i.e., you're more oriented towards a certain topic or discipline? How does that manifest in these cultures?

Certainly. A lot of the buzzwords and processes that are used now, and for centuries in education, and the strategies for educating individuals lend themselves to that native understanding of “education.” And I'm using quotes for the word “education” because again that's not a word in most native languages—it's a process in a deeper sense, but part of our

ways of knowing. It's my understanding from working with different tribes that a lot of them have what you, or western education, call apprenticeships, and that was their way of educating and grooming youth to learn a particular knowledge system. There are some tribes that continue this "education process," that have specialized individuals who are groomed to embrace this specialized knowledge that nobody else is privy to. Some of them are born into these environments, and some of them are selected or volunteer for being a part of those environments. There are different systems within those cultures that align themselves to what you would call a particular content area in academia, and so from early on they're groomed to take over the leadership of that particular environment or function.

Many tribes that I've worked with do have such individuals that are specialized. I'll give an example: You have what researchers call sky watchers, in archaeoastronomy. Those are specialized individuals that have this deep knowledge of how the earth, the universe, and the solar system work with one another. They have this implicit understanding of the earth's movement and the sun and the moon in relationship to that movement. The textbooks and academia refer to them as sky watchers, or archaeoastronomy researchers. But tribal communities have their specific names within their own communities that we refer to them as well.

So, youth who are growing up and going through an educational process, some might be attracted to a topic and then through an apprenticeship model would learn expertise?

Yeah definitely, that's one way. I'll give you an example. I just finished with a project with my colleague [Dr. Isabel Hawkins](#) from the Exploratorium called the [Yakanal Indigenous Youth Culture Exchange](#), with traditional farmers.

A few of the youth that we worked with grew up outside the community, so they weren't able to access this rich knowledge from mentors, the grandfathers, the uncles growing up to learn the process of traditional farming. And it's different from mainstream farming. Many of the Pueblos—there are currently 20 Pueblos that still exist today, and they are each separate tribal communities—have dry farming systems, so you have to have the knowledge of the environment and the soil and the landscape and really be aware of those systems that are going to affect growth of the corn or other crops planted. Also, the corn is very different. You have to know your corn, your seeds, and you have to talk to them so that you can create that relationship with those seeds. There are individuals that steer themselves to that knowledge, and there are some individuals that will say, "Wow that's really a hard thing to do, and I don't think I'm that person to be in that environment." So they take a different route. So, you know, it's dependent on their interests.

In all of the projects you are either currently working on, or have worked on, which one would you say involve[s] identity as a component of the learning?

I have to say the Yakanal Indigenous Youth Cultural Exchange, because it moves itself away from that western context of thinking, and while it's still present, it's minimized. So that these youth that we're working with can dive into reigniting the spirit of their language and culture and reactivate it. They have a craving to and want to learn about who they are. And that's identity.

And who they are is important because it's in their DNA, they can't deny it, because we're born into these beautiful indigenous communities. And unfortunately, some individuals don't have those opportunities to grow up within that rich environment for whatever reason. But these are youth that have that explicit yearning to want to re-engage in that deeper understanding of their culture so they're looking for their identity. They're wanting to strengthen that, and so the beauty of it is it's in our DNA. Science is in our DNA, we are science. And so everything that our cultural ways of knowing and being, if you study it very closely from that western lens, you will be able to see and pull out the science.

But you have to spend time with them [the youth] creating that relationship to understand that deep knowledge. And that's what we're trying to do, is create that leadership for these youths so that they feel okay, they feel pride, they feel ignited about their culture and their language, and therefore they're able to navigate these systems that are a part of our environment now and know that they can feel good that they're grounded in who they are.

For me, that would be I'm *K'awaika*. I'm not American, I'm *K'awaika*. *K'awaik* is the place. And I'm *K'awaika*. I'm "of that place." *K'awaika* is—if you translate it in the word that is on the map, it's Laguna Pueblo. When the Spaniards came over they interpret[ed] it as a lake, and they said "Aha! Laguna." So they named us Laguna. They also named our villages "pueblos" because our architecture is built around communal dwellings as opposed to being spread out by location.

