Desiré Whitmore (00:00):
I think it's really amazing when we can realize as teachers, like, no, our job is not to just enforce rules on our students, right? Our job is to help students to achieve more learning.

Eric Cross (00:37):
Welcome to Science Connections. I'm your host, Eric Cross. My guest today is Desiré Whitmore. Desiré has held positions as a science curriculum specialist with Amplify Science, a professor of laser and photonics technology at Irvine Valley College, and is now the senior physics educator in the Teacher Institute at the Exploratorium in San Francisco. Her current work is focused on providing support and professional development to middle and high school science teachers to help them teach through inquiry. In this episode, we discussed Desiré's pathway into physics, the impact of educators in her life, and the importance of representation for students in the classroom. I'm so excited for you to meet my physicist friend, Dr. Desiré Whitmore. All right. So just like a superhero, STEM superhero, you have an origin story and so—

Desiré Whitmore (01:36):
How long is this podcast gonna be? 'Cause, you know, I can talk for days, so you—

Eric Cross (01:40):
I know, I know! But it's, it's…so, OK. We can give us a highlight. So, you know, 30 minutes. But what would be the origin story? You can start from any point in time, but what's that journey like?

Desiré Whitmore (01:51):
I'm gonna start at the beginning, when I was really young, just because I think it's important. Neither of my parents were college-educated. My mother didn't finish high school. My father went back and got a GED later. But my father's grandmother, her name was Claudia Pairs, and she was a teacher, right? So when I was a kid, she actually kind of raised me from, I don't know, until I was around seven or eight. And so she was very important in who I became, I think because she taught me that college is important and she taught me to think. She taught me to ask questions. She taught me how to ask questions. Just the Exploratorium likes to do. Which is why I fit so well here. She taught me to always wonder and always think about things. And I remember as a kid, she taught me to count and read and write when I was, like, three. And she would always have bubbles at her house. And I was obsessed with bubbles. I thought bubbles were the coolest thing in the world. And just how you can take your breath and create this thing that now you can see, and it's your breath, right? It's your breath inside of a bubble and it's flying around and it has all these cool colors, and then it would fly up and then eventually just pop. And you're like, where did it go? Now my breath is just up there. Not understanding, as a kid, but my breath is always everywhere. I didn't understand any of that, but I understood that my breath was inside of a bubble. That's my earliest memory of thinking about science, was from that. And she was not a science teacher. She was—I don't even know what she taught. I think she was an elementary school teacher, maybe. She died when I was 12. So I don't have super-strong memories or of understanding who she was, only that she raised me and what she taught me as a kid. But that in itself really helped me because then when I was in the environment that I was in at home with my parents, which was not at all the environment she provided for me, I always had the things she taught me in my head, right? So I was always asking questions. My mother hated it. I was always taking things apart and putting them back

together. So I used to take apart TVs and VCRs and vacuum cleaners and telephones, and my mother's like, "Oh my God, I'm gonna murder you." And she tried a couple times, too.

Eric Cross (04:25):
Did you ever put 'em back together and realize you had extra parts? You're like, oh, hi.

Desiré Whitmore (04:29):
Oh yeah. All the time. Yeah. Yeah. VCRs have a lot of extra pieces. You're like, "What do you even…it still works. It's fine." <laugh> You know? And vacuum cleaners too. They had a lot of extra parts, <laugh> all the time. And TVs. I should not have been playing with TVs. But like I said, I didn't have a lot of parental, guidance as a child. So, like, whatever—I'm opening up TVs.

Eric Cross (04:54):
There's a lot of open inquiry going on in your household. Yeah. Unsupervised.

Desiré Whitmore (04:59):
Unsupervised. But I didn't know what it was or what it meant as a kid. I mean, I used to put things in the microwave. I did so many microwave experiments as a child, trying to cook different foods or melt different things. And so I think those kinds of experiences, where I was allowed to just be curious, kind of shaped who I am today. And then I kind of got into…you know, when I was in school, I loved math. In 10th grade, I had my first Black teacher, he was my chemistry teacher. His name was Mr. Strickland. And I was like, chemistry is cool, dude. And he was not the best teacher, but he was fun. Like you were saying, he was me, and he was talking to us the way I speak. And he was so like, just kind of chill and happy-go-lucky, I guess. But he wasn't…he hadn't taught chemistry in a long time. So he wasn't a very good teacher. And me and one other kid in the class were in love with chemistry. And so we would read the book and do all the homework and he'd be in class lecturing and we're like, "That's not right, Mr. Strickland, like, what are you talking about?" And then he'd be like, "Oh, really, Desiré? Do you wanna teach the class, then?" And I'd be like, "Yeah." And so I would go up and I would teach my chemistry class in high school, because the teacher was trying to make an example out of me. But he was also, I think, willing to be like, "I really don't know." And I really appreciated that. That he wasn't just like, "I know all of the answers and you're wrong." Like, he wasn't being a jerk, right? Like, the fact that I said, "Yes, I do wanna teach it," and he actually let me do it? That's pretty dope. And then I liked physics in my senior year in high school, but I didn't think it was where I was gonna go or anything. I loved music and I loved math. Those were my two subjects.

