

What is STEM Identity? An Interview with Edna Tan

On November 14, 2017, [Kelly Riedinger](#), Senior Researcher at Oregon State University's Center for Research on Lifelong STEM Learning, interviewed [Edna Tan](#) to understand her thinking and work on the topic of STEM identity. Dr. Tan is an Associate Professor of Teacher Education and Higher Education at the University of North Carolina, Greensboro. Dr. Riedinger conducted the interview as a member of the Center for Advancement of Informal Science Education (CAISE) task force on evaluation and measurement.

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



Tell us about the project you've done that has focused on identity.

I've been working for the past decade with my colleague Angela Calabrese Barton at Michigan State University. And we've been using identity as a framework across probably four or five projects. All of our work are with youth from middle school, some upper elementary schools. So on one of the earlier projects, we were in a middle school in the Bronx, and we looked at Latina girls' identities in practice in sixth grade science. We followed them for one academic school year and then into the first quarter of the seventh grade. Our other project, which is titled "Clubs to school," we looked across settings. So again, girls of color in the seventh grade in an informal school science context. And then looking at them as they engage in formal school science. So we tracked the girls. This was a three-year project. We had two groups of girls and each were tracked for a year. We also worked with youth in informal settings at a Boys and Girls Club specifically where we run an informal weekly program that is STEM and maker-centered. So that ran for the past seven years, and we tracked youth, some of them as long as five years, just their engagement in these spaces, what kind of identity work were they engaged in. So we've been able to follow some youth longitudinally to track their identity work in STEM.

Across those projects, how do you define identity?

I think we found it more productive to think about identity work rather than identity and also identities in practice. So identity work we think is more productive because it's more active, and it also suggests that it is something that is fluent, and identities can be stabilized or destabilized through dynamic interactions with significant others in which we are performing the identity for. So the idea of identity I think sometimes can be taken to mean very innate and stable, that is sort of like an individual trait. We don't take that perspective completely. We think a lot of identity, and identity work is a negotiation with people in whatever space or figured world that we're in. So in thinking about identities in practice, the whole idea of practice, I think is really key. We've seen the youth perform themselves differently when the community of practice in which they are entering, and to engage in STEM in, has been different.

Can you tell us what “figured worlds” means?

So that's Dorothy Hollands's work, and “figured worlds” are her way of talking about a space that has its own norms and practices. So in our work in the middle school, we have talked about within a formal classroom space that you actually have different figured worlds in which the student has to perform differently. For example, in a small group setting when they are doing projects, versus a whole class setting when the teacher is driving a discussion. So I'll just use a case study: There was this girl, Amelia, in the sixth-grade science. In a standard of sixth grade in her school, which we can consider a figured world, she has the identity of being somebody who is aggressive and a bully. In a whole class-sized classroom figured world, her science teachers say that she is a bully, and the science teacher used a descriptor, that “she's on the edge.” So she could fall off any moment, as in she could flunk her science class. Whereas when she was in a small group with peers that she could work for, she was very different. She came up with ideas. She came up with suggestions, and she engaged pretty significantly with the content. So the rules of engagement or the power dynamics in these different figured worlds really directly affect how Amelia was performing herself. So that's what I mean by figured worlds.

And then we also have been recently more explicitly looking at the idea of intersectionality. You know, who youth are and what aspects of themselves they bring to STEM. And so, for example, we've seen in the informal makerspace, a STEM-figured role the youth tend to bring—and we encourage that, i.e., the whole idea of whole child and, funds of knowledge and community wisdom and to bring that into the discourses of science. So the youth have brought in issues in which they have been struggling with. For example, homelessness was one that came up pretty frequently unfortunately because the youth we work with often experience sporadic homelessness. The identity of being someone who experiences homelessness was performed in the makerspace, and that had informed some of the projects that they then engaged in. So there was this 10-year-old girl who was sporadically homeless and had some experience at homeless shelters that left her feeling very vulnerable that are related to winter clothing and being bullied for lack of fashion and, you know, being cross with strangers and feeling uncomfortable with talking to people she doesn't know. So all these ideas that are born from the identity of being homeless informed her project. She ended up designing a light-up beanie hat that was powered by a solar panel on the back. And then she embroidered a heart shape right on the front, and where the LED light was, there's also a button and a buzzer that you can press to call for help if there was somebody around

that was making you feel unsafe. All these different identities sort of intersected in this product that she made. And so we've been seeing manifestations of intersectionality and what that means for different youth because of the different identities in all the different important figure worlds of their lives.

