

We Build the Road As We Go

Supporting teacher leadership
in an emerging field

B. DRAYTON, A. SUSSMAN, G. PUTTICK, F. SOLOMON

*Caminante, son tus huellas
el camino, y nada más;
caminante, no hay camino,
se hace camino al andar.*

*Traveler, your footprints
are the path, and nothing else.
Traveler, there is no road,
we build the road as we go.*

— Antonio Machado

The John D. and Catherine T. MacArthur Foundation invited the authors of this article to develop a summer institute for high school teachers who are teaching climate science with an equity lens. There were several objectives behind the initiative.



First, anecdotal information suggested that the number of such teachers is increasing, but that they tended to be isolated from each other. Thus, the first goal for the institute would be to bring some of these teachers together each summer, and to begin to build a network of colleagues. The second goal was to facilitate teachers' sharing their practice, as part of their professional learning, and the third was to begin to identify possible "best practices" for the teaching of climate and equity. Researchers and policy makers are focusing on the interaction of climate change with social justice, but there is no settled academic field of "climate and equity" at the high school level.

How should we design a professional learning experience for teachers who are pioneering in a field that does not really exist in any systematic way, and for which guidelines or standards, materials or techniques, are still in the developmental stage? We designed a workshop based on 3 key ideas: Biocomplexity, Equity, and Pedagogy (Puttlick and Drayton, 2024). The first week-long institute in 2022 was a success — many participants reported that it was different from any PD they had attended before, and some called it "transformational."

With some improvements, this design has been the basis of institutes in succeeding years, and soon two teacher teams will begin co-designing institutes with us that they will lead in their regions. As we support their work, two critical questions are,

What has made the pedagogy distinctive and powerful for the participants?

Can we identify "essential ingredients" that should shape future institutes?

We believe that we can.

Five principles for pedagogy

The foundation of our approach is respect for the teachers as experts and as learners. Moreover, we believe that pedagogy for teachers should reflect the way that students should learn about climate change science and its indispensable connection with equity — in their own lives and communities, as well as across the world. This learning should equip both students and teachers to engage constructively and with durable hope as climate change reshapes our world. Key principles we have identified include:

1. "The process of authority."

John Dewey wrote: "Asking other people what they would like, what they need, what their ideas are, is an essential part of the democratic idea. We are so familiar with it as a matter of democratic political practice that perhaps we don't always think about it even when we exercise the privilege of giving an answer, every individual must be consulted in such a way, actively not passively, that he himself becomes a part of the process of authority" (2008a).

Learners come to the "classroom" with intentions, desires, prior experience and knowledge. By incorporating these into learning experiences to make learning meaningful and significant, the process of authority in learning is shared.



Kelli Grabowski, a Fellow in 2023, is one of several Fellows who have returned to help lead in subsequent Institutes.



A teacher takes some time to journal during the intense week of the Institute.

When the inquiry includes a social issue in which the outcome relates to human betterment, needs, and desires, the “stakes” are intensified by the desire for a solution that results in positive and meaningful change.

How This is Enacted at the Climate and Equity Institute

First, institute facilitators ask for teachers’ input before the Institute begins, to make sure that all their interests in teaching and learning about climate and equity are touched upon. Second, during the institute, participants’ needs and desires, as well as their skills and expertise, are both recognized and deployed on an emergent basis in institute sessions. By providing continued feedback to the Institute facilitators, and by sharing and discussing their experiences of addressing climate change and equity with students, the participating teachers take ownership of the Institute and shape its direction over the course of the week. Third, we collect in-depth feedback on participants’ experiences and ratings of each session. We reflect on this data and make changes for the next Institute cohort.

2. Learning is growth.

“The value of...education is the extent in which it creates a desire for continued growth and supplies means for making the desire effective in fact.” (Dewey 2008b, Ch. 4).

In meaningful learning, the learner is in charge, as they identify a purpose, a need, or question they wish to address, and move towards addressing it by identifying skills or knowledge they need; getting and deploying these in a reflective manner; and reflecting on the activity and its context so as to see or imagine new learning and action that have become possible. Our goal is to engage participating teachers in learning that will enhance their capacity to respond creatively to new situations and emerging opportunities in their work as climate change and equity teachers – whether in their work with students, other teachers or their communities.

How This Is Enacted at the Climate and Equity Institute

Institute sessions are designed to bring together different teacher voices and provide diverse perspectives on the local and global inequitable impacts of climate change, with substantial time for reflection and discussion built in. Participating teachers consider and discuss best practices for teaching about these impacts. During the discussions, teachers identify and get input on new ideas, themes or questions that are surfacing. In the final two days of the Institute, the participating teachers form small groups around a common purpose, need, or question for or about their practice and together outline plans to address them. Many of these projects subsequently involve work with colleagues in their schools and with local community partners.

