

## Talking Science: An Interview with Remy Dou

In February 2020, [Kelly Riedinger](#), Senior Researcher at Oregon State University's Center for Research on Lifelong STEM Learning, interviewed [Remy Dou](#). Dr. Dou is Assistant Professor in the STEM Transformation Institution and Department of Teaching and Learning at Florida International University. Dr. Riedinger conducted the interview as a member of the Center for Advancement of Informal Science Education (CAISE) task force on evaluation and measurement.



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### What led you to studying identity or to including the concept of identity in your work?

I like this question because initially I was very reluctant to look at identity. When I was a grad student I was studying physics self-efficacy and physics interest development and working with undergraduate physics students and I was using [Lent, Brown and Hackett's social cognitive career theory](#).

And then around that time Dr. [Zahra Hazari](#) -- she's featured on the CAISE website -- she joins the FIU faculty and actually joined my graduate student committee. And so, of course, she encouraged me to consider the role of identity, but I had this huge academic crush on [Albert Bandura](#) who had done all this work on self-efficacy. And, you know, self-efficacy is robust enough to explain what we were seeing in terms of physics interest development and career choice around physics. And it wasn't until I started working more closely with Dr. Hazari that -- actually on informal learning research -- that I began to realize the explanatory power of the identity lens. And so that's kind of how I made the switch and how I was introduced to that framework.

### Can you talk a little bit more about why you might have been reluctant to study identity?

I think I had read so much of the Bandura stuff that I was like, this is awesome. And I could see

that it was very applicable to the context that I was studying: undergraduate students in physics. And it was a construct that seemed to be very much related to behavior and choices and the goals that we set for ourselves and it was also related to interest.

And so what's fascinating about that in itself, and why it's actually not as far away from the identity work that I do now, is that the framework for identity that I use actually takes into account self-efficacy and it takes into account interest. It just adds this other piece which is also really important; this idea of being recognized as a certain kind of person or recognizing yourself as that kind of person. So, it's actually more aligned than I thought it was at the moment.

### **Can you talk about the framework that you used for thinking about identity?**

In the broad literature of identity, my focus is science identity which to put simply it's the extent to which somebody sees themselves as a science person. And I define a science person really broadly and I allow people that I work with to define that pretty broadly for themselves. So I'm not specifically interested in whether or not somebody sees themselves as a scientist or could see themselves as a scientist, per se. But I allow for a broader definition for what counts as science and what counts as doing science and what counts as a context for doing science.

So, it doesn't necessarily have to be somebody that is working as a professional in a STEM field or formally studying a STEM field. Within my science identity framework, I see it as really being shaped by three different factors. The first one is your interest in science. The second one is your sense of competency in science which in some cases you could think of it as science self-efficacy. And then the third one being how others recognize you, the kind of person that others see you to be or at least your perception of what you think others think of you in terms of science.

And so these three, kind of, work together in shaping who we are and who we think we are. And as it relates to science, I would call that your science identity whether or not you use the words, "I see myself as a science person." But if these three factors are present, depending on the degree that they're present, you're either more or less of a science person.

### **What I hear you saying is you may not say it like, "I see myself as a scientist," but by these three different components, if you were to measure and notice that a student, or a person, has a lot of interest in science and they feel like they're competent and they feel like others recognize them as a science person, that they would have a science identity even if they don't say it?**

Yeah, exactly. And so in our interviews that's what we look for. We don't necessarily look for somebody to say, "Oh, I'm a science person," but we look for these three components; are they having those kinds of experiences -- remembering those kinds of experiences?

### **And is there anything else that you wanted to say about your working definition of identity or how you conceptualize identity?**

No, I think that's the gist of it. It's very different from other ways of conceptualizing science identities. A lot of the folks that work with the figured worlds framework, they think of science identity a little bit more as the behaviors that you enact in a science setting that are science-related.

