



THE CHANGEMAKERS ISSUE

Nicole Kelp, Ashley Anderson, and Melissa Burt are CSU professors, scientists, and parents. Collectively, they argue that scientists have a responsibility to tackle the climate crisis and misinformation through good science communications. They seek to humanize science and connect with new audiences through inclusivity, interconnectedness, and shared values. They are Changemakers.

Changemakers understand that our species is facing many crises. These crises threaten human and animal life, public health, and the environment. We will not solve them alone. We will solve them together with courage, collaboration, and action. We dedicate this issue to all of the Changemakers who are pioneering a better future.

RAISE YOUR VOICE

Three pioneers in science communication tackle climate change, misinformation, and social media

Reported by Rhea Maze

Photos by Kellen Bakovich

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Rhea Maze: With the recent collision of multiple crises, including the pandemic, extreme weather events, social injustice, and misinformation – is science communication having a moment?

Nicole Kelp: I would say yes on two levels. First, I think people are especially aware of the pitfalls that have happened in science communication during the pandemic as well as the rise of misinformation – it has blown up in our faces, and we cannot avoid it. Second, the push for social justice in the wake of George Floyd’s murder and other events also became something we cannot ignore.

Melissa Burt: It depends on the audience. Scientists can talk to one another in certain ways, but science communication directed at the public is different. I have learned that the best way to effectively communicate about the work I’m doing is to share information in a way that is relatable and understandable to whomever I’m talking with. I think because of the recent communication pitfalls, it’s become more clear that misinformation leads to inaction.

Ashley Anderson: I agree. The pandemic has put this important science topic front and center in everybody’s life in the entire world so, in that sense, there’s a lot more awareness

and attention to science communication, and there’s a lot more concern when science isn’t communicated well and when misinformation arises. There has been more discussion on these issues and more people asking: How can we communicate well about science and what are the principles behind that? How can we better understand how people respond to efforts to communicate about things such as the pandemic and climate change? People everywhere are having to face these issues.

MB: And because it’s in the forefront, every single word matters.

TRUST V. MISINFORMATION

RM: What are some of the most important science communication lessons you think we’ve learned as a society over the past two years, and how can we use them to fight misinformation going forward?

MB: Spewing data and facts alone will not change people’s perceptions and oftentimes deters them. We need to meet our audiences where they are and figure out a way to talk about issues in a way that matters to them and addresses their values so that they understand the urgency.

AA: I agree. The way communication flows right now and how social media platforms prey on our psychological tendencies allows confusing messages to take up prominent space. It’s an uphill battle because of the way those platforms are designed, and that, combined with the heightened state of uncertainty we’re facing, creates a knowledge

gap and a greater need for information that’s accessible and appealing. All of that combined exacerbates the problem, which makes it very challenging to combat misinformation.

NK: I agree with both of you. As Melissa said, we can’t just throw data at people. As scientists, the language we speak is data and when you make a statement, you have to back it up with data. But that’s not everyone’s language and if someone is fearful or distrusting, we can’t meet that emotion by throwing data at it; we need to meet that emotion with humanity. I’m passionate about training STEM students to develop that humanity. That’s not been a big focus of training in STEM majors, but it needs to be because we can’t just be talking robots that spew data. If you don’t have humanity and can’t build trust and understand where people are coming from emotionally and connect with them on that level, you’re going to create a disconnect and contribute to any mistrust they might feel. We do not yet have all of the solutions for how to do this, but it needs to happen, and the more we can implement conversations about social justice and humanity into our science courses, the better.

SCIENCE ON SOCIAL

RM: Do we need more scientist influencers on social media?

MB: Social media can be problematic because people can just pick and choose headlines without truly understanding or even reading about issues. It’s similar to how graduate students have to learn to not just read the abstract but to understand what’s happening in

Ashley Anderson, Nicole Kelp, and Melissa Burt are professors and parents. They are motivated by the climate crisis and misinformation to humanize scientists and connect with new communities.

the whole paper. If you just read a headline, you're not getting the full message.

NK: I do think there are some really good science communicators out there like Raven Baxter, aka 'Raven the Science Maven,' Hank Green, and Emily Calandrelli, aka 'the Space Gal,' for example. There are people who identify with that space and have become science influencers and many of them have scientific training in various fields; but I don't think we can all become influencers. I use Twitter to connect with other colleagues about medical education and science communication, but I'm not an influencer.