3. Teaching for growth.

If learning is growth, then as Institute facilitators we need to support the participating teachers to engage the process of learning outlined above. Our goal is to modify the Institute learning context in response to the learners’ intentions, desires, prior experience and knowledge. These modifications, which are informed by what the teachers in each cohort bring as well as conjectures based on our own research, are continually revisited, carefully examined and revised as needed. Consequently, much of the content that teachers work on during the Institute is from the teachers themselves, rather than a pre-determined curriculum. Each Institute is an experience of shared active inquiry.

How This is Enacted at the Climate and Equity Institute

The role of facilitators is to shape the context and the environment for learning. Therefore, facilitators provide framing for each session, monitor the ensuing conversation, asking questions, and sharing observations when appropriate, and leave most of the conversational space for the teachers. We meet to debrief and reflect together daily, adapting the session structure and focus as needed based on our observations and the feedback from the participants.

4. Teacher leadership is teaching for change.

We view all teachers who participate in the Institute as teacher leaders in the field of climate change and equity education. We define teacher leadership as a process of inquiry and learning in which the leader is engaged in supporting others in the same kind of learning. In this way, teacher leaders are change agents. The nature of the change they facilitate will be determined to an extent by the scale at which they apply their learning – in their own practice, or within their school, outside the school with other educators, or in the community.

How This Principle is Enacted at the Climate and Equity Institute

The Institute centers teacher expertise and leadership. The setting, daily schedule, and session structure are designed to support the development of a community of practice in which teachers learn from each other as they exchange expertise, ask questions, and share new or evolving ideas and work on them together. This community is enriched by the diverse backgrounds and experiences that each teacher brings.

5. Diversities of outcomes.

While we encourage participants to consult or collaborate with each other, each one will define how they will begin to implement and continue their learning after the Institute concludes. The Institute discussions that have stimulated or inspired the learning will continue; the teachers, their students and colleagues at home, and the Institute facilitators continue the work together as some continue to collaborate, build new partnerships, or present or publish about the work. This is a natural consequence of our respect for the “process of authority.”



An evening session during which teachers sketched from nature.



Conclusion: A Community of Practice Emerges

To the extent that the Institute embodies these 5 principles, in word and in deed, the teachers and learners (and this includes the Institute facilitators) are members of an emerging community of practice. Such a community of practice can continue to articulate what its “practices” are and discuss how to improve them (Milks et al. 2024). The members of the community continue to build networks and partnerships, seek opportunities to exercise new strategies and techniques and find ways to involve new members. Thus, community members have opportunities for further learning, or for applying their knowledge and experience, creating continuing and renewed opportunities for learning, work, service, and growth.

The Institute quarterly newsletter serves as a way for participants to share presentations, articles, news, or resources. See what the fellows have been up to:

terc.edu/climateandequity/newsletters/

To learn more about the project and the upcoming 2026 Institute, visit terc.edu/climateandequity

ACKNOWLEDGEMENTS

We are grateful to the teachers, MacArthur Climate and Equity Fellows, who have made the Institutes come alive, and continue to share their expertise and learning with their students and the Climate and Equity community.

AUTHORS

Brian Drayton, a plant conservation ecologist, has worked with and for teachers at TERC for almost 40 years. He thinks that just about nothing is more fun than being in the field with plants and animals, except doing it—and talking about it—with others. And what more amazing and fascinating creatures are there than learners and teachers?

Gillian Puttick is a senior scientist at TERC, a non-profit education research and development organization in Cambridge, Massachusetts who works with teachers to develop and research innovations in science teaching and learning. She currently focuses most of her efforts on climate change education. She feels privileged to be working with teacher-leaders from across the country on the critical work of developing guidelines for effective climate and equity education.

Folashade Cromwell Solomon (Ed.D.) Is a senior researcher here at TERC. She has over 30 years of experience in education as a public-school elementary teacher, professional developer, researcher, and college professor. Her teaching and research focus on learning, identity and exploring the interdisciplinarity and multimodal learning for teachers and youth. Her recent work explores how movement and the arts can be a tool for learning science.

Annie Sussman is a Senior Research and Curriculum Development Specialist at TERC. She has 18 years of experience in education and has worked as a classroom teacher, curriculum developer and researcher. Her current work focuses on teacher leadership in mathematics and science education and on the ways in which student and teacher reflection can inform the creation of equitable learning communities in elementary mathematics classrooms.

REFERENCES

- Dewey, J. (2008b). *Democracy and education*. In Boydston, J. A. (Ed.), *The middle works, 1899– 1924. Volume 9*. Carbondale, IL: Southern Illinois University Press (Original work published 1916)
- Dewey, J. (2008a). Democracy and education in the world today. In Boydston, J. A. (Ed.), *The later works of John Dewey, 1925–1953. Volume 13* (pp. 294–303). Carbondale, IL: Southern Illinois University Press (Original work published 1938).
- Milks, K., Vesnaver, R., Flores, T., Drayton, B., Puttick, G. (2024). Growing climate justice education: A framework for K-12 teachers and school communities. *Kaleidoscope: Educator Voices and Perspectives*, 11(1)
- Puttick and Drayton (2024) Climate and Equity Institute: a model for transformative professional learning. *Hands On!* Fall 2024 Issue, pp. 1-6.