CAMBRIDGE
UNIVERSITY PRESS

POLICY DIALOGUE

Policy Dialogue: Teaching Environmentalism on a Warming Planet

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Abstract

As the world reckons with the existential threat posed by climate change, the US remains deeply divided about the need for action. The solution to this problem, many have argued, begins with teaching environmentalism in primary and secondary schools and fostering receptivity to environmental issues and environmental science among the next generation. This strategy, of course, comes with its own set of challenges. Where does climate change fit in the school curriculum? What can teachers do in their classrooms to mitigate the influence of partisan politics? How can an abstract global phenomenon be made real at the local level? If K-12 education has a role to play in the broader project of environmental conservation, such questions need to be answered.

For this Policy Dialogue, the *HEQ* editors asked Zeke Baker and Hunter Gehlbach to explore the challenges and opportunities inherent in educating the next generation about climate change, drawing on analogues from the past and scholarship from the present to help us better understand the future. Gehlbach is a professor and vice dean at the Johns Hopkins University School of Education. Thanks to a mid-career fellowship from the Spencer Foundation, much of his research focus has shifted toward investigating how social psychological approaches might improve environmental education. Baker is an assistant professor of sociology at Sonoma State University. His research explores the development and use of climate science, especially insofar as climate knowledge is embedded in social relationships of power.

HEQ Policy Dialogues are, by design, intended to promote an informal, free exchange of ideas between scholars. At the end of the exchange, we offer references for readers who wish to follow up on sources relevant to the discussion.

Keywords: Climate change; environmental education; misinformation; attitudes; behavior change; motivation

Hunter Gehlbach: I think teaching about environmental sustainability within a traditional school setting offers a new set of challenges that we don't typically see in most traditional subject areas. One of the big challenges and opportunities embedded within environmental education is that there is a major attitudinal component to it. If you compare it to something like algebra, there are definitely some similarities: kids

have to learn facts, they have to understand concepts. But I don't think there are a lot of algebra teachers who walk into the classroom, teach the quadratic formula, and have students who exclaim, "I don't believe you! I don't think the quadratic formula exists. It's not a real thing; it's fake news."

As another intriguing outcome, you've got a tension between emotion regulation and motivation. If I, as an AP Environmental Science teacher, give you all of the cold hard facts about climate change, it could be paralyzing to you. As a student, trying to cope with the existential crisis that humanity has created is brutal. As a teacher, I've got to walk a very delicate line between transparently educating students about that reality and then actually motivating students to take some action. In an algebra class, no one expects students to walk out and behave differently just because they learned the quadratic formula. We're pretty happy if they learn this stuff on Monday and can spit it back to us on a test on Friday. If they can generalize and apply that knowledge to a new problem the following week, we're ecstatic. But at the end of the day, if I don't understand math, the world's not going to end. By contrast, if students do a comparably good job of understanding environmental content, a big conclusion they might come to in an environmental science class is that we're heading toward a major mass extinction. Thus, students' motivation to learn content and to change their behaviors is closely tied to their ability to regulate their emotions about the content—something typically not seen to the same extent in other content areas.

Then there's a social piece; no one individual is going to do anything that has any real impact on climate all by themselves. It's a huge collective action problem. And finally, there's a real diversity, equity, and inclusion angle in the sense of who gets exposure to environmental education. I think—and I'm speculating here—that you'll probably find AP environmental science getting taught at schools which are disproportionately on the coasts and probably in wealthier, more suburban schools. In short, I think that as a subject area, environmental education is really different than a lot of our more traditional subjects.

Zeke, one question I have for you is: Are there any historical analogues to this kind of an educational problem where we are trying to teach kids much more than just content knowledge and understanding? I also imagine that if we start teaching public health more, that's going to have similar real-world consequences. It's gotten politicized. But I feel like with traditional subject areas, this set of really messy, hard, real-world problems with so many different types of educational outcomes has not traditionally existed.