I didn't know that history.

Yeah, so *K'awaik* is the place. Just like you're living in the eastern part of the U.S., you have a huge part of New York today is *Akwesasni*. It's the place. *Akwesasni* is the land, and *Hodaneshoni* is the people of the land. So those are identities. That's an understanding of who you are within that environment.

The Cultural Exchange project—what are the settings where that project is taking place? Is it in an out-of-school environment?

Oh yeah, it's all informal (pun intended—western education calls it informal). It's done within the homelands of the students we work with. For instance, we work with the National Park Service here in the Southwest, Chaco Canyon, Chimney Rock, Mesa Verde. We take them home first—to where their ancestors' land base was thriving, and those are those places where traditionally they had trade systems from our brothers or communities to the south,

Mesoamerica. And there's evidence that trade systems existed, so we start off there, and the equivalent in the Mesoamerica communities. After a particular length of time spent immersed in their ancestral homelands, then we bring them to the present-day native communities that are associated with those places. And it's all again just springboarding off the science of the land or "Science of Place." So we really explicitly try to honor that relationship to the land.

One question about another specific project from some of your previous work: The [Roots of Wisdom](#) project? Does that one involve identity at all?

Oh yeah. We had engaged several native communities, and the focus was on restoration. Restoration of cultural knowledge, environmental cultural knowledge, and so it gave each of the communities that we worked with an opportunity to either revive or reignite some specific knowledge system within their culture. The purpose of that is to, from a funders' lens, to collect data on this knowledge system and whether or not it's possible in this day and age to do that. But the real deeper purpose was to reignite that knowledge within the community. I'll give you an example, the Cherokees from North Carolina, they have reeds that grow in the water that really lend themselves to purification systems of cleansing the water. The reeds were naturally growing in the area, but they also used that cane to create baskets, and they were losing that knowledge—number one of the baskets and number two because of the forest systems cleaning out those rivers, the river cane didn't serve a purpose anymore for the community. So what that community is doing is bringing back the river cane, number one to serve the purpose and to help with water restoration. They're re-creating that relationship with the water, but they're also helping build a desire and an interest to going back to use river cane to create baskets. It's beautiful because now you can go to Cherokee, you can see that there's a growth in basket makers from this particular understanding of the river canes and bringing them back, and reigniting their spirit, part of their identity as Cherokee. And the river cane is there for that community to reignite the basket makers. As my son puts it, "It's learning from our oldest teachers, the plants."

What evaluation methodologies were you using?

[Jill Stein](#) and I have been collaborating for about 13 plus years. And we're growing together, and we call this concept [collaborative evaluation](#). Jill comes from the western context of evaluation, and I come from that indigenous processes used in evaluation. There's not a model, it's just explicitly a process because we're working with so many tribes, it's dependent on the environment were in; you can also refer to it as emergent evaluation. It doesn't mean that there's a framework, it just means you're being very careful while "walking through" evaluation. Because there's a history of trauma from researchers and evaluations with indigenous communities, when you walk into a tribal community and say you're evaluators, they're like "Oh," and it closes down. I'm finding out that we need more native evaluators.

We need to change the word evaluator to storyteller. We just call ourselves storytellers. Because that's very natural. We're here to tell their story. Research hasn't been so welcomed because of the past histories in indigenous communities. It's just walking together. And when

Jill has a question, I'm there to help guide that. And creating a relationship, so that tribal community members see that we're not a threat, we're here to tell their story.

What kinds of activities are you doing to elicit the stories from participants? Are you doing interviews? Are you doing observation?

Oh, yeah. So I love our process, but some funder's priorities don't align with our process. Because it's all relationship based, and this takes time, which is [often] way beyond the scope of funding. It's all about understanding and respecting those individual communities' core values. In order to do this, you need to create relationship first.