Would you mind explaining what “funds of knowledge” means?

So [funds of knowledge](#) comes from [Luis Moll](#) and his colleagues, where they encourage classroom teachers to visit the homes of, I believe, their Hispanic students to understand the everyday lived experiences of these students and how those lived experiences are rich with knowledges and resources that can be incorporated into the discipline. And, a very complimentary idea that we draw that from is from [Carol Lee's](#) work. She talks about cultural modeling, and something that she's written has really stuck with me is that we need to figure out how to incorporate youth who are not from dominant culture their everyday experiences and integrate it into disciplinary core knowledge. So not just as a symbolic gesture saying, “oh, that's really interesting you did this at home,” but to think hard about how to use that knowledge and weave it into, either the performance tasks or the discourse in the classroom so that there's actually weight and real capital in what the kids bring from their everyday lives.

Why and in what ways do you think identity matters for science learning?

I think we're familiar with the achievement gap argument. And then there is also data that shows that achievement gaps are supposedly closing for some groups of kids and or across boys and girls. But then we also see that there's a persistent achievement gap in terms of test scores. And the other troubling phenomenon is that even when youth of color or girls, that when they make up the test scores, they are not pursuing higher-level STEM courses. So there's something else beyond what I can do on a test, right? And so we think that in addition to the achievement gap, which is one piece of data, we need to think about identity gap. There is an identity gap instead. So youth of color, women, and girls—and this has been shown—they just don't see themselves as belonging to STEM. There is a lack of role models. There's a lot of literature on that. And that the other piece that I think is interesting is that some of the role models who may look like youth of color, but from conversation we've had with youth, this tension that they think the role models who may be African American, for example, seem to have to become the “other” in order to succeed in STEM. So there's this conflict in “do I want to risk any erasure of who I am in order to be somebody in STEM?” I think it's more than just saying that look, we have STEM professionals of every hue and different gender, but also to look at the culture in the STEM professions and which dominant culture that really resounds with a particular group of people. So, to us at least, this is all related to identity and identity work, and it starts from upper elementary to middle school. Researchers say that 60% of STEM professionals decide that they want to be, that they want to pursue that as a career by the time they're 12 or 13. That is troubling to us to an extent and in thinking about what is the STEM pipeline, maybe we should think about a pipeline as a matter of fact, but maybe we should also think about pathways. But also that the issue of an identity gap should be something that is addressed right from the get go, at a young age.

There's a lot of ways that people approach identity, and we know that identity is very broad. How is your approach distinct from other approaches to identity?

I think our approach is similar to some other scholars in the field, which is identities in practice. It is socially negotiated. It is not an innate trait. And we are very hesitant, and I think this is connected to a question later on about the idea of measuring identity. Because in our work we've seen that it is very fluid and dynamic. I think we can capture snapshots of what the manifestation of a particular identity looks like in the moment in which we are taking that snapshot, but I do think that there are a lot of caveats in what we can infer from this snapshot.

You said that there's a lot of caveats—would you mind just explaining a little bit?

I think the affordance of using identity work as a lens, and seeing it longitudinally and tracking it longitudinally, is that we can see at different timestamps and in different settings the youth you can say is performing a different identity. For example, there's this girl that we've written about, Melanie. She's a sixth-grade Latina girl. She's very insecure with her English, but she's not labeled as an English Language Learner. However, in any other informal space, she would be speaking Spanish with her other Latina friends. In the beginning of the sixth-grade school year, she started to author this identity in practice of somebody who always passes, you know, she called it a game show rule. When the teacher asks her a question, she will pass, and he allowed students to pass. So then she became known as the passing girl. So her friends were calling her the girl that passes. What happened is that when she was in a small group setting, this is also in the first three months of the school year, other students were actively trying to trick her out because they didn't see that she was a valuable asset to the group—she didn't know any science, she passes all the time. So if we took that snapshot and read all the descriptions we would say that she is not a science person, right? But because we tracked her, and the teachers opted to put her with groups where her friends were there, the girls with whom she spoke Spanish and are fast friends with, these friends in that figured world started to demand that she participated. It could start with very small things, right. The teacher would often make them do some sort of chart, poster, or concept map, for example, the nutrient recycling and each of them would have a particular biotic factor to focus on. And they would say you need to draw the soil, and you need to color it, and you need to take care of that part of the poster. So it started with these kinds of, you know, we conjectured, from Melanie less threatening kinds of academic tasks. But then it progressed to where she was able to put up her hand and answer questions. This was much later on in the school year. So it's a completely different snapshot than what we would get then. And so she was somebody, a rule, you know, at different timestamps you would see that she is evolving and her identity is productive and positive, but it also was destabilized when the teacher put her back with the rest of the students who were less supportive and who did not demand her participation as much as her friends did. And then you think about intersectionality. We don't know how much of the friendship relationship, the supportive relationship that she enjoys out of the science context, is mediating whether she would feel that she wanted to take the risk or not. So all to say that at different timestamps, you know, students can perform an identity, you know, positive or not positive toward science. And if we don't track them across, it's really hard to say what's happening and who and what is supportive of a positive and a productive identity work.