And so [figured worlds] is more of an identity-as-performance kind of framework. Most of the students that I work with come from populations that are minoritized in STEM and I just personally found that identity-as-performance framework to not really tell us the full picture. Sometimes there is a sense of a science identity in the individual that may not actually be performed in a particular context for a variety of reasons.

And not that it's not a valid framework, I think it's really valid, there's great work that's being done using that framework. But, I take a little more of a cognitive approach to identity.

### **You're more interested in their discursive identity than enacted.**

Yeah.

### **You mentioned how your work is potentially a little bit different from the work related to figured worlds. What about others in the field and how they conceptualize identity? How is your work different or similar?**

Actually, for the most part I find a lot of alignment. Even with the folks who work in figured worlds or who use a framework of identity that's more participatory or enacting behaviors, at the end of the day I think the one thing that we all share, is that to a certain extent identity is forming individuals' motivations and attitudes and behaviors.

A person generally doesn't do something that they can't see themselves doing. And so when you see yourself a certain way or you're enacting a certain kind of behavior, it's most likely because you can see yourself in that setting. Or, you're taking a risk, if it's a novel experience, or you're taking a risk and then making a judgment, "Yeah, this is cool, I like this, I can see myself doing this or continue to do this."

Ultimately knowing that identity has this relationship with motivation and behavior is, I think, part of the reason why we are so interested in identity research. We do want to be able to not just study identity from a psychological perspective, but also have practical recommendations for how to motivate people to engage with science, to get excited about science and go do science things in their community. Whatever that might mean for them, whether it's engaging with

university folks or informal learning centers or just playing with their kids.

I think ultimately knowing that there is this link between identity and behavior and that we share that belief is what keeps our work aligned, even though we may come at it from slightly different perspectives.

**You talked about how your time with Zahra influenced your interests to pursue identity as a theoretical lens. Can you talk a little bit about since you graduated and moved on from Zahra's lab, how you've built on her work and extended it with your own projects?**

That's actually a very easy question to answer because my work literally builds off of a project that Zahra and I did together. She had some data that we analyzed – this was a national survey that went out to 27 different colleges across the country. The survey included items about science identity and informal learning experiences. And we looked at the connection between having certain kinds of informal learning experiences as young people.

So, we focused particularly on the ages of five to nine, which is elementary school, and then looked for a relationship between having those kinds of informal experiences that included going to science camps, writing computer programs, growing plants, all of these kinds of activities. And then the science identity measure that we were collecting of these college students who were answering these surveys and thinking back to what were the experiences that they had as children.

Of all these experiences, the ones that were correlated with their science identity as college students, positively correlated, were two. It was this idea of consuming science [fiction] or non-fiction media, like TV shows and books. But the variable that had the largest effect was this talking about science with friends and family. And so that was a project that Zahra and I worked on together with a few other folks and it was actually published early last year in *Science Education*.

That led to a proposal that I wrote to NSF [National Science Foundation] essentially suggesting that we should explore this idea of talking about science with friends and family. What does that mean? What does that look like? Who's starting the conversation? And again, focusing on these early years, ages five to nine.

I was fortunate enough to receive funding for that and it literally builds right off of the work that I started with Zahra except now I have my own team of researchers that I work with -- a postdoc and some undergrads. We are interviewing a ton of people and there's just so much data. We're learning so much about what are these conversations that children are having or that college students remember having and how are those shaping science identity.

## **And that's the [Talking Science](#) project?**

That's correct.

## **And do you have any other projects related to identity or is your focus primarily on [Talking Science](#)?**

I had, I don't know if it's going to continue, but I was working on a computer science identity project. We had gotten a Verizon Foundation grant to create some afterschool programs and some summer camp programs around computer science with middle school boys from minority communities in particular. And we had bused over 100 kids from our community to FIU over the summer to participate in computer science activities and then throughout the school year they continued and engaged in afterschool programs. And we surveyed the students, we also interviewed them.