And there's some general core values that cross within indigenous communities, and there's some that stand alone. I can give you a few snapshots of core values that are generally within most native communities: love, compassion, respect, reciprocity, these are deeply embedded in most tribal communities. You have to love yourself, you have to love what you're doing, you have to love the earth, you have to love your environment in order to have those deep relationships. You have to have compassion for everyone's worldview and for that individual that you're working with—if they suffer from something you have to be willing to reach out to them; this affects their work that they do. Really understanding those and being respectful of those is key. Then you also have to be willing to step outside your worldview and dive into their [others'] worldview. So that means you have to spend a lot of time creating relationships before any of this work can start. And relationship doesn't come overnight. That's where we kind of have a challenge with our funders.

Relationships you have to build, so that they can trust you to tell their story. And right now, a lot of tribes, like I said, they don't trust individuals that wear this research or evaluation hat. They close off. But we're learning also that because I'm native that there's a little bit of trust. Not much, but it makes a difference.

What we use is participatory process—one that is important for us to engage. I have this great story about a project that wouldn't allow me to do this. It was a native project that was run by [a] non-native person, and they would not let me engage. They saw evaluators as, you know, this outside entity—with characteristics like being detached, independence, neutrality, objectivity—and it was crazy. Anyway, we got through that. But, it's an example of what didn't work, and so I couldn't tell the rich story. I told the story of the surveys and observations of certain events, but nonetheless I wasn't able to create that deeper relationship, particularly with the team. So participatory evaluation is the process that's most important. And to get those vignettes that you don't necessarily find in interviews or surveys, you gotta be on the ground creating that relationship with those individuals.

We're moving away from focus groups and styles of questioning. We started off with the art of questioning and being careful about how we're constructing the questions that we're going to use. And [while] stepping back and analyzing this incredible data, the richness of the stories that we're being able to tell, even the notion of questioning can be pretty scary. Some tribal communities have, for lack of words right now, taboos about questioning.

You know, that you shouldn't be questioning and you shouldn't question to go into places that can take you in the wrong direction. That's a deeper knowledge system that someday I can share. So how do you engage these individuals? What we're doing now is we're taking our questions, and we're turning them into invite statements.

They're statements, basically statements, and we can share with you some of the work that we're doing now with that. We take the question, we work together and develop the evaluation questions, and then we morph them into statements or invites, so that it's less threatening. One of the notions within indigenous communities is that when you're invited in by those individuals and welcome them, that's where that notion of deep and genuine relationships emerges. So taking that same concept and notion of *inviting*, that's what we're using. In other words, we'd like to invite you to share some experiences with us in this particular environment.

That's a very nice concept.

Yeah. It lends itself a little bit better to those knowledge systems.

And then people respond to statements rather than to questions?

Exactly. And then we're also learning that, you know, evaluation sometimes is just rigorous, where they have a protocol of questions, and so the evaluators [are] watching the time and say, "Okay, well, let's move on to the next question." And so they don't stay with the flow of the conversation or the story.

We're also morphing that as well. Evaluation questions are just a guide, and if the story is rich, and it's inspiring people to share, don't break it. Don't break that wonderful flow. We're both learning this, how do we create that continuous process where that flow is natural, and it's not distorting the rich knowledge that they're [the interviewee is] trying to share. This process is what we are calling "Talk Story."

So, if you break it up you're going to miss a lot.

Yes. We're there, we're committed to telling their story because we created relationship. Early on our strategies did have the questioning. But what you're gonna see now, as we move forward, is that process of using the statement. So it's going to be interesting how Jill and I move together within that environment. That would be one thing to watch. We have a [report from Roots of Wisdom project](#) that describes our process and has reflections on collaboration with integrity. We also did a presentation last week that we can share.

Do you have any advice for researchers and evaluators?

Here's some general advice: Be careful about the questioning that you use when you engage with various projects. You're questioning—the art of questioning needs to be very carefully looked at and maybe not moving away from questions that put up shields or walls, and instead consider more of a statement or invitation for program and project participants to engage in the conversation. The other thing with identity is, you know, I fully respect those individuals that are storytellers and that are involved in these projects that we work with. And allowing them that space to tell the story is really important. So, in working with communities, try hard not to be that “western” evaluator or researcher that is not fully engaged but is only interested in the responses of the questioning process and the time.