Zeke Baker: I'm reminded of the history of American Indian boarding schools. Although not an "environmental" or "science" issue per se, we have here a clear example of a large-scale social institution, namely colonialism, that most Americans have failed to learn about and therefore failed to reckon with. But it is also an issue that has a wide array of important outcomes and dimensions beyond traditional learning outcomes. This is a historical education issue, insofar as the boarding schools were nominally "educational" facilities. Likewise, in educational settings with non-Native students, instruction about boarding schools and their purposes has changed over time—say, in high school social science textbooks and state educational standards. Nevertheless, it has consistently failed to recognize the role of boarding schools within a framework of cultural genocide. Looking back,

educators and educational policymakers have had many decades to reconsider how students learn about and engage with the history of Native American struggles, including over Indian boarding schools. And we are largely uneducated about this; it is nigh impossible to imagine our society widely embracing Indigenous sovereignty, revisiting treaty rights, and considering reparations.

In what sense is this example applicable? First, we have to recognize that the history of environmental education is marked by an overwhelming inability to foster ecologically minded citizens. As with formal education regarding colonialism, it may historically be evaluated as part of the problem, not the solution. So we can start there. Further, this aspect of colonial history applies to climate change issues because they require truthfulness, problem-solving, and reckoning. They require emotional learning regarding trauma, healing, and hope. And they require navigating the politics of education policy, for which the history of Native American studies departments in universities since the 1960s is not unlike the ongoing struggle to implement climate programs. Insofar as dealing with climate change requires more than a science lesson on "the greenhouse effect," I think scholars and educators would do well to relate climate issues to some of these other systemic issues we have been wrestling with for quite some time.

Of course, insofar as it's a political issue, the go-to comparison is with evolution education. But that's a different kind of issue. It gets to the issue of science and politics, and exposes the relationship between a decentralized educational system and the politics of knowledge. That certainly holds lessons for climate education. Yet, like your quadratic equation, it doesn't get to the issues of the changes that society requires. With evolution, it's a messier line from scientific theory to what we should do about it, compared to the climate change issue.

You could also look to examples of environmental problems that more or less have been successfully addressed—for example, issues of ozone depletion over the last couple decades—as analogues for how to teach about a real environmental problem that has social, economic, governmental, scientific, and technical components to it that can then be solved. I also think that an approach to climate literacy is best broken down into chunks. Teaching about existential crisis is both bad teaching at a given level and simply impossible to digest. Start with the infrastructure in your town. There are ways in which breaking the problem down both makes it more teachable and possibly more hopeful, as well.

Hunter Gehlbach: Some of the environmental education teachers that I've talked to over time have, similarly to what you just articulated, some really thoughtful approaches to how we convey this material in ways that are not overwhelming and paralyzing. When I was a student teacher, I was told that the first thing you need to do is meet the students where they are and figure out their current level of understanding. That, to me, sounds very congruent with a focus on local and regional levels. Get the kids outside and then have them talk through what they see and how they're processing the environment.

But at some point, I think it's also incumbent upon teachers to stack that knowledge up so that students really get a grasp of the magnitude of the overall problem. I find this to be an unbelievably tall task for teachers.

Zeke Baker: That's where national and international educational policy-making is necessary. For example, the UN Framework Convention on Climate Change, which was ratified in 1992, has an educational component to it. It had education, outreach, and public understanding built into addressing the problem. The spirit of that should have been implemented over the course of the last couple of decades in the building of a robust, national-level climate literacy program and policy that can link the scales of the educational system. That way you can connect what students are learning about on their local level, meeting students where they're at, with larger-scale problems, but then also provide standards that amount to something like an educational policy.