And in that particular project, one aspect of that project was looking at how their stereotypes of computer scientists shaped how they perceived themselves in the world of computer science and their perception of what it would mean to become a computer scientist, and whether or not they could see themselves in those kinds of careers, again as a factor of the stereotypes that they had about what a computer scientist does and what they look like and how they spend their time.

So that was interesting because it takes this other factor, which is what does it mean to be a computer science person or when I ask somebody what does it mean to be a science person, you get all sorts of different kinds of ideas. And so how do those ideas or perceptions, whether they're right or wrong, the affinity that a person has with that field.

## **Are you looking at how the participants create their own stereotypes about what it means to be a computer scientist or a scientist? Are you also looking at stereotypes that might be applied to them as minorities?**

Yeah, there's a little bit of both. And I'm not exactly looking at how they create those stereotypes, I think that's fascinating, understanding where do these stereotypes come from. I think we make some assumptions about where they may come from and how they build those stereotypes. We're essentially asking them -- well, actually what we did is we did a review of the literature, of all of the stuff from Billy Wong that he does with people in the UK. We drew out some of these typical stereotypes that keep coming up in interviews, at least in these studies that we reviewed, and we created a list of computer science stereotypes.

We presented this list of stereotypes to students and included things like, computer scientists make a lot of money, computer scientists are really nerdy, computer scientists spend a lot of time in front of a screen, those kinds of things that kept coming up in their interviews. And so we

presented the list and we said to what extent do you believe that these things are true?

What we didn't do is we didn't ask them, "What do you think a computer scientist does or looks like?" That was the next step in that project. So we did start the interviews and then funding for the project ended. The data's there and I'm hoping that I can get a grad student to kind of pick that back up.

We do have a paper that's being reviewed [[The Effects of Computer Science Stereotypes and Interest on Middle School Boys' Career Intentions](#)]. Hopefully we'll get some positive feedback from that.

**One thing I wanted to make sure that we talked about is, I think a unique piece of your work, is that there is a focus on students or participants from minority backgrounds. I want to make sure that you have a chance to talk about that with regard to your Talking Science project.**

So doing identity work, it's actually caused me to really self-reflect on my identity. And the more I learn and the more I study what others have found about science identity, in particular -- the more it becomes really obvious that identity is a multi-layered thing. So I'm not just shaped by what kind of science person I see myself to be or the way I see myself as a science education researcher, but at any given instance I'm also shaped by how I see myself as a father, for example, or how I see myself as an immigrant from another country. I wasn't born here, I was born in Cuba. My dad's Venezuelan, my mom's Cuban. I grew up really poor. All those things shape a lot of who I am and I bring that into my research.

And so in thinking about doing identity work, I think it's important as scientists, we want to try to be objective. But I think what makes this work really rich and what really allows us to have some interesting perspectives and contribute something novel, is being honest about where we're coming from. Being transparent about that and rather than trying to suppress that, to really embrace who we are.

As such, I have a passion for students with similar backgrounds as myself, and that's part of what I bring to this research. A lot of the students that we interview either identify as Latine or Hispanic, many of them are immigrants, whether or not they identify as Hispanic or not. Many of them came from backgrounds similar to mine or similar to some of our other researchers. And so for me it's important for a variety of reasons. One, because I care about the community, but also because I have a deep connection to that community. Also, many of these students that we're interviewing or the children that we're interviewing, they've grown up here in Miami for the most part. And I'm also kind of a Miami boy myself and so I understand a little bit of what that means. It gives me a perspective to be able to understand how, that in itself, these cultural aspects play a role in how these young people come to see themselves within the scientific enterprise.

**You've touched on this a little bit, but I just want to give you an opportunity to expand if you want. Why and in what ways do you think identity matters for science education or science communication?**

Yeah, I think it's that idea that to an extent the things that motivate us, the behaviors that we take, they're all in one way or another related to our identity. So, for example, in general people aren't going to do something they're not interested in, right? So this interest, which is one of the components of identity, regardless of what has made you interested in that and whatever the behavior is, you're usually not going to do something you're not interested in. You're usually not going to accept a job where you can't see yourself doing that job. And if you are hearing a lot of negative statements, if somebody's saying, "You're not really doctor material," or, "You're not really biologist material." You keep hearing those things over and over, you start believing that and that could end up shaping the kinds of goals that you set for yourself and the behaviors that you have.