Eric Cross (06:51):
What was it about math that resonated with you?

Desiré Whitmore (06:55):
I think it helped me understand the world a lot better. I didn't have strong science teachers, I guess, growing up. It was a lot of reading out of books or watching laser discs in class. That's how old I am.

Eric Cross (07:12):
Laser discs.

Desiré Whitmore (07:13):
Laser discs. And you know, so there wasn't a lot of…I moved around a lot as a kid. I didn't have this straight curriculum. You know, in one year, in the third grade, I went to three different schools.

Eric Cross (07:25):
Mm. Oh wow.

Desiré Whitmore (07:26):
It was kinda hard for me to latch onto school. But with math, because I could look at math and actually understand the world in it, I could see how math can be used to describe how things work.

Eric Cross (07:40):
I almost imagine, especially with so much transition in your life, it helped make sense of things. You had a lot of transition going on, but you were able to understand the world through the process of math. And then this early exposure, it kind of reminds me my own story too. Because there were these books that would do these cross sections of a cruise ship or a machine; that's what got me really into engineering. Kind of How Stuff Works. I would watch that on Nova, How Stuff Works. I'd always be fascinated. Even Sesame Street had a segment where they would show you crayons and how the dye was added. You remember that?

Desiré Whitmore (08:19):
Yep. Yeah.

Eric Cross (08:20):
Young Desiré, doing photronics…photronics?

Desiré Whitmore (08:24):
Photonics.

Eric Cross (08:24):
Photonics. Photonics at home with the microwave and all these other things.

Desiré Whitmore (08:29):
Sure. How 'bout that.

Eric Cross (08:30):
<laugh> Right. And then loving math. So, early, I could see this combination, sort of this alchemy, happening inside you. And then, how did that lead to you becoming a physicist?

Desiré Whitmore (08:46):
It's not as straightforward as it seems it should be. It's obvious to everyone. <laugh>. But it wasn't obvious to me. 'Cause I wanted to be a lawyer. You know, because my parents weren't educated, they didn't really know…both of my parents and their subsequent spouses when they broke up—so my

parents and my stepparents—are all bus drivers. And so they don't know what options are. Right? So for them it's like, "You have to be—you can be a doctor. You can be a lawyer. 'Cause you're smart. I know you're smart, so you're gonna be one of those things." And I was like, "I don't wanna be a doctor. That's not actually interesting to me." I did wanna be a teacher when I was younger, because I knew that my grandmother was one. But yeah, I went in and I was like, "I'm gonna be a lawyer. I'm gonna be a lawyer." And then I go to college and I was like, 'Eh, I don't. I hate writing." <Laugh> Like, I love reading, but I don't writing. So I don't think I wanna be a lawyer. I love music and I love math. I was originally going to major in music and math, but then I went to community college because I missed my opportunity to go to university for…long story. And so I'm at community college and I was like, "You know what? I'm gonna just do something new. I'm gonna be a marine biologist." So my major was marine biology, and then they're helping me pick out my classes. And they had zero math there. And I was like, "Pardon me. I think there's a mistake, but I'm not taking any math." And they were like, "No, you're done with all your math. For marine biology, you only need calculus. And you took all of that in high school, so you're done." And I was like, "No, this is not gonna work for me, dude." So I continued taking calculus anyway and moving on in math. And then I realized that biology wasn't what I needed, but I did love my chemistry and I loved my physics classes. So I asked those teachers—chemistry, physics, and math teachers in community college, my professors—"I don't wanna be a marine biologist and I don't wanna be a lawyer. What do I do? What do you think I could study? I really like chemistry and math and physics." And so all of them, all three of these professors told me, "Oh, it sounds chemical engineering would be good for you, so you should be a chemical engineer." And I was like, "OK, cool. No problem." That's what I did. So I got my degree in chemical engineering. Right. And I finished community college, studying chemical engineering. I was like, "This is really cool. This is a lot of fun. I love engineering." And then I transferred to UCLA as a chemical engineering major. And I was like, "I hate this." <Laugh>. "I hate it a lot." It was just…

Eric Cross (11:07):
What was it about chemical engineering that you were just not feeling anymore? What was it that just made you go, "nope"?

