

## PREFACE

Research frameworks were the focus of the 2016 Physics Education Research Conference, under the theme “A Methodological Approach to PER.” The more than 300 conference attendees were encouraged to join in a lively discussion about methodologies and their role and importance for strengthening research.

The AAPT/PERC Bridging Session highlighted work by Kerrie Douglas on “Appropriate Use of Assessments through Applications of Validity Theoretical Framework” and Jesper Bruun on “Network Analysis as a Research Methodology in PER.” Douglas challenged attendees to consider whether assessment instruments are appropriate for certain uses and provided a practical framework for that determination. Bruun presented a network analysis approach that provides insightful maps of learning in a rich methodological framework.

In a change of format from previous years, the banquet was replaced with time for participants to have dinner on their own and then return for a plenary and “first-timers” poster session. Saalih Allie presented the first plenary on “Methodology and Theorizing in PER: The Role of Humble Theories,” where he presented an approachable category of theorizing that could be applicable to specific content and contexts of PER research.

Along with 185 contributed posters over four sessions, 13 parallel sessions with 38 talks and 16 poster presentations, and two workshops, two additional Plenary sessions were held on the second day of the conference. Peter Hewson encouraged disciplinary connections as he spoke “On the Interaction of Physics with Physics Education Research.” George Bodner’s talk, “Theoretical Frameworks for Qualitative Research from Chemical Education Research,” shared lessons from the integration of qualitative research into CER. A Speaker Panel Summary served to reflect back on the methodology theme and wrap up the event.

The Editors thank this year’s conference organizers Paul Irving, Rebecca Lindell, and Cedric Linder, and the Physics Education Research Leadership and Organizing Council (PERLOC). As always, the dedication of all involved in the planning and implementation of the PERC was evident as another successful and engaging conference is in the books.

The Proceedings’ online submission process for contributed papers and referee reports are supported each year by Lyle Barbato and Bruce Mason who work closely with the PERC Proceedings Editors to make improvements to the system and ensure that everything runs smoothly. Lyle and Bruce are owed a great many thanks for their ongoing commitment and tireless work for the whole community and on behalf of the PERC Proceedings in particular.

We also acknowledge and thank the American Association of Physics Teachers for their sponsorship of the The Proceedings as it is published on-line through comPADRE and for their support throughout the process.

Last but not least, this volume owes its existence to the referees, who volunteer their time and expertise to help improve the quality of the papers published in the Proceedings. This year we

had 197 reviewers who reviewed the 128 papers submitted to the Peer Reviewed Section, including some who were willing to step in and review with extremely short notice.

The Editors thank: Elise Agra, John Aiken, Carolina Alvarado, Katherine Ansell, Gordon Aubrecht, Ryan Badeau, Charles Baily, Pablo Barniol, Alexander P. Becker, Abigail Bogdan, Andrew Boudreaux, Danielle Bugge, John B. Buncher, Adam Burgasser, Esmeralda Campos, Stacey L. Carpenter, Eduardo Castro, Stephanie Chasteen, Zhongzhou Chen, Jacquelyn Chini, Warren Christensen, Alice D. Churukian, Eleanor W. Close, Geraldine Cochran, Vincent P. Coletta, Jessica Conn, Monica K. Cook, Joel C. Corbo, Jessica Creamer, Abigail R. Daane, Melissa Dancy, Debbie DeRoma, Seth Devore, Angeles Dominguez, Leanne Doughty, Dimitri R. Dounas-Frazer, Benjamin W. Dreyfus, Gintaras Duda, Ben Van Dusen, Andrea Van Duzor, Melissa Eblen-Zayas, Melissa Eblen-Zayas, Mark Eichenlaub, Andrew Elby, Leslie Atkins Elliott, Paul Emigh, Jennifer Esswein, Eugenia Etkina, Brian Farlow, William N. Ferm Jr., Noah Finkelstein, Claudia Fracchiolla, Andrew Gavrin, Elizabeth Gire, Lisa M. Goodhew, Kara Gray, Mark D. Greenman, Bor Gregorcic, Ian T. Griffin, Nathaniel Grosz, Jenaro Guisasola, Ayush Gupta, David Hammer, Alexandria K. Hansen, Danielle B. Harlow, Zahra Hazari, Ryan L. C. Hazelton, Andrew F. Heckler, Deborah Hemingway, Charles Henderson, Rachel Henderson, Ilkka Hendolin, Paula R. L. Heron, Sarah T Hierath, Kathleen Hinko, Andrew S. Hirsch, N.G. Holmes, Jessica Hoy, Zdeslav Hrepic, Simone Hyater-Adams, Bashirah Ibrahim, Joss Ives, Manher Jariwala, Anders Johansson, Joseph Johnson, Christof Keebaugh, Patrick Kelley, Alexis V. Knaub, Joshua Von Korff, Hagit Kornreich-Leshem, Laird Kramer, Mila Kryjevskaja, Thanh K. Le, Anne Leak, Sunbok Lee, MacKenzie Lenz, Charles De Leone, H. Lewandowski, Shih-Yin Lin, Rebecca Lindell, Beth Lindsey, Angela Little, Michael E. Loverude, Brandon Lunk, Alexandru Maries, James Marshall, Emily Marshman, Kelly Martin-Gaffney, KK Mashood, Andrew Mason, Michele Frances Mateycik, McColgan, Alistair McInerny, Daryl McPadden, Laura Millay, Bahar Modir, Camila Monsalve, Emily B. Moore, Elise C. Morgan, Gary A. Morris, Alice Olmstead, Gina Passante, Andrew Pawl, James Perrone, Jeffrey A. Phillips, Steven J. Pollock, C. D. Porter, Edward Price, Gina M. Quan, Monica Quezada-Espinoza, Jennifer Radoff, Katherine Rainey, Ajith Rajapaksha, Carina M. Rebello, N. Sanjay Rebello, Daniel Reinholz, AJ Richards, Amy Robertson, Rebecca Rosenblatt, Edward A. Roualdes, Gabriel Rowe, Andy Rundquist, Qing X. Ryan, Mel Sabella, Homeyra Sadaghiani, Oscar Sanchez-Mata, Emily Sandt, Brianna Santangelo, Vashti Sawtelle, Ryan Sayer, Eleanor Sayre, Erin Scanlon, Benjamin P. Schermerhorn, Rachel E. Scherr, Bill Schmitt, Emily Scott, Ozden Sengul, Peter S. Shaffer, Chandralekha Singh, Trevor Smith, Erin Ronayne Sohr, Patricia Soto, J. Caleb Speirs, Jared B. Stang, Jacob T. Stanley, MacKenzie Stetzer, Linda E. Strubbe, Nutifafa Kwaku Sumah, R. Talbot, John Thompson, Eugene Torigoe, Adrienne Traxler, Chandra Turpen, Marlene Vega, Michael Vignal, Stamatis Vokos, Jarrett Vosburg, Paul J. Walter, Tong Wan, Jue Wang, Daniel R. White, Jada-Simone S. White, Bethany R. Wilcox, Matthew Wilcox, Michael Wittmann, Steven F. Wolf, Bert C. Xue, Edit Yerushalmi, Tugba Yuksel, Genaro Zavala, Liang Zeng, Jing Zhang, Guangtian Zhu, Dean Zollman, Tianlong Zu, Kristina Zuza, and Benjamin Zwickl

Last, though certainly not least, the Editors wish to thank the Community at large for their innovation, dedication to the field, and support for all things PER.

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Editor-in-Chief