To let go of that notion of time, because it can really defeat what it is you are tasked to do as an evaluator. Another area, looking at funding for evaluation that lends itself to this type of process is really important. Also, being mindful when you're creating proposals to look at what you're putting into the evaluation budget. That's important.

Because you want to create relationship with these communities to really understand them, so that you are better able to tell their story. The words that some participants in these projects and programs that we work with have explicit understandings that are really deeper than what they're saying. And when you write it into a report, I would be careful about, what did they mean by this? What did they really mean? Sometimes that means you do have to have a person from that community on your evaluation team to help you with that understanding because these are internal knowledge systems that have core values—those general knowledge systems may be a little bit confusing to understand through a western lens. But if you have a relationship with an individual that is a native person, and it doesn't have to be an evaluator, maybe a mentor or someone that you can go to to get this understanding, it's important. So, the projects that we've worked with that are NSF-funded projects, we have evaluator advisors. If I'm not available, Jill can go to our advisors. It's important to build in advisors who can help with understanding identity in these contexts.

Identity in the area of science for projects that are targeting native communities, you need to work with a partner that's either indigenous or who has some history in working with these types of projects, so they can mentor you. Having a mentor or a partner that can really help develop this proposal but also help develop the activities that will lend themselves to that better relationship, with a better balance, so that identity from that native worldview is really evident within those project initiatives.

And, I think we need, and I've been saying this for the past 15 years working with these projects, as individuals in STEM, I think we really need to take a look at some of the language that we're using that doesn't necessarily lend itself to native epistemologies.

Maybe we need to rename the notion of what an evaluator is. There are words within science education that don't lend themselves to that way of knowing and those communities' epistemologies. Because that historical trauma I mentioned earlier is very prevalent.

So how can we in the STEM field—as educators, facilitators, or partners—start moving towards better or stronger or more friendlier language systems that really create that balance and relationship?

Because evaluation can be a poor term for something that I think is much more natural and organic, which is just monitoring your progress as you master something, right? You're trying to learn a skill or an art form or whatever. And of course, along the way, either you or your teachers or whoever you're apprenticing with is helping you understand the progress you're making.

Right. And I think that we just call ourselves storytellers and that's what we are. We're telling their story, and that lends itself to a very native worldview.

And does the story evolve as the person grows?

Oh yes. That should be the case in any project that you work with. Like the example I gave you of these students that I worked with and how their science language, their literacy skills in science, are definitely growing from that western context.

But their knowledge systems and cultural language are also growing because now they have opportunities to learn the language and ask the elders for permission to share their knowledge. So that for a particular phenomena—say they're looking at bicultural restoration, and they're looking at a plant system that is being impacted by climate change—they have to go to their elders in their home to learn these stories about that particular plant and how it lives within the environment, and how the people take care of and use that plant. Through that whole process that individual is learning traditional knowledge but also learning—very wonderfully learning—their language for these systems in these environments. So, it's a win-win situation. They're building these two very different but very similar knowledge systems together. They're becoming more attuned to western science in the academic sense, and they're embracing and reigniting the cultural and language part of who they are.

I think what I'm hearing is that another way that identity manifests is in a story. If you think even yourself as a learner, as a growing person, your identity is a story you have about yourself and your relationship to nature and your community.

That's exactly what it is. I am who I am because of my relationship to the land and my relationship to the people—"the people" meaning my traditional community. I'm very proud, extremely proud, to be *K'awaika* and to come from *K'awaik*. I've been blessed, and I was gifted into this wonderful family that just happens to be native. And because of that, and my parents desire to bring us up in the cultural environment, I have an explicit relationship to my community, and I've been given a chance to learn that knowledge. It's up to me to engage. I've also learned from that western academia side that I've gone through for another level of education. I've been given an opportunity to work alongside some incredible partners and to learn from them. Learning will always be a part of everyone's life. It's up to you how much you want to engage in that learning environment and to strengthen those knowledge systems within you that go back to who you are as a person, and that's identity.