So the caveats are sort of that you have to contextualize the snapshots?

Yeah.

We've talked implicitly about science identity, but some people also talk about a STEM identity. What do you think about that? Do you think there's such a thing as a STEM identity?

I think STEM is a really loaded term. And I think it is useful in the context of K-12 education for educators and administrators to lump these disciplines together. Because, yes, there are, obvious connections between science, technology, engineering, and mathematics. But one can also argue that each of these letters, in this discipline system, have very unique content knowledge and practices and [are] very distinct from one another. Depending on how the discourse is framed for the children and for the youth in the educational context, that if the science teacher who is an authority person uses the word STEM, and says that this is what we're doing in STEM class, and youth who are performing and creating the artifacts that are being supportive might articulate that, "yes, I have a STEM identity." But teachers who say this is a science class, they would say they have a science identity. So I don't know if there is such a thing as a STEM identity that applies across contexts. I think it's where the term is being used. And right now, I think it's more useful for teachers and educators, the adults who are engaged in the enterprise and not so much just student learners who will find this term useful to a certain extent. I mean, you take technology, is computer science even included in that? People have different opinions. I think it's very challenging to say that there's a STEM domain that I am equally engaging in science, technology, engineering, and mathematics every single time. And that's challenging.

How are you currently measuring identity in your work?

We're not. I think we wouldn't use the word "measuring." We would use the word "capturing" snapshots across time. But we have found that there are, what we term in our research critical science identity, artifacts. So these are either products that the children have made in STEM learning experiences or it could be a particular experience in which they engage. It doesn't have to be a material thing. But it could be a way in which they have engaged in STEM class that really resonated with them that they keep going back in their interviews, and when they're referring to themselves and how they are thinking [of] themselves as a science person or not; that they keep going back to that artifact or they keep going back to that particular experience. So we have reasoned it out that these seem to be critical science identity artifacts that start to solidify or laminate the productive identity work that the youth are doing.

An example would be this kid made a documentary in an after-school STEM program about greenhouse gases and then was really compelled by the work that he could do and brought the movie from the informal space to the formal space to show the science teacher. So for that kid in whom we would trace, that was sort of my pivotal experience for him, and the pivotal product that he made that showed who he could be in science. He was not the class clown all the time, it reflected his abilities and his potential. So we could call that a critical science identity artifact.

How do you collect data to understand students' identity work or to get at those critical identity artifacts?

We engage in ethnography, and most of the time critical ethnography, because we're really interested in issues of power and how systemic injustices intercept with local performances. I don't think you can run away from considering that. And so we embed ourselves for a long time in the field. So in the classrooms it will be two or three times in a week where the researchers there are collecting data in terms of field notes. But then we [are] also very happy to serve as co-teachers or co-mentors so that we really know what the norms of the place is. Because in thinking about identity work and identities in practice, I think it behooves the researchers to know what the norms are and what the culture of their space is. So we do a lot of hanging out in that space, inserting ourselves in that space and then following the youth in that space and across spaces when it is across settings. There's the usual repertoire of qualitative data collection methods, field notes. We also engage in sometimes videoing of the classroom when we have permission. And [there are] many focus group interviews, sometimes with teachers and students, sometimes only with students, and also one-on-one interviews with kids and teachers. So we have all that. And I think in one of the papers we wrote, we tried to dig a little bit deeper in narrative identity—how kids talk about themselves and what they think they are doing and who they think they are becoming or can be in a science setting. So that's narrated identity through interviews, mostly. And then we looked at embodied identity, which is what we see them being able to do and perform in these spaces and in the classroom or in the informal space. And we looked at the disparities between what they were narrating and what they were doing and how the community of practice at large influenced it.

