

## Q&A with Ainissa Ramirez

Interviewed by Joelle Seligson

Whether it's the world's biggest wardrobe malfunction or *MacGyver* meets *Survivor*, Ainissa Ramirez knows that generating interest in science requires a hook. A professor at Yale University, Ramirez prefers the title "science evangelist"—in her words, a person who "takes the call" to ignite curiosity in kids of all ages. She spoke with *Dimensions* about the importance of science, technology, engineering, and math (STEM) education—the topic of her TED Talk last year ([blog.ted.com/2012/03/02/a-sputnik-moment-for-stemeducation-ainissa-ramirez-at-ted2012/](http://blog.ted.com/2012/03/02/a-sputnik-moment-for-stemeducation-ainissa-ramirez-at-ted2012/))—and how to put science in unexpected places.

### **Tell me: What is a science evangelist?**

A science evangelist is a person, like myself, who's interested in getting kids to be excited about science. I love teaching; I've done it at the university for over 10 years and I also had a program for kids called Science Saturdays, which was a lecture series for kids, sort of like TED for kids. And I didn't know it at the time, but I love getting younger children excited about science. I liked making demonstrations, bringing in exciting speakers, and just getting their exuberance about the topic and igniting their curiosity. So that's what a science evangelist is: a person who takes the call to ignite [in] kids of all ages their curiosity of science.

### **You mentioned Science Saturdays and I know you have that and also have your *Material Marvels* program. Could you tell me a little bit more about both of those?**

Well, Science Saturdays is a lecture series for kids that started in 2004. I did it when I was writing a grant as part of my broader impact criteria for NSF [the U.S. National Science Foundation] and I pretty much said I'm going to open up the doors for Yale, bring in some scientists that I know can engage younger audiences, so I wanted [them] to be excellent communicators with science, and have them for a couple Saturdays in October and a couple Saturdays in April, both the fall and spring semesters. I opened up the doors and I thought maybe I'd get 50 people, and the first lecture had 100 people. And the lectures averaged about 175, and when it's dinosaurs, it's 300 and standing room only. So I realized that I had hit something. There was definitely a need, and I had, as I said, children of all ages—so I had targeted the lectures for middle schoolers, 7th grade and up, but I had all ages. I had grandparents that came with their grandchildren; I had grandparents who came by themselves. Everyone who wanted science could come, there wasn't any registration fee or any sign ups; they just showed up. And you experienced what we call the Science Saturdays experience, which was the 3D of Doughnuts,

Demonstrations, and Dynamic lectures. The doughnuts were pretty obvious, they had a draw—

**—and then dinosaurs.**

And dinosaurs, yes, the 4D, you should be in marketing. But the three Ds were constant so we just had the three Ds. We had demonstrations that were staffed by undergraduate students, so a lot of them I made, a lot of them I purchased, and then once again, the dynamic lectures. We brought in people that could communicate science to the general public. We really did our homework on that. We vetted people to make sure that they were able to communicate to the general public because bad science lectures aren't necessary. We don't need that anymore. We don't need any more of them. So that was the 3D experience.

And I did that, as I said, from 2004 to about 2011, and that's a long time, but I also wanted to have a greater draw. I wanted to be able to reach more people, so I started this video series called *Material Marvels*, which is material science in three minutes, and I got to use a lot of the demonstrations from Science Saturdays, but create a small story or small lesson so that the general public that's watching these videos could enjoy them as well. And they have grown significantly—it's been actually a lot of fun to develop them as well because I personally grew as a presenter and as a teacher, because I learned that you really have to put the demonstration at the top, you really have to hook and rehook an audience, even in three minutes. And it was also the best job in the world because I got to buy all these science toys, and keep them. So that was *Material Marvels*—I did about seven of those, that was in 2011.

And I wanted to do a broader scale of topics besides material science, so I started a new series called *Science Xplained*, and with that I was able to do videos that were on football helmets, Napoleon's buttons, which is the story about the buttons—this is a myth now—buttons are supposedly turned to dust during Napoleon's campaign into Russia because tin, which is the main component of the buttons, disintegrates at very, very low temperatures. So the myth is that the army experienced the world's worst wardrobe malfunction. And the anniversary of Napoleon's campaign to Russia—I thought that this was a great time to talk about tin because it's not only important as a fun story, but tin is very important to our lives because it's a major component of solder, which is in all electronics. So I try to hook and put things in a context, but also in hook them in ways that are kind of interesting and fun.

**Why do you think it's important right now to hook the general public, and I think especially kids for you, into learning about science and promoting STEM education in general?**

That's a very good question. I've been thinking hard about that. I'm writing a book for TED Books called [*Save Our Science: How to Inspire a New Generation of Scientists*] on that topic. And I've been doing this speech about the importance of STEM education and it has—it depends on who you're talking to. If you're talking to a politician, [you say], OK, this is great because you're going to build a workforce, and if you're talking to parents, you say, well, your kid's always going to have a job, and if you talk to kids, you just kind of say, well, you're going to get to do all these fun things. But I think it's deeper than that. I think it's really, we want to make the next generation the builders of the future and not just the consumers of the future. And currently the way we're teaching, because we're so beholden to tests, won't allow children to be the builders. They'll be watching what's going on but they won't be able to participate. And STEM I think is an excellent way—and some folks will say STEAM adding A [for arts], I'm totally fine with that as well—I think what we're really trying to do is we're trying to get kids to be engaged and to fuel their curiosity. And as a scientist the best pathway that I know is STEM. That doesn't mean it's the only answer. But that's my answer, because I think that those skills—not necessarily information, you can always look on the web to grab whatever information you need. Our brains are changing, we don't need to store any information; we know where to get it. But the skills that you need in STEM, of being curious, being patient, relying on your imagination, and also making friends with failure—trial and error is very important for science—those are things that we don't get to exercise when we're beholden to taking tests, but are actually more important to being successful. And so I'm pushing STEM because at least those muscles get exercised in those opportunities.