I think it may be at a turning point, with the Conference of the Parties, held in November in the UK, on the heels of unprecedented youth-led activism and a whole lot of uncertainty regarding what Biden will try to accomplish upon rejoining the Paris Agreement. There are efforts in this regard to match what's going on within the US to international efforts under the Paris Agreement and the UN Framework Convention on Climate Change mandate to implement educational programs, which fall under the umbrella of Action for Climate Empowerment. So, I think that that's one way to look at what needs to happen in terms of matching these different scales, and this may present an opportunity to follow through on multi-scalar climate educational initiatives initially proposed in the early 1990s.

Hunter Gehlbach: I love the optimism of that. Yet, I do simultaneously worry about the historical legacy that we have in this country of education being so local, and I worry about the intense bifurcation of political parties in this country as they move farther and farther apart. I also worry that even if the UN, Biden, and everyone else involved comes up with the perfect plan, between the sort of political moment that we're in and the prominence and prevalence of social media, it's just so easy to undo policies that would be so, so helpful at this point in time.

Zeke Baker: I share your pessimism for a number of reasons, but I'll also sort of put in some optimism. We know that when climate education and literacy are taught well, they have a positive impact on values. You can't inculcate environmentalism directly, but you can teach about our relationship to the environment, which can impact people's individual choices, their views later in life, and so on.

Then again, I'm thinking of a 2011 finding from Aaron McCright and Riley Dunlap, where they conducted a survey-based study looking at the role of education and people's degree of confidence about whether climate change is happening or not. They find this interesting interaction effect with partisanship and education, where highly educated Republicans are more confident that climate change is not happening. So, education actually has *that* kind of effect, whereas for liberals and Democrats, it has the opposite effect—people are more concerned. That's a larger problem about the politics of information and knowledge: that even if this stuff is being taught, it can go in different directions because of how much partisanship shapes the way that people evaluate environmental problems.

Hunter Gehlbach: That's a neat study you cite. It's certainly worth trying to replicate the McCright and Dunlap findings on a current sample, since I think a lot has

changed since 2011, when the paper came out. The thing that gives me a little hope is that—and here I'm thinking in part of a study we did—it's actually not that hard to find stuff that people have in common. I think that, working from a common starting point and establishing a handful of common beliefs, you can open up conversations even between people who take very different stances politically. I have a huge amount of faith that teachers can teach climate change by building from commonalities, provided they are put in a context at the school district level, with a supportive school board, and a state legislature that's not going to overreach and decide what to dictate in the curriculum.

Here's what I mean by beginning these conversations around climate from a common starting point. We did a fairly simple demonstration experiment online where we laid out a handful of questions asking people about the extent to which they believe in climate science. We asked things like: "How credible is the climate science data that ocean temperatures are rising?" and "How certain are you that global warming explains many of the new weather patterns we are seeing today?" In short, we were trying to answer the question, "Does climate science seem like legitimate, believable research?" We sent out a survey that starts with those questions to a whole bunch of people. We got their political affiliation afterwards. And the liberals said, "Sure, of course I believe in climate science, I'm not crazy." And the more conservative end of the sample responded: "Whoa, this is very controversial. It's inflammatory. I'm getting a little offended that you're even asking me these questions." It's a pretty big spread of results.

Then in the treatment group, we embraced this idea that there's still a lot of common ground, and maybe if we can point people's attention to that common ground, we can actually make some progress—open up a conversation and close the gap between the Left and the Right on this particular issue. We start with the most obvious "Do you believe in science?" kind of questions. Things like: "How credible is the medical data that germs are a primary cause of disease?" My personal favorite: "How certain are you that physicists' theory of gravity accurately explains why objects fall when dropped?" Except for the most hardcore conspiracy theorists (and we did get a couple), everyone is strongly endorsing these items. So, whether you're from the Left or the Right, everyone says, "Yes, science has taught us some stuff that has been valuable for society."