So it's really interesting in this one particular classroom, just for an example. This is a sixth-grade classroom: two girls, one Asian American, one African American. [The] Asian American girl narrated a really positive science identity. She said, you know, "I'm gonna become a doctor for animals; I really love animals." The teacher loved her, she had all top grades throughout the year. And then in our observation of her, she would do her work really quickly and turn in the worksheet. Then she would get onto where the teacher has extra credit work. So her performances were all the good-girl student performance, whether it is science or not. This is just how she is. But, when we watched her, the teacher didn't do many hands-on inquiry-based STEM experiments, but when she did, it was interesting that this girl, who on paper and through and her narrated identity was so tip top and positive, she did not perform the practices of inquiry-based science. She was quick to make assumptions and to check her answers with the other smart people in the class that she has personally identified. She just wanted to do everything very, very quickly. The other thing that we have done is to have think aloud interviews with the students that are very much content-based. We would draw the scenario based on what is related to the content in the setting. We would ask them to think aloud about "what do you think is going to happen with scenario X?" And this girl could not answer the questions. It was interesting in how she was performing herself, which if you looked at the data, you will not say that she is really engaging in inquiry-based science. But when she narrates herself, and the teacher's narration of her, [it] is all very productive and positive.

So then this other girl, and this is an example of intersectionality, she was struggling really hard with formidable challenges in her home life. And so she was coming to school with the same set of clothing every day for months. And that presented a problem, in terms of bullying

and hygiene and all that. And so the science teacher who was a really kind lady, she collected money from the rest of the teachers to buy this student new clothes. But this student—at the same time as she was just being scripted as someone who was really poor, and we need to help her—was engaging in inquiry-based science. We gave the students disposable cameras, just like go and capture what you think is science happening in your home life. She was the one that was super excited and came back with many different pictures, and she would narrate what she was doing. She would ask questions during the times when they do hands-on stuff, in an authentic inquiry-based way, but she was unfortunately shut down by the teacher all the time because the teacher seemed to be foregrounding her as a *you are a student-in-need* identity, so those were the norms in the classroom.

The teacher didn't like them to talk loudly, didn't like them to keep putting up their hands to ask her a question like "can you come and look at what I'm doing with this experiment, this is what I'm thinking," e.g., the teacher wanted them to just write everything down and decide as a group what their final answer is, and then she would just check it off in the work; she would just not help. This student wanted to, and was able to do it. She was just really excited. So when she narrated herself, she talked about all the negative things: "My teacher is always scolding me; my teacher doesn't think I'm good in science; my teacher blah, blah, blah. I don't think I'm good at science." But, in her embodied performances, we think that she's one of the best in her class. She's always the one who's asking the really good questions. And then sadly, when the teacher looked at her test scores, the teacher was shocked that she was doing as well as she did. She said, "I would never have thought"—and this is the teacher who is grading all the papers—"that this student made an 'A' in my class, because of all the challenges I've had with her in asking her to be quiet and do her work." So there [are] all these intersections between a good student identity versus a good science-student identity. And parsing out narrative identity with embodied identities, I think we found to be illuminating.

One thing you mentioned was *critical ethnography*. Can you explain what that means?

Ethnography is a way of conducting research in authentic settings for lack of a better word, and it comes from anthropology, where anthropologists would go and essentially live with the group of people, a community that they are interested in learning more about. So we in the same way embed ourselves in the school. We're there a lot. We spend many hours in a classroom with the teachers, with the students. So to contrast that with a more drop-in or another approach in which, a large number of survey data is given to students via computer across many grades and then you analyze a large chunk of survey data, but there's minimal contact, face to face, with the students that you might be studying. Ethnography is very much focusing on and for long periods of time, a significant period of time, maybe a smaller group of people, to really learn about how they are engaging in this particular phenomenon, which is science learning in our context. And then criticality, critical ethnography, the criticality comes from acknowledging that this is connected to power. There's no neutral education. There's no such thing as neutral learning, there's always power involved. Some people have no power, some people have less power. And bringing that lens to the ethnographic world to reveal where are the inequities in terms of power distribution and how that might impact some kids' learning, and what we can do about that.