I think that's why it's important for science education researchers and practitioners in both formal and informal settings. Because in understanding that our identity is tied in one way or another to our motivations and behaviors, then we may be able to understand how to really engage people, how to get them excited about science. And not just for the sake of becoming scientists, but just for the beauty and awe of science in and of itself. Whether it's a zoo that wants to motivate their visitors to have more positive attitudes about conservation, for example, or it's a parent that's worried about how their child is going to perform in school. I think understanding these factors are important. Especially if we care to motivate people in ways that we think will empower them.

**So what specific advice would you give practitioners who are trying to integrate your findings about identity into their work? And feel free to choose a particular context, or age if you want to focus on elementary students for example. But I think we're just interested in knowing more about how you would translate your research in the process.**

The bulk of the findings that we are putting together from the data that we've collected this past year relate to the relationship between parent and child and the kinds of conversations parents have with their children around science. And that's a little more nuanced than it sounds because there are a lot of factors involved. Again, like I said, identity is a multi-layered thing. In the cases that we're seeing, we're finding that the gender of the parent plays a role. So children have different kinds of relationships with their father than they have with their mothers. The gender of the child plays a role, the ethnicity or immigration status of the family plays a role, the values that they carry, whether they're cultural values or they're values around career choice or what you're going to do after high school. All of these things play a role in the kinds of conversations that parents and children have about science.

And then on top of that you also have this factor that being a parent is a lot of work and you have a lot on your mind. You're dealing with work and stresses, and that also plays a role, right? It's like in exploring these worlds and exploring the family structure, which we know is really important in shaping children's science identity, we are beginning to see that one thing that we would love to encourage and recommend and connect with practitioners on is how do we break down the stereotypes around science talk that happens in the home between children and parents. For example, one thing that we would look to see is to break down the stereotype of who does the fun science and who does the school science [in a family]. We generally see that children, whether or not their mom works as a scientist or is interested in science, they tend to go to dad [and say,] "Hey, I saw this thing on TV...what do you think, this is really cool." Those interesting questions that just pop up for whatever reason. And they tend to go to mom for school projects. Again, I'm speaking in generalities; that's not true in every case, but we're continuing to see this pattern. So it's important to begin to break those stereotypes, to encourage mothers to engage children in these impromptu science conversations, and vice versa, to encourage fathers to engage children in school-related science projects. And also to find ways to support parents in doing that.

The great thing about science talk, in terms of shaping science identity, is that you don't actually have to know a lot about the topic but be able to reflect your child's interest. So as your child comes up to you and says, "I saw this really cool animal show." As a parent you're so busy, it's very easy to just say, "Yeah, that's nice," and then move on. But how do we support parents in those moments to engage them, whether or not they have any more information to share, to let the child know: "Hey, what you find interesting I also think it's really interesting. And by the way we can also learn more about it here or if you have time you can also go to this resource and learn more about it. Let's talk about it later on in the day or whenever we've got time."

It's supporting parents in doing that and not just directing children to resources. But once the children have access to the resources, or the parents do, to come back and to talk about it and to have a discussion, whenever that may be.

**It's almost like helping the parents understand that they don't have to have an answer, but just being curious together is a really meaningful thing.**

And so much of it, too, is building that relationship with that child, right? Because for the child, going to the parent with some question that they're curious about, it's not just for learning but it's also to engage with that parent, to build that social bond.

When you can tie that strong emotion of building a bond with your mom or with your dad to something like learning about animals or learning about why stars burn or whatever it may be, then you're layering science with this beautiful emotion, with this social component that's going to be very hard to unwind or to untangle. And hopefully it's a positive marrying of these two



experiences so that it suddenly becomes part of who you are.