Desiré Whitmore (11:12):
It didn't—at least the way it was taught to me—it wasn't as as…exploratory, I guess. There wasn't a lot of theory in it. There was just a lot of "OK, pull out a ruler and you're gonna draw a thing and then this is how you're gonna build a reactor." And it didn't seem very scientific to me. The science was missing. And don't get me wrong, I understand, now that I have a degree in chemical engineering, that it's not that chemical engineering is not scientific. But it's that you build up the science and then you don't focus on it. You focus on the engineering aspect of it. Which is, you have the science and the scientists will work on that aspect. But then how can WE do kind of larger batch chemistry. And for me, that was just less interesting. It was a lot of pushing buttons and just plug-and-play equations stuff. Instead of diving into first principles of why things happen in chemical engineering. There was no "why things happen"; it was "this is what happens, so this is the next step."

Eric Cross (12:25):
You had to go so far into your academic career to realize that this is what chemical engineering is. And we were talking about representation, and not having examples or parents; your families were bus

drivers. My mom was a receptionist and executive assistant, things like that. And I was the first of many, like you…we kind of had to go through and invest all this time and money to finally get to this place to realize, “This ain’t it.”

Desiré Whitmore (12:58):
This is not for me, yeah.

Eric Cross (12:59):
This is not for me. That was a long journey to get to that point.

Desiré Whitmore (13:03):
It was. Especially because I went through community college and I took a long time in community college, ’cause I was working full-time. So I was working full-time, going to community college. Took me a while. And then I finally get to UCLA. I’m like, “Yeah, I’m finally gonna get my degree and go make money!” And then I was like, “Ooh, no.” I mean, I could go and make money, don’t get me wrong. I could have graduated and made a ton of money. But I was not happy at all and I did not enjoy what I was doing. So, while I was in undergrad, I realized I don’t wanna do chemical engineering anymore. But what do I wanna do? But then I was taking…I took a quantum mechanics class. And that class blew my whole mind. And I was like, “This is the coolest thing that I’ve ever learned in my life, and this is what I wanna do.” And so I went and talked to my professor and I was like, “Can I work for you? Can I do research? Because this is amazing and I wanna do this.” I felt it was too late for me. I had been in school for so long and I was already kind of burnt out. So I was, “I’m not going to change my major. That’s just outta the question for me right now. It costs so much money for this degree and I don’t have—I’m not just gonna waste my time and keep working all these jobs.” So I had three jobs in college. And it was like, I worked at Radio Shack, I did research for this professor, and I worked in the library, the chemistry and physics library.

Eric Cross (14:28):
I love the fact that we’ve talked about laser discs; you said Radio Shack; and we talked about the analog internet of the encyclopedia salespeople. And I know all of those things. And I’ve been through all of those things together.

Desiré Whitmore (14:43):
Just in case people don’t know how old I am. <Laugh>

Eric Cross (14:47):
For our listeners who are way younger, yeah, this is how we grew up. This is how we—these things are extinct now. There’s this element of this kind of cultural connection. I think that we experience that. It kind of it flies under the radar. People don’t really realize it until you’re in an environment that’s different from what you’re used to. And you realize that, “Oh wow. this is not what I’m used to.” And the things that I’m finding funnier, the things that I connect with, it’s not what everybody else connects with. And as a teacher, it’s the same thing, right? Like, we go in the classroom and you know, you and I are rapping about laser discs and Radio Shack and I’m trying to talk to my kids about it. And they’re like, “Yo, Cross, what is that? Are you gonna give us a history lesson? What are these things?”

Desiré Whitmore (15:35):
Yeah.

Eric Cross (15:36):
And I found myself having to stay connected to pop culture, because I teach 12- and 13-year-olds all day. And it's great for keeping things relevant for my students. But when I talk to my friends that are my peers, they're like, unless they're a teacher, they're like, "I got no idea what you're talking about."

Desiré Whitmore (15:55):
Yeah. I have a friend who's also a middle-school teacher and she's always coming to me with all this. I'm like, "What are you talking about?" She did the Glow-up Challenge, but she did the Glow-down Challenge. So she invented a new thing. She's like, "No, I couldn't do Glow Up 'cause that's too much. So I did the Glow-Down Challenge." And it's the cutest thing ever. And the students think it's amazing. And I'm like, "That's awesome. But I have no idea what the point of that is." <Laugh>

Eric Cross (16:21):
And there's this theme, too, that when we talk about teaching kids STEM, there's this soft part of it, this relational piece of it that you mentioned, of this connective aspect that in a certain way kind of even superseded the content knowledge that your teacher even had at that point, where you're going up and teaching the class. But just the fact that someone looked like you or spoke like you or connected with you in a certain way made a big difference to who you are as…well, the trajectory of where you went.

