

Preface

The theme of the 2019 Physics Education Research (PER) Conference was Physics Outside of the Classroom: Teaching, Learning, and Cultural Engagement in Informal Physics Environments.

The plenary talks highlighted this theme in several ways. Paula K. Hooper's talk entitled *Making through a lens of culture, power, & equity: Visions for Learning and Teaching in Informal Settings* focused on factors and ways that educators can think about where equity and science ideas are intertwined.

Shane Bergin led an interactive session demonstrating a collective experience of running, or participating in, informal physics programs. Shane also addressed the scholarship from this emerging sub-discipline.

Jamie Bell provided an overview of what is sometimes called an "invisible infrastructure" of support for informal STEM learning and communication, and invited attendees to share their own discoveries and what's in their toolboxes.

In 2019, PERC continued the breakout "Dine and Discuss" groups started in 2018. Among these groups of a variety of topics, the PERC Proceeding editors hosted a session inviting attendees to meet the editors. Steven Wolf, editor of 2019 proceedings, led the dinner discussion and addressed questions attendees asked. Juried talk papers continued in the main peer-reviewed section of the Proceedings, also a transition that happened in 2018.

PERC often ends with a plenary session or panel, and in PERC 2018 it closed with parallel discussions run by a panel of plenary speakers. This year, Mike Bennett, one of the organizers as well as a Proceedings editor, ran a relaxed, discussion-based closing session inviting attendees to reflect on their conference experiences, including the conference's interactive community engagement piece, and to discuss how the PERC 2019 themes and content might impact their own practice moving forward.

This year, the Physics Education Research Leadership and Organizing Council (PERLOC) was involved, working with the editors to improve the process of paper reviewing.

None of this could happen without a team of people every year who bring their vision, energy, and sweat. The 2019 PERC organizers were Mike Bennett, Jackie Chini, Claudia Fracchiolla, Danielle Harlow, Katie Hinko, and Katemari Rosa. They were joined by the formidable organizational powers of the American Association of Physics Teachers (AAPT).

The PERC Proceedings online submission and review process was supported by Lyle Barbato and Bruce Mason who work closely with the editors to ensure smooth functioning of the online system. We owe Lyle and Bruce a great deal of thanks.

The editors also thank the AAPT for their sponsorship of the Proceedings, allowing it to be published open-access through the comPADRE website.

As in every year, the editors wish to thank the referees for volunteering their time and expertise to give feedback to papers submitted to the Proceedings. This year we had 212 reviewers who reviewed the 151 papers submitted to the Peer Reviewed Section. The PERC Proceedings is both an important archive of findings and also a place where many new members of the field publish their first physics education research, and we are deeply appreciative of the reviewers who make this possible.

The Editors thank: Wendy Adams, Abolaji Akinyemi, Anne Alesandrini, Jonathan Alfson, Emily Allen, Rabindra Bajracharya, Pablo Barniol, Daniel Barringer, Lauren Bauman, Ian Beatty, Michael Bennett, Theodore Bott, Andrew Boudreaux, Eric Brewé, David Brookes, Jacqueline Bumler, Jan-Philipp Burde, Eric Burkholder, Danny Caballero, Esmeralda Campos, Ying Cao, Sheh Lit Chang, Stephanie Chasteen, Zhongzhou Chen, Mary Chessey, Jacquelyn Chini, Eleanor Close, Hunter Close, Robert Colesante, Kelley Commeford, Joel Corbo, Edgar Corpuz, Adriana Corrales, Sonja Cwik, Abigail Daane, Robert Dalka, Kushal Das, Ian Descamps, Richard Dietz, Constance Doty, Daniel Doucette, Dimitri Dounas-Frazer, Archana Dubey, Andrew Duffy, Jared Durden, Philip Eaton, Paul Emigh, Eugenia Etkina, Brett Fiedler, Noah Finkelstein, Thomas Finzell, Claudia Fracchiolla, Scott Franklin, Kelsey Funkhouser, Cynthia Galovich, Geoffrey Garrido, Andy Gavrín, William Gerace, Julian Gifford, Elizabeth Gire, Fred Goldberg, Melanie Good, Lisa Goodhew, Matthew Guthrie, Brianne Gutmann, Kelby Hahn, Megan Halpern, Danielle Harlow, Thomas Head, Richard Hechter, Charles Henderson, Rachel Henderson, Eder Hernandez, Paula Heron, Travis Herring, Kathleen Hinko, Brant Hinrichs, Robert Hobbs, Natasha Holmes, Dehui Hu, Tra Huynh, Paul Irving, Joss Ives, Dena Izadi, Westley James, Paul Justice, Yasemin Kalender, Christof Keebaugh, Caitlin Kepple, Raina Khatri, Abigail Kimbrough, Antje Kohnle, Eric Kuo, Alexandra Lau, Anne Leak, MacKenzie Lenz, Heather Lewandowski, Yangqiuting Li, Will Lindsay, Robynne Lock, Savannah Logan, Diana Lopez, Joshua Love, Michael Loverude, Brandon Lunk, Meghan Macias, Vina Macias, Adrian Madsen, Steve Maier, Nuraan Majiet, Tshiamiso Makwela, Alexandru Maries, Emily Marshman, Andrew Mason, Jonathan Massey-Allard, Austin McCauley, Michele McColgan, Sam McKagan, Gabriel Mestas, Daryl Moore, Emily Moore, Thomas Moore, Jason Mophew, Claire Mullen, Alexandria Muller, Sarah Muller, Carissa Myers, Kizito Ndiokubwayo, Jayson Nissen, Timothy Nokes-Malach, Eglá Ochoa-Madrid, Tor Ole Odden, Daniel Oleynik, Alice Olmstead, Christopher Orban, Lindsay Owens, Gina Passante, Alanna Pawlak, Kathy Perkins, Anthony Pina, Jacob Poirier, Benjamin Pollard, Steven Pollock, Christopher Porter, Geoff Potvin, Brean Prefontaine,

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Finally, the Editors wish to express our special thanks to the PERC Coordination Committee chaired by Erin Scanlon, who facilitated communications and coordinated logistics among multiple parties to streamline the process for future years.

See you Summer 2020 in Grand Rapids, Michigan!

Ying Cao
Editor-in-Chief