Then the next thing this treatment group does is answer the same questions about climate science that the control group had. The more left-leaning folks in the sample are like, "This is so dumb. Why are you asking me the same thing over again? Yes, I believe in science. Climate science is just a branch of science." So, they're strongly endorsing the items on both scales. But for the more conservative folks who just acknowledged that, yes, they believe in science, it becomes very awkward, though not impossible, to say, "Yes, I believe in science, but *climate science* is a very different thing." So rather than putting themselves in that awkward position, they adjust their beliefs about climate science and decide maybe it has some merit after all. The implications are that I think we might find common ground, whether it's in a state legislature, on the school board, or even within a classroom itself, and begin to have deeper conversations about climate change, as opposed to just sort of talking past each other. Although the effects of a simple intervention like this might not last

very long—they might only need to last long enough to start a more productive conversation. If we can latch onto some of those common ground starting points, that gives me a little bit of hope.

Zeke Baker: That's a fascinating study. The atmospheric scientist and public intellectual Katharine Hayhoe says, "Just talk about it." Because when people talk about environmental issues, they themselves can find common ground on issues, as opposed to not talking about it or reading things online about it instead or something like that. That seems like a very hopeful direction, both for education and for public discourse. Hayhoe's dictum, backed up by others' research, reminds me of intellectual threads that show the role of communication in the historical creation of a "public"—as in Habermas's theory of the public sphere, or Benedict Anderson's account of nations as "imagined communities." To the extent classrooms can be less alienating and polarized spaces than other forums, there is real capacity for educational institutions to recover social capacity to "just talk about it" and mitigate what some scholars call "truth decay," that prioritizes individual opinion, valorizes polarized beliefs, and forecloses public dialogue. Recent survey data clearly show a correlation between the politics that characterize your area and how frequently you discuss global warming. This is disturbing.

Hunter Gehlbach: You're also tapping into something else that the social psychology crowd has documented in a pretty compelling way, which is when we spend time thinking about and perceiving the other side—whether that's on the Left or the Right or any other type of in-group/out-group dynamic—we always perceive the other side as more extreme than they perceive themselves. Likewise, they are perceiving us to be more extreme than we perceive ourselves and our in-group. I think you really illustrated a nice point, which is: you put people in conversation, and they begin to realize that they're not as far apart as they thought as long as that conversation can get past the surface level.

Zeke Baker: One of the things that I find encouraging in education, which speaks to this issue of generating common problems and common conversation, and also addresses scale, is the promising efforts to deal with the environmental impacts of the educational system—it's buildings, energy use, transportation, land use, et cetera. For example, in higher education, the Association for the Advancement of Sustainability in Higher Education does a really good job of linking educational programming in higher education with the goal of—broadly speaking—decarbonizing college campuses. That's also something that has a lot of possibilities in K-12 education. One of the things that I worry about with teaching environmental education is the glaring contradictions that students face when they learn about the environment and are faced with environmental degradation and unequal access to clean environments, not simply at the global level, but in their own communities. This is where the Sunrise Movement, social movements, figures like Greta Thunberg step in and say, "You're telling us these things, and look at our communities around us." That's where I think there's a role for that kind of activism in education to bridge that gap.

Hunter Gehlbach: I'm reminded of my favorite *New Yorker* cartoon, where a parent is reading to a little kid in bed, and the kid is wailing and crying. Then the dad turns to his wife and comments, "I think he's not ready for stories with moral ambiguity." By contrast, I think students really are ready to tackle these morally challenging issues that climate change poses. Part of what is educationally really interesting for students is when they feel like they're being treated much more as peers with the teacher in an intellectual sense. If the teacher doesn't have all the right answers, they can say, "Yeah, it is pretty horrible when we look out in our neighborhood and see these inequalities. This is a real issue of environmental justice. How did it happen? How did we get here?" I think that's becoming a little more common, to have these more nuanced explorations of really tough issues about which historically we've not been great in teaching to students. My non-historical sense of a lot of older curricula is that they wanted to paint a pretty clear message for students—like, there are good guys and bad guys, and here's what happened and here's who won—not a lot of shades of gray.