Desiré Whitmore (16:57):
Yeah.

Eric Cross (16:57):
"I like chemistry. It resonates with me." And it's something I think can get lost. And I think just to kind of a good segue, I use Amplify my classroom, and one of the reasons why is because of the representation that is in these videos. And you were part of crafting this for…was it the fifth grade?

Desiré Whitmore (17:21):
I mean, it was K–8. So I was—

Eric Cross (17:23):
OK, so you were doing the whole thing.

Desiré Whitmore (17:24):
Yeah, I was a part of the K–8 science team. My title was science curriculum specialist. But in reality I was hired to do the engineering internships, mostly. Which are middle school. And to be a sim developer. So sims K–8. I worked on several of them in both middle school and elementary. Yeah.

Eric Cross (17:47):

What was that like for you? When you were designing curriculum? 'Cause as a teacher, it's, you know, I think with teachers it's kind of…I would consider myself, if I was gonna use hip hop as a metaphor, I'm more of a DJ than an MC. Where I wanna remix things that exist, versus, I don't wanna write the lyrics in freestyle. So I don't want to go and write the curriculum completely; I wanna take something that's solid and then I want to go ahead and remix it. You are great at both. What was the process for you, being on that team, designing? How did you go about making, "OK, we're gonna create this experience for kids"?

Desiré Whitmore (18:25):
It was, it was amazing. I learned so much, so much. It was the best job I had before I came to the Exploratorium. The process was amazing, because it wasn't just me, right? It wasn't just me. It was a whole team. And each unit had its own team. So we had a scientist, which I was the scientist we had. So we had a scientist; we had a literacy specialist, because it was really important to increase science literacy so that students understand not just that science exists, but "What are the terms that are used in science and how can I speak and act a scientist? What are the things that scientists actually do in their real life?" Then we had an assessment specialist and then we had a simulation specialist. And so, on the units that I was on, sometimes I was both the sim developer and the scientist, or sometimes I was just the sim developer and I got to work alongside another scientist, which was always fun. And so it was really nice, because I was working alongside master teachers. People who had been teaching for years, and they were able to help me better understand. 'Cause I'll come in and I'll be like, "Yeah, there's a unit on light waves, let's come in and teach this unit on light waves!" <laugh> I was the sim developer and scientist on that unit, and there was another scientist working on the unit, but they were like, "Well, Desiré literally builds lasers, so I think she should be the science developer." So we kinda had two science developers on that one, which was fun. But I come in and she'll come in and she'll be like, "Yeah, I think this is where we wanna go and this is what we wanna teach." I'm like, "No way! Like, that's not accurate, right?" And so I can come in, but then I'm coming in with all this crazy lingo, right? I'm up here. But then also I have taught kids about lasers and optics and photonics my whole career. So I'm also very capable of bringing it down to where kids need it to be. What I don't know is how effective that is, right? When to do it and when not to do it. When to bring the level up; when to bring the level down. And so working alongside these other teachers and assessors really helped me to do that. And so for me it was just two years of deep learning experience. I learned—every single day at work, I learned something new. Which is something that I value and I've wanted in my career, my whole life. We made active decisions in that room. Like, "We want to interview scientists who are scientists of color or who have different abilities or who have different representations in all kinds of ways." Right? And then we also have these fake internships, or not even the internships, but just in the general units. And we actively wrote scripts for those. And we actively wrote in those scripts, like, "This is a Black woman. This is an Indian woman. This is a Jewish man in a wheelchair." Like, we specifically dictated exactly who we wanted in these videos, because we knew that representation was super-important and we knew that we wanted students to be able to connect.

Eric Cross (21:35):
Right. One of the things, I appreciate what I'm hearing a lot in that is the amount of intentionality that went into this. But even now as you're reliving it, you're still almost iterating on how could we improve it or how can we make it different or reach more people. And I think that goes towards when we're talking about including more people and inclusion. Like, it's not a binary thing. You're always modifying; you're

always iterating; you're always redesigning and improving to be more inclusive, to reach more students. Because you know, to your point, part of it is, "Yes, we wanna do this really awesome science curriculum," but the other part of it is there's more to it than just your content. And I think now more than ever…I use—we just finished the food bar unit. Metabolism. And in there there's a simulator. They always ask me when I show the videos, "Are these, are these real people? Are these real situations?" And I tell 'em, "Well, the story is real, but these are all fictional actors. But what's actually happening happens. It's real." And they get really into it. And I think one of the other things is with your simulations—especially the engineering units—there's no one right answer. And so my students who want to go, "Mr. Cross, I wanna make the best bar! Perfect 10, best taste, cheapest!" And I'm like, "All right, good luck!"

