

What is STEM Identity? An Interview with Jennifer Adams

On November 2, 2017, [Jamie Bell](#), Project Director and Principal Investigator of the Center for Advancement of Informal Science Education (CAISE), interviewed [Jennifer Adams](#) to understand her thinking and work on the topic of STEM identity. Dr. Adams is an Associate Professor at the University of Calgary. Dr. Bell conducted the interview on behalf of the CAISE task force on evaluation and measurement.

A video of Dr. Adams's interview, as well as interviews of other researchers, is available at InformalScience.org/identity.



Can you tell us about any projects that you have worked on or are working on that involve identity as a component?

I've done a lot of projects on identity. [Preeti Gupta](#) and I looked at youth identity in informal science learning spaces, and we wrote a little bit more about young women's identities and STEM through their relationship with informal science learning. Then I did some work around place identity and sense of place. My most recent work is focusing on STEM teachers, science teachers, and their identity in relation to informal science learning. I started out with looking at informal science learning experiences and how that shapes their identities as teachers. Most of my research has either identity as very central or peripheral to it.

In that work, do you start off from a common definition of identity or is the definition you use contextual?

It's very contextual. It's shifted even from the time that I started looking at identity until now. I think the thing that has maintained at the core though is the notion of identity, agency, and learning and how those are all related to each other. As a person may learn in a given context, they develop a particular sense of agency in there. That therefore contributes to their identity, being like either themselves or being seen as others as a particular type of person.

In the [research that I'm doing now](#), I'm looking at the agency that has been central for a group of teachers and how they're both defining and redefining informal science education in their classrooms and how this is dependent both on their own social identities and what they're bringing into the teaching and learning context but then also in relation to the identities of their students.

It's very complex, and I think it's becoming more complex as I learn more and research about it. I also find, even though I don't use this term in my work, the notion of doing identity work. I don't know if you remember that article by [Jay Rounds](#) a long time ago about doing identity work in museums? It's a blast from the past.

Because of this interview, I revisited that piece. It really does ascribe this notion of identity as being an ongoing process that is something that you're doing either through positioning or through being identified. It resonates with [Anna Stetsenko](#), who I've been using a lot in my work recently because she has this transformative activist stance in relation to identity. She talks about being and becoming, and so it's this ongoing process of being and becoming and positioning yourselves with others learning how to contribute to a given community. All of these different notions of identities have really resonated with me. I'm definitely not seeing it as this fixed thing or something that you finally reached this particular identity, because it's always going to be this process.

How do you see the relationship between agency and identity?

First there's learning. As you learn, and whether that is through formal or informal means, as you learn to become a part of a community, you develop a sense of agency in being able to contribute to that community and that becomes your identity.

As a beginning flamenco dancer you don't really consider yourself as such because you don't know a lot of the terms and a lot of the particular background or baseline things. As you learn, you're able to contribute through choreography, through performances and everything so you come to identify as a dancer, as a flamenco dancer. It's the same thing I think in any endeavor that people pursue. As they learn, they develop agency, being able to make changes and to shape things in that field and through that they learn to identify in that field.

That identity in the field is not a monolithic identity. It's not like "a" flamenco dancer, or "a" science teacher, "a" scientist because they're still going to be multiple facets of that identity or that label. There are still going to be multiple facets because of all of the other social identities that the person is bringing into that setting.

In terms of other people's work, are there distinct ways that you're looking at you would say are different from how other people are looking at it?

I think my work is heavily intersectional, and it really does not focus solely on the science learning aspect, but it really looks at how the other identities intersect with that aspect of science learning. I even see it in the work that I'm doing now with my science teachers because there's a bunch of them, and they all have different identities. Three of them that I've looked at in a group are women of color, and they all teach in very different schools. How they approach their science teaching and think about themselves vis-à-vis their students

has to do a lot with how they view themselves as women of color in the science field. That's different amongst all three of them and in how they view themselves vis-à-vis their students.