### **You were looking at not just mom and dad, right? Beyond that part of the family, with aunts and uncles and that sort of thing?**

That's right. And we see that a lot. We see that children tend to be pretty persistent. When they can't get an answer or they can't get that reaction that they're looking for from mom or dad, they will keep looking for somebody. Often we see that brothers play a role, sisters and aunts and uncles. What's interesting is that those are the go-to's and then if they are still not supportive, then they might go to their teachers and look for that in their teachers.

But as children, our world revolves around our parents essentially, so they will be the people we go to first. But teachers do play a very important role both in recognizing children as capable of participating in science and also providing that kind of excitement around science that they might be looking for and not finding.

### **Let's talk about how you're currently measuring and assessing identity in your work.**

I was trained as a quantitative researcher and the work that I did with Zahra was also quantitative, research and essentially surveying writing. And I did borrow items from Zahra's prior work and also [Dr. Geoff Potvin](#) who's worked with Zahra a lot. I borrowed their items and built instruments using items that they have that you can find in articles.

But we're also exploring areas of science identity development that haven't been explored before, you know? And that relationship between impromptu or everyday science talk in children's science identity development, there's some work that's being done in that area. I know [Scott Pattison](#) is doing something around interest development which is related, but there's still a lot that we don't know. It's hard to create a survey when you don't know what to ask so we've relied a lot on interviews. Our interviews with college students tend to sound more like life histories. We get a lot of stories around when they started becoming interested in science or what kinds of science related activities they did as children and who they did those activities with; when they did have conversations, what triggered the conversations?

In those interviews, we are looking for those three kinds of broad components to identity. We're looking at when they exhibited interest in science, we're looking at when they were recognized by somebody as a science person or the opposite. For example, in one case, we had an interviewee who was in fifth grade and she was very, very excited about science. She said that she did see herself as a science-interested or a science kind of individual at elementary school, but her fifth grade science teacher didn't promote her to an honors science class in sixth grade.

And that one recognition event -- or lack of recognition as capable of performing well in science --

just completely, at least for the next four or five years or her life, she didn't want to have anything to do with science. And so we look for those kinds of moments where somebody feels recognized as a science person or feels like they're not being recognized as a science person. And then finally we're looking for moments where somebody's expressing that they felt competent in science, like they could succeed in science.

Again, it doesn't have to be formal science, per se. One of our interviewees loved watching *Bill Nye the Science Guy* and doing these crazy experiments. In school she received a lot of negative recognition, in terms of being a science person or her science identity, her teachers saw her, at least in her words, as a bit of a failure. [But] she considered herself a science person because, at home, she would get together with her neighbors and they'd do all sorts of fun activities, exploding things and mixing chemicals and cutting up bugs or whatever it is that they were doing. So, it wasn't a formal school context, but she certainly saw herself as a science person. Again, that goes back to the way I define science identity is broader than just wanting to pursue a science career or profession.

### **What kind of things are you trying to get at related to identity on the surveys?**

We have items that address those three different factors: recognition, interest and performance competence. And the items are things like "my teachers see me as a STEM person or a science person," "I could perform really well on science exams," "my friends come to me when they need help with science things". That kind of stuff. Each of those items will pertain to one of those three factors and there we usually use a one to five Likert scale. We anchor the Likert scale at the polls so either strongly agree and strongly disagree. It's about ten, eleven items on the scale.

Something that's really interesting is how exploding things is science and how that would have shaped whether or not they see themselves or feel confident in science.

### **Did your interviews, or the survey instrument, explore how they identify within their definition of science?**

Yeah, I partner with a colleague of mine here at FIU, her name is Dr. [Idaykis Rodriguez](#). We're looking at what counts as science in people's minds. And we're looking at that as a factor of whether somebody identifies with a minority group or a particular gender because there are some people that might see something like baking a cake as very scientific, and indeed there's a lot of chemistry involved, and there's some people that may not see that as science.