Desiré Whitmore (23:06):
Yeah. Go do that.

Eric Cross (23:09):
Casue there's something called trade-offs! It could happen! And they're like, they're trying. They get into the code. They try to open up the Inspect Element, when they feel like hackers.

Desiré Whitmore (23:17):
Yeah, they do. But these kids like, they're so smart and they're so resourceful. And I'm just thinking like, maybe that's how we challenge them more, right? Sometimes we can give them these kinds of things where it's like, "Go and create a program, 'cause that's the level you're at <laugh>. Go and create this program to do something similar that's related to the work that we're doing."

Eric Cross (23:38):
I've had some of my own students redesign—I have one student who redesigns every assessment I give him. I give the project; I give the options for the final goal; and he always chooses—if I give three options, he always chooses option four. If I choose two options, he's choosing option three. And so he'll go into Google Sheets, he'll pull all the data and then he'll construct his own kind of spreadsheet with all the probabilities of different things.

Desiré Whitmore (24:06):
You tell this kid to make a GitHub right now <laugh> so that he can get a job as soon as he's done with high school. <laugh>.

Eric Cross (24:12):
He's amazing. And we did this one project where students had to design a Netflix show to show their understanding of metabolism. And they had to do four episodes. So I gave him a template. It's not from me; it's from, I think, EdTechPicks.org or something. And it looks like the whole Netflix splash page. They took photos, did the whole deal. He created NOTflix. Everyone else did Google Slides. His Google Slides was interactive. So when you clicked on different boxes, it actually took you to the next splash page of that show. I mean, it was….

Desiré Whitmore (24:48):

That's fantastic.

Eric Cross (24:49):
It was, it was. I recorded his presentation. It was brilliant.

Desiré Whitmore (24:53):
But that's amazing. And that speaks to your strengths as a teacher and why you're an amazing teacher. Because you see the students and what they're trying to do and you work with them; you meet them where they are. Right? There are so many teachers who would just be frustrated with that student. And it'd be like, "No, these are not your options. Your option was to do what I told you to do." And there are many teachers who would do that. And I think it's really amazing when we can realize as teachers, "No, our job is not to just enforce rules on our students. I mean, that is part of the job, because that's what school was when it was created. But our job is to help students to achieve more learning in what we're trying to do. And so the fact that you are so good with this student and that you encourage him to go above and beyond when he can, I think it's so amazing.

Eric Cross (25:49):
Well, that brings me to my favorite group, organization, and the phase of your career of where you are now: The Exploratorium. And I wanted to kind of rap, talking about what you do now. Because the Exploratorium—I tell people, they go, what is that place? And maybe you can tell us what it is and then what you do. But for me, I'll just tell everybody: It's Disneyland for science teachers. And I love going there. I not only love going there because of what I receive from it professionally. Many of the PDs, I don't even call 'em PDs—just communal learning experiences, that I've had that have been led by you and Lori and, and Tammy and the rest, and everybody that's there have been incredible. And I have so much fun. Emotionally, I get excited when I go. When I'm on the plane, I'm like, "Here we go!" And then we go and we're making fudge or we're blowing darts with marshmallows across the room in the theme of Boba Fett. There's just these rad things that are going on there. And it's not like anything I've ever experienced before. So maybe we can close with talking about what the Exploratorium is, what you do there, for people who've never been and have been a part of it.

Desiré Whitmore (27:19):
I'm gonna give you what my definition of the Exploratorium is.

Eric Cross (27:21):
That's what we want.

Desiré Whitmore (27:22):
So, the actual definition is, we are a public learning laboratory. We are known as the Museum of Art, Science and Human Perception. Cool. But, like, what does that all mean? Right? And I think your description of the Disneyland for science teachers, I think that's a perfect description. 'Cause for me, I tell people like, "Oh, I wanna go to the happiest place on earth." And for me, that is the Exploratorium. And yes, I work there, and yes, it's still true for me. So the Exploratorium is this huge museum. It's an interactive science museum. And art—we have a lot of art. And it's all about learning through doing. It's not about learning science by going up to an exhibit and reading the little paper next to it. It's like, no,

you go up to an exhibit and you interact with it and you teach yourself science. The goal of the Exploratorium is really to help people understand that learning science, doing science, isn't reserved for only scientists. Doing science is something that everyone in the world should and does do. And so helping people understand that everything we do is science is kind of the point of the Exploratorium to me.

Eric Cross (28:35):
Even the building itself…one of the other cool things too is, for people that don't know, it's the size of Costco or two.