A lot of them have taken up this notion of race and science in both implicit and explicit ways. Looking at [Nasir's](#) work around racial storylines, how they present because it's science. There are these notions of who can contribute to science, who can participate in science in the ways that different people should and could participate in science. These teachers are actively doing different things to try and debunk those notions of racial storylines so that their students can imagine different futures.

For example, one of the women is in a charter school that is very restrictive because it's focused on the standardized tests. She realized that all of her students were not coming with the same background as the students she student taught in an affluent, more white school. So she developed this whole after-school program in a library in the neighborhood so that the younger students and even the older high school students can come and learn science in these ways so that when they do get into the classroom, they have the science foundation. That was her motivation, out of her own pocket, her own time. These stories have been emerging from my data. A lot of it has to do with the notions of what teachers know about these stories of race and science and how it presents in their classroom, and what are they trying to do to make it different for their students.

You described a little bit about how you conceptualize and how [there are] distinctions and also the relationship to the other aspects of learning. How are you actually measuring it? Or what kind of methodologies are you using?

I guess it would be more of a grounded theory because I'm looking to see how it emerges in my data. A lot of the data that I collect is very narrative. We have ongoing meetings with the teachers. I have one-on-one dialogues with them. I've gone with them on their field trips and not necessarily as a participant observer but just along with them. Just observing them and their students and how they interact with their students and how their students interact in these different spaces that we bring them into. I've used discourse analysis and narrative analysis to really see how they talk about themselves, how they talk about their students. What are the other aspects that they're bringing into these conversations, what motivates them to do what they do?

It's very emergent because I think it would be very hard to structure it into one tool that's going to measure an identity, and especially if we're talking about science identities, because there is still a pervasive notion of one way of being in science and one way of doing science. The hegemonic notion of science, and I think that if we start to think about measuring science identities, it's going to lend itself more towards that hegemonic notion of science. It's going to exclude a lot of people because they're not going to fit those measures.

We heard from others that they've struggled or even given up on developing scales or measures for identity as a distinct construct, although some people are using some tools they've developed.

I'd be interested to see what those tools look like.

Do you want to say anything more about other identities besides STEM or science identities—gender, ethnic, any other social aspects. You take a broad intersectional view of everything. What's the relationship between them and science identity?

They definitely influence science identities, and I don't even know if there is a science identity. I would say there are multiple science identities if there is such. I mentioned before there are stories that exist about race and gender, socioeconomic class, that influence what people's perceptions are and the opportunities that they have to engage in science. For example, if I'm a woman of color, I'm going to have a lot more barriers to engage in science than a white male, and so that's going to influence a type of identity or how I identify ultimately with science. All these things intersect. If you think about socioeconomic status, that's going to be "oh, poor people can't do science" or if you're in a poor school you don't have access to the resources that allow you to identify with science in a way that is commensurate with your own existing identities. That's the thing I feel about science too is that we talk about science identity a lot. Stuff that I read is that people have to fit into a science identity, but science needs to be more expansive and inclusive in order to accommodate different identities. There was an article that Megan Bang and Carol Lee and Doug Medin wrote a while ago for the [Scientific American](#), and they touched on how we know women. They were able to approach a particular research problem, I don't remember exactly what it was, from a different perspective just for having lived experiences as females. It was climatology or something, and so that made me think about all of these different perspectives that they have from their own lived experiences coming up against this notion of science that is supposed to be objective and universal. It's through these different lived experiences that enable us to approach scientific-related problems from different ways, especially now when we think about all these really complicated scientific problems like climate change. It is a big thing. I'm going to approach it very differently from somebody living in an urban environment than somebody who's living on an island. Even somebody on an island with more resources is going to approach it differently than somebody with less resource.

It's about expanding science to accommodate a broader range of identities rather than having a funnel where everybody has to fit into this one or even a small scale of science identities.

That makes sense, and your work really bears that out in terms of people's lived experiences.