Jennifer Garner will do live interviews with pediatricians about COVID-19 vaccines where she engages them in long, authentic conversations through her social media platforms that have a lot of reach.

NK: Or the example of Anthony Fauci teaming up with pop star Olivia Rodrigo to help convince teenagers to get vaccinated. It shows how one person can't be everything. Maybe you have the reach or maybe you have the scientific training, but if you're going to communicate well you need good partners. That is a



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AA: I think using social media can be effective in harnessing a knowledge community, like how Nicole uses it to reach people in her field. And data shows she has more impact because she does that – there's evidence that scientists have much more impact if they're using social media to promote and talk about their work within specific knowledge communities. Social media is good at connecting like-minded people. So, if an influencer has a following for being popular in a specific area, they might influence their followers on other topics such as vaccine adoption. That's a proactive strategy where authenticity really matters. For example, the actress

powerful lesson in science communication as it is by nature interdisciplinary, and you need many different skill sets to make it work. No one person can be the ultimate science communicator but good partnerships can be really effective.

SCIENCE + MOTHERHOOD

RM: All four of us are moms, and Melissa is a founding member of Science Moms, a nonpartisan group of climate scientists and mothers working to advance climate

change solutions with the goal of giving kids a better future. Can you tell us more about the organization and what excites you about being part of it?

MB: I think there's a misconception of who scientists are, who they can be, what they may look like, and what they do. Science Moms humanizes scientists as people. We are scientists, and we are also moms. Our goal is to connect with other moms and share information and resources with them to help them better understand climate change, the urgency of the issue, and the lasting impact that it will have on our children's futures. We provide them with resources to be able to talk about the issue and take actionable steps.

NK: I like what you're saying about having multiple identities; you are a scientist, a mom, and obviously many other things that are important to you. Historically, being a scientist meant being a scientist and that's it – just fit in and keep your head down. Fortunately, this is starting to change, and more work is being done to push for inclusion as well as to allow ourselves to have different identities, perspectives, and experiences so we can more effectively and creatively solve problems and better connect with people.

MB: Yes, and something that is really important to me more broadly, but also in my work with Science Moms, is connecting with other Black women who have kids. I conducted a panel recently, and a woman sent me an email afterward saying that she had no idea climate change was impacting her community. We know about the disproportionate impacts of climate change on communities of color and under-resourced communities, and sometimes it's all about the messenger – not only that they are credible and trustworthy but also that they are relatable.

AA: The Science Moms campaign is a great example of knowing your audience. I love that it reaches and resonates with a core identity for its audience. It effectively tells the stories of the scientists involved and what motivates them to

do research – humanizing scientists builds trust.

MB: One of the first questions I always get about Science Moms is, 'what about the dads?' It goes back to our target audience. Yes, dads can also do something about climate change, but our core audience for this campaign is moms. It is very targeted, which is why I think it has really worked to get other moms to see the importance of the issue. And I have heard from others who have noticed the campaign because it's a different kind of climate change message – it's personal. We're sharing the 'why' behind this work, and that is to build a better future for our children.

RM: How do we protect children from misinformation that makes threats like pandemics and climate change even more dangerous?

MB: I try hard to help cut through the noise and the misinformation that's out there by sharing the main components of why climate change should matter to people. Oftentimes, things become politicized in a way that's not necessary. It doesn't matter what side of any aisle you may be on, it's important to stick to the main point that this is about our children's futures.

AA: I think building digital literacy is important and that includes gaining awareness of these issues and of the foundational principles that go into digital literacy. My kids range in age from 3 to 13, so what the 13-year-old is dealing with is completely different from what my 3-year-old is going to be dealing with when she's his age. We need to identify digital literacy foundations and principles that will help guide us through these rapidly changing times, starting with understanding the dynamics of the current information environment.

NK: It's important to help people of all ages understand how science works. COVID-19 put the scientific process in everyone's face and people were confused by changing guidelines when, for the most part, it was all driven by new data. Science changes its consensus based on

data and that is a normal process to scientists. But to some people, that uncertainty and the way the scientific process played out was really confusing. So we need to help people understand that there is inherent uncertainty in science and that doesn't mean the science is bad, it means the process is working and that's to be expected. And it doesn't mean we can't trust science or scientists. That is something simple enough to be instilled in kids as young as our 3-year-olds.