**How can readers of *Dimensions*—which would be science center and museum professionals—help in this charge?**

Well, I think they have an *extremely* important role, because the school system is not going to change overnight. We're kind of stuck in this rut. So I really believe that it's science or STEM outside of the schools—I call it SOS, STEM Outside Schools—that's going to keep children engaged so that they will hang in there in the pipeline until they get to a place where they can actually do it in a way that's meaningful. So museums have a huge role in keeping children engaged and inspired even though they may not be experiencing inspired STEM in the classroom. I really think that the space outside the schools is highly, highly critical. So museums—they've both had a difficult position because it's hard to teach science in an environment that's kind of anti-science or anti-intellectual, but if they can do all they can to just bolster their efforts and be even more committed—what they're doing is so important that I can't be emphatic enough, especially in this space where things that are needed to keep science going are going away. Funding is

decreasing for the National Science Foundation, the space program is hobbling along—these are all things that motivated us and kept us going in the past, and we're losing them. We're completely distracted. We have reality TV. Nobody really thinks about science very much, so we need to keep that in the conversation, and museums and science centers can keep science in the conversation.

**I read that it was actually a television show, a PBS [Public Broadcasting Service] show, that first inspired you to follow a scientific career path. And given that the airways are plugged with so much reality TV, as you mentioned, what do you think is around today that could inspire young people to take a similar tack?**

That's a very good question. I'm the product of *3-2-1 Contact* and I feel very strongly about television that's engaging, particularly with science, because there weren't any scientists in my neighborhood. I lived a few blocks from the projects, and the joke that I like to say is that there weren't any scientists in my neighborhood, and if there were, they were up to no good. They were doing chemistry. So it was very important for me to see science, and PBS, *3-2-1 Contact*, shot this flare in the air that said science and I saw it and I said, "Hey that's interesting, I'm going to follow that." Now what can we do now? Well, there's great shows—I mean, *Mythbusters*, we have a science channel, we have Discovery Channel—those things didn't exist when I was a kid. We had seven channels that shut off at 11:30. That's not the case now. But I think we need to work harder to promote the shows that are science related. So one of the shows that I would love to do, I don't know if you recall but there's a scene in *Apollo 13* where the CO<sub>2</sub> scrubbers were failing, and they had a few items and they had to make a CO<sub>2</sub> scrubber. I thought that was the best scene because they had like a sock and a bungee cord and duct tape and some plastic, and they said, "OK, you need to make this with these items." That's the engineering process, and that movie captures the tension that you can have. We need a show like that. Get a couple of people, two teams, that don't know a lot about science, they each get a box and they have to build something based on what's in that box to win some points. I call it—it's *MacGyver* meets *Survivor*. We need something like that. If we're in the reality TV phase of television, then let's put science in reality TV. *Mythbusters* is great, but TV is actually looking for the next *Mythbusters*. I think this show, which I call *Duct Tape*, is one thing that we can do. So yeah, I just think that we need to keep making science compelling.

I also think that we need to lather science everywhere. It's not just on television. I would implore that science centers think about putting some of their exhibits in places that they usually don't put them. Put them in McDonald's. Put them in the mall. Put them in a van and drive to a school's parking lot. I think the age of them

coming to us has to end. It's just too critical to be in that state. We have to go out—that's why I'm an evangelist, I have to go out, and I think the museums should go out to places that they usually don't go. Think of places that people are stuck and cannot go for a while—waiting rooms for dentists, the Department of Motor Vehicles, barbershops, and put some explainers in there. Put a whole bunch of explainers on a Saturday morning at a barbershop—you're going to hit kids that you've never hit before, because they just never thought about going to a science museum. I think that's what—we need to get past the preaching to the choir, which is preaching to the people that usually come to the museums and have access—we need to hit the folks that don't have access. So that's what I would do, I would engage people in the way that we have in the past, which means television, maybe update the shows so that it has a reality component, and then I would think about putting the tentacles out further. If we really, really want to get new eyeballs to see science then we have to go to where they are.

**Really interesting ideas. Do you have anything coming up for 2013 that you'd like to share, project-wise?**

Oh, yeah. I am working really hard. So project-wise, *[Save Our Science: How to Inspire a New Generation of Scientists]* by TED Books should be out by January [2013], and the thing that's taking up a significant amount of my time is this project with Random House, it's called *Newton's Football*. I'm writing it with *New York Times* bestselling author Allen St. John, and it's conversations about the game of American football, which I know very little about... but it's conversations between a scientist and a sportswriter about the game. And there's a lot of different science at work, and it's beyond momentum, and this guy hits this, and that's a vector—there's a book out there that does that already. We're not talking about that. We're talking about chaos theory at work when you drop the football, and we're talking about the evolution of the game, sort of like an evolutionary biologist would look at the evolution of life. The game evolved as well. So for football fans, it's a new way to look at the game, and for people who never thought about football—except, for myself, where I think about where I'm going to be during the Super Bowl so I can shop without lines—for those people, so that they can look at the game from a new vantage using science as a lens. So we're really excited about that. And I'm continuing in my evangelism, I give talks to different museums and schools, that's continuing to go, and that's what I know so far for the year. I do it one step at a time.

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