So how do you think about interest or motivation in identity? When I was a high school student, the narrative I tell myself for the reason I didn't get interested in physics in high school was that I thought I couldn't be interested in something that my physics teacher, who I did not identify with, was interested in. I looked at it closely and thought if being interested in that means I'm that kind of person, I know I'm not that kind of person. My interest wasn't sparked or even my curiosity around that.

That example that you gave is perfect. It's different for different people, but I do think that the interest and motivations that people have are going to be somehow related to their identity. It is about a positioning and how you want others to see you. Preeti Gupta and I were talking about this with the science café in trying to theorize that people maybe attend science cafés because they want to be seen as smart or they want to be seen as a part of the group. Science still has this perception as being an elite pursuit, an elite subject. They want to identify with that so that would be their motivation for maybe attending a science café, even if they're not interested necessarily in the topic.

It is about whom you want to be seen as. It's about who you aspire to be and that has to do with motivation. In your case you saw this teacher, and he was not somebody that you wanted to be like, and you strongly associated with him with physics. Had you had different experiences with physics, maybe you would not have had that strong association with that one person and physics. It's complicated, but it's that motivation piece. I do think it's important because that's about the whole piece of positioning and how they say the scene; you go to a scene to be seen, and being seen as doing this type of activity. Because people see me performing this activity, they're going to ascribe me with this particular identity or characteristic.

You've already mentioned a few sources that have been important to you; Stetsenko, Jay Rounds, the Medin, Bang and Lee piece. Are there any other resources or papers or anything you would point people towards if they want to understand how identity's being thought of in theory and in practice?

I would talk about the [Nasir and Shah](#) talk about racial storylines and again going back to Anna Stetsenko's work on transformative activist stance. I think that a paper that Preeti Gupta and I wrote in 2015 in the [Journal of Research in Science Teaching](#) really ties agency identity and subjectivity nicely together, and that's allowed me to really tie that notion of learning to teach as having agency and shaping and enabling particular types of learning experiences for students.

Those are the ones that I tend to revisit because I know that in that paper we built a lot on Anna Stetsenko's work. And [Jay Rounds](#), this interview made me think about that, and when I read it again I had a newer understanding of it because I know more now.

If somebody was developing a project right now and there's an NSF AISL deadline next week, and they were thinking about identity as something that they're setting their project, design, or intervention their addressing; do you have any other thoughts about what they should think about, how they should think about it, measuring it, or any advice you would give people?

The measuring is the tough part because it's such an intersectional piece. For proposal purposes for readers, you do have to make it as linear as possible, so I would encourage people to maybe think about and to diagram out the constructs that they think contribute to identity in that given context. And what the outcomes are that they would want to see of people in relation to science, and maybe not labeling it as a science identity, but thinking about it as multiple science identities. What are the different ways that people engage in science? What are the agentic ways that people engage in science?

Wow, I never heard that word before.

Well, yeah, it's coming from Anna Stetsenko again.

A lot of people like to tie identity and equity but not really necessarily thinking about science as a field itself. I know that's a bigger ask to think about how we can go about changing science so that it accommodates a broader range of perspectives because a lot of equity seems to point to having students fit into a particular science box rather than expanding the box or getting rid of the box—I don't know.

I would say begin with what you think contributes to identity. Even thinking about the kinds of identities going to that notion of agency. What kinds of agency would these identities afford the people, the participants in the program? What will they be able to do as a result of that would be transformative for them? Will they be able to access higher education? Will they be able to ask questions or address questions about their own healthcare? Will they be able to respond saliently if they had a community board, and they were discussing something like climate resilience or talking about cleaning up like a Superfund site? Would they be able to contribute in a way that would make decisions for the betterment of their communities?

Think about the larger contributions that people will make beyond just that project. What kinds of knowledge, sustaining identities, will they develop that will allow them to contribute to society in a way that allows them to be knowledgeable about science? Even if they're not going to be scientists but want to be knowledgeable and be able to talk saliently. To be able to access and appropriate science resources in order to improve their lives and the lives of their community? I'm thinking in that more social justice oriented way—the larger social justice for the collective. How is the individual going to contribute to the collective?