MB: No matter someone's age, there's always



teamed up to create a new course focused on understanding and addressing the spread of scientific misinformation that will prioritize empowering and connecting communities. How is that coming together, and what are you most excited about?

AA: Right now, we're laying the groundwork and connecting with local leaders in different sectors such as public health, education, business, technology, and faith-based communities to better understand how they're addressing pandemic information. We're collecting data on how they see misinformation happening in their communities, how they've been responding to it, what has been effective

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a way to introduce them to ideas of science and help them in their own exploration and understanding of it. While I might not talk to my 5-year-old about the specifics of climate change yet, I can teach her to have an appreciation of the world around us and the natural components of the Earth when we're taking a walk. At every level, there's a way we can engage in these conversations.

ELEVATING NEW VOICES

RM: Ashley and Nicole, you recently

for them, and what challenges and barriers they've faced to build out cases that can be used in the classroom. We're focusing on the pandemic at this point, but we think this model could apply to a range of science issues. At this time next year, we'd love to see scientists and CSU students in the classroom together with some of these community members. We'll be inviting them all to participate in the class together to think about how to identify misinformation, prevent it from happening, and best respond to it when it pops up.

NK: I am so excited about it because it encompasses all these things we're talking

about, such as interdisciplinary partnerships, humanity, and relationships – we’re trying to put all of that together. It’s a grassroots effort to bring together scientists, communicators, and community members to make science communication more effective and powerful by focusing on relationships.

RM: How can we bring together and elevate more voices in science? What will it take to make sure there is a place for everyone at the table and for real change to happen?

MB: While it’s important to bring more voices together, we need to ensure that those voices are actually heard, valued, and supported. We hear all the time that

NK: Yes, elevate them even more than make space.

MB: Yes, elevate and continue to amplify those voices.

RM: What are some ways those ideas can be put in action?

MB: It takes accountability.

AA: One way to build accountability within the science community is to formalize it by building



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we need to bring voices to the table, but many voices can be at the table and they can still be spoken over or talked down to. So, we need to ensure that we have respect, value, and trust components in place so that people feel like they have an accepted and welcome voice at the table.

NK: I agree, it’s not enough for diverse voices to just be at the table – the voices that have been traditionally heard from most often in science need to make space for different voices, and that is an active practice that we all must do.

AA: And elevate those voices.

it into institutional processes such as the tenure and promotion process, or the review system for accepting new research when running a conference, or in requiring panels that address these topics and include diverse voices.

NK: I love that idea of panels and ensuring that they aren’t representing the same identities over and over. It’s accountability, it’s formalizing, and it’s asking: What are you assessing? What are your metrics? And what are you listening to different people about? And then not limiting what those diverse voices can contribute.

THE NEXT GENERATION

RM: What fuels your passion for science and science communication, and what are your hopes for the future of both?

AA: I’ve always been intrigued and interested in understanding how we communicate about complex topics in a complex world. The pandemic is a good example of what can go wrong in communication, and figuring out how to involve a range of perspectives to more effectively communicate about complex topics will remain increasingly important.

NK: There are many things that fuel my passion for science and science communication, such as human health and social justice. But why I care so much about science communication in particular goes back to that idea of humanity in science – which wasn’t part of how I was originally trained as a scientist. I wasn’t taught that to be a scientist you also need to be a human; it just wasn’t elevated in that way, so I want different for the next generation of scientists. I think that being a good scientist is more than being good in the lab; it means being good at connecting with others, being empathetic, and elevating diverse voices. I didn’t receive that message in school and had to learn it on my own, and I want the next generation to get it sooner than I did.

MB: I echo everything that Nicole just said. And when it comes to climate change specifically, what gives me hope is my daughter. I continue to do what I do so that I can give her a life that she can truly thrive in, on a planet she can truly enjoy. In the work that all three of us are doing, we are helping to train the next generation to be more diverse in their disciplines, experiences, and skills – so that they can become more well-rounded scientists and people who understand the complexities of the world around us. ■

Loyal

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