Desiré Whitmore (28:43):
Yeah. Yeah.

Eric Cross (28:44):
It's immense! And even the building itself teaches. Like, you have that whole workshop, dead-center in the middle of the floor where they're designing things. It's like inside-out. And then I remember going to the one experience where I think it was Eric who showed us that it's one of the few facilities that is actually cooled by the Bay water. And there's only a couple of those in the state that can do that. And it has a platinum rating, something wild that. So even just the building itself…everything that if they can extract every ounce of science teaching in that, it's in there. And you are in a very important program for me. And can you talk a little bit about maybe what you're doing in T.I.?

Desiré Whitmore (29:33):
So I am in the Teacher Institute. I'm a physicist in the Teacher Institute. And the Teacher Institute is a group of teachers and scientists. And our job is to basically support middle school and high school science teachers and teacher leaders in the state of California, but science teachers around the world, in their pursuit of science teaching. And by support, I mean we provide professional development. We provide other things, communities of practice, and we go and do workshops in certain places. We go to India to teach Tibetan monks and nuns science. And we go to Costa Rica to teach teachers all over the country of Costa Rica about science. And so our job is really, to help science teachers feel more secure in their science teaching and help to retain them in the field, because a good science teacher is so important in helping our students thrive. And so our job—and we take this very seriously—is to help science teachers thrive. And we are made up of PhD scientists and veteran classroom teachers. So we have on the one side teachers who have been teaching middle school or high school for years. One of my coworkers, Zeke, who I work with the most, he was a high school physics and environmental science teacher for 21 years before coming to the Exploratorium. And then me, I was never a classroom teacher. I was a professor; I was a physics professor at a community college, and I was a researcher. So my deep knowledge of physics and current knowledge of physics—or knowledge of current physics—combined with Zeke's extremely experienced pedagogy is really how we work together as a team. And it's not just Zeke, right? We've got a geologist on the team, Eric Muller. We've got Tammy, who's a middle-school bio teacher. We've got, Julie Yu, who is a chemical engineer, PhD, and also a prior middle school teacher, former middle school teacher. We've got Hilleary Osheroff, who was a PhD biologist who used to work at the American Museum of Natural History. We've got Lori Lambertson, who was a middle-school math teacher. And so, you know, we all come together to bring our experiences both in and out of the

classroom and in and out of the research lab to provide teachers with the best inquiry-driven stuff we can. And we're very—we're so equity-focused, because we believe that that's important, right? We know that the impact of our work is, I think, why most of us are here. It's why I'm here. In undergrad, my grad school, and my postdoc, I would go into classrooms. I would go into science museums and teach science to people. And I probably reached out to maybe…over that whole time, I would say a couple thousand people, right? Maybe a couple thousand people total. That's great. But over 15 years of reaching out and only reaching a couple thousand people, that's rough, right? And now I'm at the Exploratorium, and I know that if I reach one teacher, right? If I can teach one teacher…let's say you. How many students do you have in your classes a year?

Eric Cross (33:11):
Two hundred a year.

Desiré Whitmore (33:12):
You have 200 students a year that you teach. So if you teach for 10 years, that's 2000. That's 2000 students. So I have, by teaching you today, assuming that I'm actually teaching you something that's gonna be useful for you—

Eric Cross (33:29):
You do! And you are!

Desiré Whitmore (33:30):
You are going to be impacting these 2000 students over the next 10 years. And of course you're gonna be in teaching for much longer than that. But let's just say in 10 years, that payoff is so much higher, right? And you're one teacher. But I have 30 of you in my workshop! And so if all of these 30 teachers each teach 2000 kids over the next 10 years, then I'm actually doing something. I'm actually changing the way that students see science, through changing the way that you see science. Right? And so I take my job very seriously, as we all do. Like, we're so invested in our teachers. And it's not that we don't care about students, 'cause we absolutely do. But we understand that without good teachers, students aren't going to be able to thrive, as often as they would otherwise. I was able to do it somehow. But I'm one. There are so many other kids who could have gone into science who didn't because they felt they never connected to it. So our job is to try to help teachers connect to it. And an important part of that is allowing you all to experience science as a learner. We want you to play and have joyful experiences. We want you to enjoy science and to try to think about it from the perspective of your students. Walk in their shoes. So that when you then go back to your classroom, you are able to think about like, "Oh yeah, you know, my students totally asked the same question that I asked, or that another teacher asked in the workshop because they had the foresight to think about that's what my students would ask." Right?