The question that we're trying to explore is, are there broad patterns in the kinds of individuals who may consider something like that when they see the science in that and the people who may not see that as science. [Dr. Rodriguez] is leading that project; she has a lot more to say about it than I do. But it is interesting and we're just in the very, very beginning stages of analyzing that data.

But that does play a role when we're thinking about how our interviewees are defining science. How are the children that we're going to interview going to define science? And using the word science with them is probably going to be futile or useless because they might either think school science or may not even know what we're talking about, right?

What is it that we're counting as science? That's an important question even for me and my team to think of and we have thought about that, how are we defining science?

**Yes, it's messy because how you identify in science might be a little different in terms of how you think of yourself in science class versus how if you have a very loose definition like you talked about, you know, how not only like what your broader science identity, but how does context matter, I guess.**

Yeah. How does context matter, yeah. Absolutely.

**I think you mentioned this in terms of how your work or how your measuring is building off of Zahra's work. So what I remember you saying was that you are taking the survey items that you guys developed when you were working with her and that you're implementing some of that. And are the interviews an extension of that work or is that something you're doing?**

Yeah. The interviews are an extension of that work. We essentially re-did the survey, we surveyed all students that were taking introductory STEM courses, so there's Intro Bio or Calculus or Intro Chem, a variety of introductory STEM courses. And we surveyed them and then we used the survey to identify individuals who said that they remembered talking with friends and family about science when they were little.

And then we're sampling from those individuals -- students who had very high science identity and students who had very low science identity -- in trying to get cases that are comparative or maybe they're kind of counters to one another, to help us understand what aspects of childhood science talk may have contributed to their science identity now.

But it's a long process and it's really hard to make any kind of causal relationship between something that happened in childhood that they're remembering and maybe not remembering accurately and how they feel about science today. So, there has been a lot that we've had to untangle.

And now this summer we'll start interviewing children. And so these interviews that we've had with college students have really helped us hone in on what other kinds of things that we want to understand from children's everyday science talk.

### **Do you want to talk at all about the interviews with the children?**

Yeah, I was, and still currently am, pretty freaked out about developing interview protocols for children. I mean in part because we are still hoping to target younger children as well. We've maybe expanded our range, so we will sample older children. And by older I mean 12 and 11 years old. But we're also hoping to interview children maybe as young as seven and if we're brave we might go a little younger than that.

And so the focus has been on, okay, how do we learn about their everyday science talk? This kind of impromptu science moment, that they may have at home with their parents or with their family members or friends, or maybe it's happening in the car ride, whatever it may be. How do we get [at] it without using the word science because we don't want to fail to capture something because they may have a narrow definition of science; so we don't want to use the word science. We definitely don't want to use the word STEM, we definitely don't want to use the word identity, right?

And so how do we learn about their science identity without actually using those words? How do we do it also in a way that they won't just get bored and want to go home, right? What we've designed, or what we're starting to design, are a series of games where, through the games, we start learning a little bit about the child's own interests and allowing them to talk about their own interests, whatever that may be really broadly. And trying to see if in their expression of their interests, there are things that we can pinpoint that might be closely related to how we're thinking of science and science identity, that we can then further pursue.

So we'll be starting really broadly trying to figure out what excites them -- who do they talk to about the things that excite them? -- and trying to see if in getting that information we might be able to narrow that interview down. And so we'll do pilot interviews in a couple of months and then hopefully this summer we'll be doing a bunch of interviews and we'll be interviewing kids mostly who are participating in either private science camps or some of our local community science camps.

### **Very cool. Do you have any examples of what tasks in the game, or questions in the game, that you're thinking about will prompt thinking about or talking about identity?**

Yeah, we have a couple of ideas. So one idea is having them draw themselves either at home or in a particular context. And I think, then taking elements of the drawing and asking a little bit more about them. And often when you ask children to draw themselves at home, or wherever it may be, they usually draw other people with them. And so then asking, well, who's that, and asking more

about those kinds of relationships and getting to know who are the people that seem to matter in their lives and what are the kinds of things that they're talking about with these individuals. So that's one activity that we're considering.