Do you think it is possible to create tools for measuring identity that practitioners or evaluators could easily use? Is it possible to develop practical measures of identity that can be used to guide program design or program impact?

I think the first step when we work with teachers is to introduce the idea of identity gap. That students need to actually author positive identities in science. I think that identity work as a concept, as a learning outcome, as a productive and essential learning outcome is pretty foreign to a lot of teachers. And so we've done some professional development work around that in one of our projects that we called [Recognizing Productive Identity Work](#). Everything sort of boils down to pedagogical moves and strategies. So some of the things we have tried out, and this is what is ongoing, is "what does it mean to value every day experiences that your students have and to bring those experiences authentically into the classroom science discourse?" I think a lot of teachers are familiar with science talk and science stories and asking students what have you done in your home and all that. But then they often stop. The kids share their stories, and then that's it. They'll move on with whatever is on the [pacing guide](#). So what we are trying to do—what the teachers get to say is okay, so you've done the story, which is great. How then can we read these stories and dig for more community relevance in their experiences to inform what they do in the classroom and what their final products might look like in a classroom?

For example, this sixth-grade teacher was teaching about the respiratory system, and diseases, lung diseases like emphysema, which is connected to smoking. This is in an urban district, and this is the second year in which the teacher has worked with us, so we had some of these PD talks with him. And so he decided that, as a final performance task for the unit, he was going to ask the kids to come up with a skit, which they would perform to convince people not to smoke. He just painted it broadly, "let's do an anti-smoking skit." And then he had some requirements that you need to show understanding of emphysema and the biological consequences of smoking. And he left the script up to the students. So what happened was that there were six skits in his classroom, and all of them were about easy access to cigarettes on two or four streets that surround their school. The students brought into the scripts which bodega you could go in where the owner would not bat an eyelid in selling you cigarettes, even though it's clear that you are too short to be smoking. And what it means when some of your friends who have dropped out of school or who had to support themselves. So there were a lot of kids who were acting as newspaper girls or newspaper boys, or people who are just helping in the bodega to make a buck or two and how their culture sort of intersects with early smoking.

So all these community funds of knowledge, and the things that the teacher didn't even know that the kids could bring in, were woven into the script of this performance task in science class that was then further dug into deeper in a whole class discussion. And that counted to us as a final grade for the students. That's just one example that we're trying to help the teachers to figure out.

A lot of it started with recognition. Recognizing that you can position all your students as competent in having something available to bring to the table, even though it might not be what you traditionally think it should be. And how you can progress as your lessons go from introduction to digging into the content, to assessment—how those threads of students' everyday lives can be woven into the process.

What about program evaluators—do you think there are any kind of tools that could be created that would help in measuring identity?

I think if I were a program evaluator, and I want to see identity work, which is my construct, I would probably tell the PI or the teacher to say, “okay, I would like you to at regular intervals, be it monthly or every fortnight, to have snapshots of the products that the kids are making. I would like to hear three-minute snippets of the classroom discourse discussion.” And then I would probably come in and have a focus group on narrated identity at least—how kids are thinking and talking about stuff.

The other challenge is that for young children, especially upper elementary, it’s very hard for them to talk about identity because it’s a difficult construct, right, even for adults. And how do we help them? So this is like in research methodology, and how we help them to articulate and think about how to give us ideas of how they are thinking. One of the things that we’ve done is just to ask them on a scale of one to seven, “how would you rate yourself, in your science class and why?” A lot of times, kids would rate themselves [as] “oh, you know, I’m a three.” Why? “Because I just don’t talk in science class, I get really nervous, blah, blah.” And then we would follow up and ask (and this is usually done in focus group) the peers: “Do you agree that Anna is a two in science class? Why or why not?” And then that usually brings up really interesting contradictions that tell us something about how the kid is maybe conflating different kinds of identities together. We would do that on a regular basis just to check how the kid was changing and how their friends are either corroborating or bringing up other kinds of data points that we can then go back and either look at classroom videos to see how this kid was performing at this point in time, as triangulation. So if I were a program evaluator, I would probably ask for those kinds of data sources and also look at those data sources across students; students who the teacher say is high ability, low ability, however they define it; medium ability, and then across ethnicity or gender.