Eric Cross (35:02):
Well, I think it's really effective to create empathy for the learner. Because I find myself in that position. I don't know if some kind of memory displacement field happens to me when I sit in those workshops, but Hillary will ask a question that I know the answer to and I'm like, "I don't want to answer the question. I don't—I might be wrong." And I teach the subject! And I embody what it's like to be a student. And when I leave, I might have to go back and reference exactly what the lesson was, but I

remember how I felt when I didn't know. And very rarely as teachers do we get put in positions like that. And so it helps me be in the position of my students emotionally, of what it's like. Even even the intentionality of how do you ask questions and not showing an affect on your face when somebody says the right answer or the wrong answer.

Desiré Whitmore (35:55):
Well, I'm still learning that. I'm not great at it. Julie is the mast.

Eric Cross (35:59):
Julie's got it nailed.

Desiré Whitmore (36:00):
I'm still trying to learn from her. She's amazing. And I really would like to get there one day. But I'm still not there. I'll be like, "Oh! Oh! Well, that's…". I have a terrible poker face. So I'll be like, "Oh yeah, but you think that? Maybe…". That's a piece of it that's really important, right? It's this not giving away the answer, even when you have the right answer. Allowing people to ask the questions and explore and become invested in the problem, before giving away the answer. That's something that I learn here at the Exploratorium. And like I said, I learn every day. And it's something that I think is so important for us as teachers to learn and try to implement. Because oftentimes you'll come and you'll have students who are like, "I'm too stupid. I don't know the answer." And then somebody else will say the answer, and then the student is like, "Yeah, I was right. I'm too stupid.'" But it's like no! But if you have that student actually think about it, then the student—once they do hear the right answer—they might be like, "Oh yeah, that would make sense." Instead of "I'm stupid." It's like, no, this is, "I explored this and I figured it out on my own."

Eric Cross (37:08):
Things keep coming back to how this experience and the process of them learning science even outweighs the content of it. 'Cause the content is almost easier to share, it's easier to get, you can look it up really quickly. But in your story and in many other people's stories, the exposure, the experience, how they're going through that process—I know that's something that I've learned a lot in just watching. Not teaching science, but actually the science of teaching. Sitting in the workshops and watching how we're treated as students, how you interact with us, and then being able to take that back to the classroom. And just to add onto the value that it's created, I think one thing that it's also done is given us community. And in addition to being able to impact students, it's also been able to build resilience in teachers. Because we as teachers can feel very isolated. And especially now when things are incredibly difficult, and every teacher's experiencing Covid and shutdowns and low staffing across the country in different ways, when you don't feel you have community or people that you can connect with, it just makes everything feel exponentially harder. And you've done a great job at being able to build community with us in our community of practice. The Exploratorium has been able to do that. And it's something that I'm super-grateful for probably more than anything else is that through these last two years, being able to connect really made me feel like, "OK, we're gonna be able to do this." And it's not just about Cross or my other teacher in eighth grade or my sixth grade teacher who's doing this. That message, I think, is really, really important. I wanna ask this: Was there a teacher or an experience that impacted you or inspired you throughout your educational career? You know, kindergarten all the way to

college? Was there a moment or a person or anything that that really stuck with you, that you felt maybe influenced who you became? Met you where you were at? I know you mentioned your chemistry teacher at that point, but is there anyone else, or was it that person that was really the person who sticks out for you?

Desiré Whitmore (39:21):
There actually have been a few. Of course, the first is my great-grandmother, Claudia Pairs. But I think in the fourth and fifth grade I had the same teacher. She stayed with us going from fourth to fifth grade. And fourth grade was a new school for me. New town. I was the only Black child in the school, me and my sister. And my teacher recognized that I had no real help at home, I guess? And she really kind of…she saw that I was really smart. She would give me extra assignments when she could tell I was bored. It meant that someone outside of my house cared about me in a way that I didn't feel cared about at home. Her name is Ms. Comet. Mrs. Comet.

Eric Cross (40:11):
Like…comet?

Desiré Whitmore (40:13):

Yeah. Mrs. Fran Comet. And I've tried looking her up as an adult and I can't find her. But I work with so many teachers, and I know how hard teaching is and how degrading it can be…or demoralizing, I guess, to not be appreciated. And so I know what it feels to me when a student has reached out and shown me like, "Hey, I'm now in dental school," or "I'm now getting a PhD in science," and I'm just like….

Eric Cross (40:40):
I got a message this morning on Instagram from a student. And none of my students use their real names in their Instagram handles. So I got a message from Moonshine. <Laugh> And I was a seventh grade teacher. And through deduction, deductive reasoning, I figured out who it was. This person's now in college and they responded in that…you know, you get one of those every once in a while. And I feel it just fills your tank. It's just so important that we—it's funny because, kind of to your point, we don't realize who or how we're making impacts on people. And in what ways. We just know that we are. And I tell other teachers, I said, "You have one of the few professions where you fall asleep worrying about other people's kids." And it's the words that we speak, the things that we do, people are always watching. I know, no pressure, right!? Hopefully, someone listening can find Ms. Comet.