We're also trying to see if we can do that in a way that's not drawing. Drawing may take up a little bit too much time, so how can we do that where it's maybe like play acting with dolls or figurines or whatever it may be?

We're also considering having a station with different kinds of toys that -- this is a little bit more problematic because we're thinking some of the toys would be more like science toys -- but again, how you define that is the problematic piece. And then just seeing what it is that they get drawn to. And then asking them, well why did you pick that toy and why is that toy fun for you, whatever it may be; some following up. That's one idea. I don't know if we'll actually end up doing that one.

Those are the kinds of things that we're thinking about, things that are not really interviews but it's having fun, it's playing. I think the icebreaker that we ended up on is making slime. It seems like kids, everybody makes slime these days, boys, girls and it just seems to be this craze. And so we figured that could be a good icebreaker, making slime, and then just talking about it while we're making slime together and seeing if just the activity of making slime together leads to some interesting conversation around if they do that kind of stuff at home and who they do that with.

**All right. So we also had a question about what's the current state of the field with regard to identity research and how your research fits in the current state of the field and/or builds on it?**

So a lot of my work, that's built off of Zahra's work. And I think the more I read about identity and some of the newer pieces that are coming up around science identity, the more I think as a community that we're beginning to recognize the complexity and how it's not just science identity that's playing a role.

But this work is very intersectional in nature. You can't just consider the way an individual sees themselves as a science person or not but you also have to consider their ethnic and racial background and the gender that they identify with. All of these factors play a major role in our coming to see ourselves as science people or failing to see ourselves as science people.

It becomes a very complex scenario very quickly -- this research can get very complex very quickly. So I think what I'm not seeing, as much as I'd like to see, are newer frameworks or updated frameworks that help us take into account this complexity in ways that are comprehensive but also practical.

And I know there are some people who have done some work on that. I actually think the figured

worlds framework attempts to do some of that, you know, wrangling with this complexity. But I do feel like we're due for an update. I think that would be awesome. That would be something I would want to read about. You know, how do we take into account all of these complex intersections that people bring with them, and help us understand that complexity in ways that are practical to our research in science identity.

**If I could just summarize what I think I heard you said, some of the newer research or the newer work in identity, is starting to explore all the different ways that there might be intersectionality with a science identity and that your work is contributing by exploring some of that intersectionality.**

Some of that intersectionality. Absolutely, yeah. Yeah, definitely.

**And so what do you see as the big questions in informal science education, science communication or even formal science education in the next five or ten years, particularly related to identity? Other than you want to see more frameworks.**

To be honest with you, that's what I think would be -- like the questions would be around how do we take into account this complexity? And, you know, I'm sure there are people out there that are currently thinking about that. And again, like I said, it's not that that doesn't exist. But as this field is advancing and as we're learning more, I do think that we need some updates. Or maybe this is just me like looking for --

**No, I mean, I think because a lot of intersectionality work has been like gender and identity -- or gender and science identity or racial/ethnic background and identity -- and then when you said layer on your racial/ethnic identity, then layer with your gender identity in science...I mean, you're right, it gets complex really quick, right? Because we're so individual that we may have all these different levels of intersectionality and how do we account for that in different frameworks as well as measurement and that sort of thing.**

In our interviews in particular, we're finding that children who are either immigrants themselves or whose parents are immigrants, that in itself also plays a major role because it contributes to family values around the kinds of careers that the parents are willing to encourage their children to pursue or the kinds of subject areas that the parents are willing to encourage their children to pursue because they do want them to be successful. For many of the students that we've interviewed, they feel it's a sense of responsibility to make their parents proud because their parents made a sacrifice by leaving their country and coming here. So also taking that into account and it becomes very complex very fast like you were mentioning.