Zeke Baker: On the one hand, perhaps what you call moral ambiguity is a long result of the eclipse of positivist assumptions in educational texts, along with socio-demographic and teaching paradigm changes that helped to establish multicultural education and diverse learning environments. On the other hand, the rise of ecological thinking, which wasn't really present before the 1970s, is important because it requires you to think across multiple complex systems. For some context, in 1970 the US established—on the heels of the passage of the National Environmental Policy Act and in the year of the first Earth Day—a National Environmental Education Act. Some educators were critical that it didn't go far enough in creating a space for students to deeply understand how humans are embedded in ecosystems. The legacy of "man over nature" was fundamental to common belief, and it became part of the aim of the North American Association for Environmental Education to organize educators to root out this legacy.

Approaches to education have since changed positively in this regard, but so has the world—the blowback from concepts and ploys of control over nature are so visible. So I think moral ambiguity and ecological thinking go together in complementary ways when it comes to teaching something like climate change and environmental education.

In regard to using education to deal with moral ambiguity and uncertainty, I worry about equity for two reasons: There's an equity question of access to that kind of education, as opposed to standards-based settings that are much more regimented. There's also an equity concern about the capacity for a kind of curriculum that can support ecologically sensitive education. That's where I say, and maybe too optimistically, standards of some sort need to be in place to prevent inequity in access to those educational experiences.

Hunter Gehlbach: I might throw in a third inequity, which is across the geographical distribution of the country. We've seen the Electoral College maps. While any given county or voting district might be a little bit purple, on average, it's a lot bluer in the far east and far west of the country than in the middle and the south. Your point about access is right on, in terms of the extent to which you get a nuanced education.

To what extent do you get exposure to environmental education or environmental science? That is probably not equitably distributed. Then, in the same way that the theory of evolution was taught in some places and not others, I think we're in a situation where some kids by luck of being born in one part of the country versus another get exposure to environmental education and others do not.

Zeke Baker: I did a study with some colleagues last year on climate scientists in California. We surveyed about a thousand of them. We were trying to get some data on what the climate science field looks like in terms of what discipline researchers are in, but mostly we were trying to evaluate their level of engagement with non-research audiences and some of the barriers they face in that engagement. This gets to some of the problems in terms of the production of knowledge around climate change that filter into education.

One of the basic findings there is that researchers want to do a lot more engagement with external, non-research audiences than they currently do. Another point is that climate change knowledge production is still dominated by physical science. That is where there are some problems on the knowledge production end, where we're still stuck with looking at climate change as a physical science issue, when we know it's a societal problem. In terms of knowledge production, it's an interdisciplinary problem, or a multidisciplinary problem, or a non-disciplinary kind of problem.

So, there's this structure to how knowledge is still being produced around climate change, which is dissonant with the situation. That's definitely clear if you look at climate literacy educational tools, even for the educators that can bring those tools into the classroom. It's still often painted as a physical science problem. Part of that is because it's a way to skirt around political issues or anything having to do with systemic social issues. It's also a way for educators and education policymakers to skirt around the problem of causes, the clear—not only human, but social and economic—causes, which most people don't want to talk about. But there is a kind of upstream problem among knowledge producers that they want to be engaged, they want to do more outreach, but the situation for science isn't currently set up that way.

Hunter Gehlbach: I think that's a great observation. The notion that there's some safety in your local K-12 school district conceptualizing environmental education as really a natural science problem, and not so much as a social science problem—that makes a ton of sense to me. I can imagine a lot of people who find it easier to sleep because they view climate change as a problem that "somebody else" is on the hook for solving. I suspect that kind of thinking may be happening in lots of places.

There's also the whole layer of the incentive structure for researchers. When the knowledge producers are producing that knowledge, the incentives are to produce it and share it with an audience of colleagues and peers. By contrast, scholars are not particularly motivated to share it with an audience of, say, K-12 teachers, or policymakers, or people at their local state house to help inform what curricula should be required. In most institutions of higher education, that's not what's going to get you tenure. It's the combination of both those things: (1) not quite conceptualizing the problem of climate change or environmental education as both natural science and

social science, and (2) the incentives that don't reward you for disseminating your knowledge beyond what promotion and tenure committees are looking to reward. Both of those are probably pretty problematic and not helping much.