Desiré Whitmore (41:37):
Ms. Comet. Teacher at Buena Vista Elementary School back in the '80s. But your talk about this impact, it reminds me of the thing I wanted to say, but I didn't. But I'm gonna tell you right now. I mentioned how science was not a priority when I went to school, in my hometown. That's Lancaster, California. But recently I got a phone call from a family friend and she was so excited. And she called me to tell me that her daughter was super-excited when she picked her up from school. Because I was in her classroom. She said, "Auntie Desiré was in my class today! And she works on lasers! And she does spectroscopy! And I wanna learn about spectroscopy now. So can we call Auntie Desiré?" And I was like, "Wait, what?" My friend was kind of confused. She's like, "Desiré didn't tell me she was in town." She had no idea why her

daughter was saying I was in her classroom, 'cause I was not physically there. And then I had to put the pieces together and I was like, "Oh my God, your daughter's in eighth grade already." It made me feel really old, 'cause I know this girl from a little baby. But I was like, "Oh my God, that's the eighth grade unit on light waves for Amplify that I wrote, and I'm featured as the scientist." Because we have real scientists in the units. And they featured me in that one, in my laser lab. And so this little girl who knows me really well, who lives in my hometown, is seeing representation in science. She doesn't necessarily know I'm a scientist. She knows that—I don't know what she knows about me. She just knows I'm Auntie Desiré and, you know, I like gumbo at Christmas. That's what she knows about me. <Laugh>. And so she comes back and she's so excited 'cause now she knows so much more about me. And she knows that if I can do it and I came from where she's at, she can do it too. And she was super-excited. And I was just…it brought me to tears. I was just crying in the car. I was driving <laugh> at the time and I was like, "This is amazing. Work that I did is teaching you and all of your friends in this tiny little town that you live in. And that to me is so important because now this little girl knows that, like, she knows me as just a normal human right. Who likes Star Trek and Star Wars and The Owl House. And now she's over here like, "Oh my gosh, this normal human wrote the science curriculum that I'm learning from." Which I think is just so fantastic. And it really brought home for me kind of the importance of my work and why I'm doing what I'm doing. And that's pretty awesome. And I get messages from Instagram, you know, from teachers who are like, "Hey, did you work on this? 'Cause you were featured in the video, but did you write this light waves unit?" And I'm like, "Yeah." And they'll tell me, "I have students, this is their favorite unit. I've gotten notes from students saying, 'This was my favorite unit in all of middle school.'" And I'm like, "Ohhhhhh!"<Laugh>

Eric Cross (44:33):
That story just gives me chills. Because I just can imagine how surreal that must feel. And you're directly making that impact on those kids. And I'm glad that you shared that story so that everyone can hear it, because it's a powerful story and I lived—I feel I was living it through you, just now, as you were discussing it.

Desiré Whitmore (44:54):
Yeah.

Eric Cross (44:54):
And I feel that way in the classroom to a small degree, because I get to have—when my students create posters of scientists that we don't typically see, I've got you on my list of scientists, and I'm they're like…And I'm like, "I can call her!" Like, "Mr. Cross, you KNOW her?!" I'm like, "Yeah, she's a friend of mine! I was talking to her the other day!" And they're like, "Whoa. She works with lasers?!"

Desiré Whitmore (45:17):
<Whispers> I do.

Eric Cross (45:18):
Desiré. I've held you for so long and—

Desiré Whitmore (45:23):

Yes, I'm sorry! I told you, I talk so much! I'm a teacher!

Eric Cross (45:26):

No! No, no, no, no. It was great! I wanna honor your time. Can you tell everybody where they can find out more about you again?

Desiré Whitmore (45:33):
So first off, you can find me on Twitter at Darth Science, D A R T H S C I E N C E, and you can also find me at Instagram at Dr. Laser Chick: D R dot laser chick. Even though I don't post on Instagram that much. I also have a website, which is laser chick dot net. I'm still working on it. It's not the best website yet. But, you know, it'll, it'll be better in the future.

Eric Cross (46:02):
Would you be willing to come back later on in the year and do a part two?

Desiré Whitmore (46:07):
Oh, for sure. Yeah. So I can actually finish telling you the story of how I got into physics! 'Cause I totally didn't. 'Cause I'm all over the place.

Eric Cross (46:15):
So, everybody, cliffhanger! Next time she comes back, she'll continue to tell us the story. Desiré, thank you so much.