A lot of people are talking about things like interest, motivation, and attitudes as outcomes for science learning. How do you think these connect with identity, if at all, and how do you distinguish science identity from these other concepts, if at all?

We’ve thought a lot about this. I think because we take a sociocultural and sociohistorical view of identity focusing on identity work and identities in practice. I think the descriptions or labels or constructs such as interest, motivation, and attitude are manifestations or markers of a student’s identity in practice in the moment when attributes are captured. So if I took a survey today and you ask me about my motivation, one to ten, about doing well in science, that’s how I’m thinking or how I’m feeling at that moment. I see them as indicators of a moment and that they are fluid and that they can change depending on the students’ ongoing negotiating about their identity work. I do not necessarily think that there’s anything completely intrinsic or innate in these attributes located in the individual, but it’s very interesting in our interviews of students that the students themselves, in the discourse that is more commonplace, that they latch onto these ideas of, e.g., Sammy is a science person, Sammy is so smart in science, and Sammy is invariably a white boy. And so they latch onto this individual attribute, especially when, you know, the classroom is traditionally constructed. So we think it’s a descriptor. Even in identity work construct you can say, at this moment, Melanie, when she is with her close girlfriends in a small group, is highly motivated

to do the work and highly interested in work. But when she is with another group of kids who tend to bully her, she is not motivated, and she is not interested in work. In that instance, personally, I think it is a snapshot and again, there are limitations of that snapshot.

What are some examples of resources or tools for measuring or understanding identity that you have found useful? Are there some people or projects that you would recommend that are useful for thinking about identity?

We're not measuring. I think there's a lot to understand, explore, and name in terms of identity work that requires longitudinal embedding in the field. I think unless we understand the norms, the practices, the power dynamics in these spaces and what is supporting or not supporting kids in engaging in productive identity work, then it's more difficult to have recommendations. Because if we don't know what is supported, in terms of pedagogical moves, [this] could be as mundane as how we group students. [It] is difficult to get kids interested when they're not interested for various historical reasons, especially for historically marginalized kids.

People whose work that I found useful, of course, [Angie Calabrese Barton](#), her work since the nineties, and she's worked with homeless youth across settings. I think [Megan Bang](#) and her colleagues work with Native American youth, indigenous youth, in figuring out and really making visible the rich sources of community knowledge that is so grounded in science that has just been blocked because of the dominant culture in science—I think has been really helpful to thinking. [Maria Varelas](#), who does work with her colleagues in elementary school students, African American students—I think that's been helpful. [Na'ilah Suad Nasir](#), she does work with looking at learning environments. She and her colleagues recently had a [piece out in the Journal of Learning Sciences](#) looking at mathematics and how African American boys engage in mathematics and how mathematics experiences are racialized. So again, highlighting intersectionality and why we need to look at that. And my colleague at University of North Carolina, Greensboro, Heidi Carlone, and Angela Johnson, her colleague, they have also done interesting work looking at identity at the college level. They have worked with women scientists either at the university level or graduate level, or even the professions to see why it is that these women persisted. And a lot of the things that they found out I think resonate with the productivity of thinking of identity work because of this whole slew of supportive relationships or experiences that we've had that kept us going. And even then, there is this big problem because we know that women tend not to remain in the field, even after they put in 15 years of their lives, to get the required standards and qualifications. Once you are in the field itself, it's still so hostile towards them as women scientists and also to minorities. I think that is an impetus for us to really seriously think about that it's not just that we want more girls, black and brown, children to engage in STEM so that they will think about pursuing STEM. But it is really a disservice to have them do all that work and then go into those fields and then decide that, no, I am going to have to give up my whole entire other personality to do this work. I don't think that it is very productive in thinking about how to expand the STEM professional pool to be more inclusive.

Is there anything else about identity and science learning that you wish to share?

I think identity work is key in supporting students to engage in science learning productively, and I think, to quote [Gloria Ladson-Billings](#), we have accumulated considerable “education debt” to our low-income and youth of color, and I think that a lot of that debt is connected to not focusing on identity work, thinking about who the youth are and who they can be in science class. And who they want to be, in science. So these are questions that are not necessarily considered, and should be considered as a cohesive suite of what are expected learning outcomes from science. I think we need to keep pursuing identity work and to understand why there is such a large identity gap between youth of color and white youth, and between girls and boys.