Zeke Baker: That speaks to a disconnect between the scientific field and the educational field, which I think is generally unfortunate. But with an issue like climate change, it's most unfortunate. I think that's a problem that needs to be addressed.

Hunter Gehlbach: I'd love to talk a little bit more about the social media angle of this. I think it's so daunting for teachers to have to manage this whole other stream of information that emanates from outside their purview—that is, the students in their classes—but obviously, these outside sources of information intrude in really big ways.

It's been years and years since I was teaching high school, but I don't know how I would handle teaching something like environmental studies right now if I were back in the classroom, for a whole host of reasons. One, because now it would appear—and maybe this is some media bias I have—that you only hear the stories about outraged parents coming in and suddenly the teacher's life is a mess. Maybe I'm overreacting, but I would be nervous and scared about that. And two, it's so important to teach kids to sift through and be able to evaluate sources. I was a social studies teacher, so that was part of what I taught. But it just seems so much more complicated and messy now.

Zeke Baker: The level of skepticism among policymakers is outsized compared to the US population. The trends in public opinion toward accepting climate science and being concerned about it are on the increase, and higher even on the political right than among their representatives. There's some opportunity there. If we look at those trends, I think we can look forward to a different situation in civil society regarding climate science where it's not either/or; it's not skepticism versus acceptance, or faith versus no faith. Although there is still what sociologist Robert Brulle calls the "climate change countermovement," I would say its heyday is past, or at least it's not what it was in the 1990s and 2000s.

I think we can get into social media–based misinformation, but we should also recognize that that may be a little bit different than the political organization of denial through lobbying, and think tanks, and all that sort of thing. Among policymakers, hopefully we can look forward to a situation where the level of organized denial is as low as that among the general population. And maybe that's just a matter of time or maybe that's a matter of grassroots pressure. I'm not sure about that.

Hunter Gehlbach: I've spent a fair bit of my time thinking about the PhD program here at Johns Hopkins. We embrace this apprenticeship model where the students are becoming equals and "learning by doing" alongside the faculty members who are conducting various types of research. I think porting some of that down to the K-12 level might work. Students can work on real projects, whether it's writing letters to their local elected officials (and actually sending them, not merely writing letters as a classroom exercise), or volunteering at places that are going to put in some better

infrastructure to protect a set of homes in a particular neighborhood that may be vulnerable to flooding or sea level rise. I'm increasingly impressed with how different and more impactful experiential education is than the sort of book learning that was the bulk of what I got when I was in elementary, middle, and high school. A greater focus on experiential education is one thing that I think teachers can embrace and feel confident is going to make a big difference for their students, to the extent that that's possible.

The one other huge thing that schools could do collectively—which is to your earlier point, Zeke—is to think in terms of interdisciplinary problems. If we localize the learning about climate and climate change just to one natural science class, that's not going to cut it. We need to get into this issue in the English class, in the social studies class, and so on, and it's really got to be much more interdisciplinary. If schools and school districts can start doing more of that work and some really impressive experiential education projects, those two things happening at scale would give me a lot of hope.

Zeke Baker: I think there's a lot of opportunity there, and there's a lot of good case studies of these sorts of programs, crosscutting curricular programs at the K-12 level, universities with freshman seminars devoted to the topic, or in the California State University system where I work, crosscutting sustainability minors and that sort of thing. I'm hopeful about those opportunities. For me, it's an open question again of how that can be done equitably across different types of schools. Is a Title I school going to have the same opportunities as others? Is project-based learning equally accessible? I don't necessarily have an answer for that question, but I'm hopeful about the capabilities that those kinds of programs provide.

With the international component, I think this is an exciting frontier. I was local faculty—basically an advising faculty member—for a program on climate change that took this really interdisciplinary approach, and which was structured as a study abroad program for mid-level university students. They would go, over the course of a semester, to four different locations around the world and look at the intersection of climate change and energy, food, and water. That, generally speaking, borrowed from a model of experiential education, project-based learning, and a study abroad program. Enter COVID and the increase of digital education, by force or by circumstance, and I think there's now increasing opportunity for engagement around the world on these topics, without having to go to four different communities and fly to each one of them. We're not all going to be able to do that; there's a privilege aspect to that. I'm excited about that possibility for learning. Those kinds of engagements, as schools, as teachers, as educators move out of the pandemic, have to be at the forefront of what we can do.

Hunter Gehlbach: If we harken back to our earlier part of the conversation, there was a bit of a tension between two ideas. First, start where the kids are at; but, second, we can't forget there's a big picture that is a pivotal part to understanding climate change, sustainability, and assorted topics. I also agree that there are technological affordances that we have now in today's world that really ought to be able to facilitate this.

If we imagine kids are developmentally, cognitively at different places, for your average fourth grader to really wrap their head around a global problem is tricky.

This is just what happened to be in the news, but if the fourth grader happens to be from Tennessee, where there's been devastating flooding over the course of the past week, there are a bunch of students in Germany, approximately fourth grade as well, that have had that exact same experience. They could be having conversations with each other that would allow students to see that their local experience has this parallel on the other side of the world. And you can gradually ramp up from there, so that maybe by the time they're in sixth grade, it's kids in California experiencing wildfires who are having conversations with the German kids who experienced flooding.

And so students could begin to see how those are very different experiences, but have the same root cause. There's a definite way we should be able to do a better job of educating in this approach of taking advantage of technology and making the world smaller, in that sense.

Zeke Baker: I think that is exciting.

The anthropologist Susan Crate has this great research methodology in the social sciences which she calls "climate ethnography." She says climate change is local and global, so the way to understand that is by linking the local to the local—one locality to another somewhere else. That's kind of what we're talking about in educational terms because you have this big problem which seems abstract to learners, but then also at a global level, it *is* abstract. You have to get local to understand how it matters, both in terms of communities and in terms of learners. I think these kinds of possibilities open that up.

What's also significant here is that it also works around the misinformation problem. If you're linking a local experience to another local experience in a way that's relatively unmediated—it's not a headline, it's not the news, it's not social media— that's interesting because if you think about education, let's say in the mid-nineteenth century, how are students learning about the Western frontier in the Eastern United States? Or, how were students in the North in the early twentieth-century learning about Reconstruction in the South? It was full of misinformation, in a way. It was thoroughly mediated. They weren't speaking to the families of gold-mining workers in California. Those facing racial terror in the South did not have Instagram through which to broadcast lived experiences. Recent analyses of history textbooks of those periods show how historical narratives were pervasively ideological or keyed to a dominant audience's national myth. There are now some ways for actual local-to-local understandings and learning that didn't exist before, so maybe that helps deal with this informational issue that we have been discussing.

Hunter Gehlbach: I think that's a neat and fascinating idea, and also a testable one. You could design a study to see if that local-to-local approach to teaching works better than a more traditional approach. One other thing you just made me think of is the idea of generalizability, which involves an understanding of statistics. If we really do begin to have more interdisciplinary courses in US middle and high schools, statistics would tie in very nicely with environmental science. Take the earlier example of a group of kids from California having a conversation with kids in Germany. The teacher could draw on both subjects to facilitate deeper understandings, saying, "So there's a bunch of these extreme weather events happening. Are we seeing a trend,

or not? Are the trends happening only in a couple of places or are they happening globally?" Statistics is a great tool to help teachers facilitate students' understanding of the big picture.

We started with how much of an intriguing, tricky problem sustainability, climate change, and environmental education are, purely from an educational standpoint, and I think we're ending by listing possibilities about how rich that kind of educational experience could be.

Additional Readings

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