

ALISON RILEY MILLER

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EDUCATION

Ph.D. Science Education (May 2015)

Teachers College, Columbia University, New York, NY

- Doctoral Research Fellow, Teachers College (2010 – 2013)
- Sandra K. Abell Institute Scholar, National Association for Research on Science Teaching (2013)

Dissertation: Miller, A. R. (2015). Examining the Relationship between Physical Models and Students' Science Practices. Dissertation defense passed April 8, 2015. Graduate School of Arts and Sciences, Columbia University. (Degree conferral, May 20, 2015)

M.A. Education, Environmental & Conservation Education, with Distinction (2007)

Arcadia University, Glenside, PA

Teaching Certificate (Pennsylvania): Environmental Education, Earth & Space Science, Biology, General Science

B.A. Anthropology & Drama, Cum Laude (1998)

Ithaca College, Ithaca, NY

- George C. Textor Memorial Scholarship (awarded 1995)
- Jane Woods Werly Scholarship (awarded 1995)

PROFESSIONAL EXPERIENCE

Associate Professor

July 2014 – Present

Bowdoin College, Brunswick, ME

Department of Education

Doctoral Research Fellow

June 2010 – June 2013

Teachers College, Columbia University, New York, NY

- Research Assistant for a National Science Foundation grant-funded project studying students' analogical reasoning around physical models in Earth science
- Familiarity with Construct Map, Item Response Theory and Rasch Modeling
- Qualitative and quantitative data collection and analysis

Adjunct Instructor

September 2012 – May 2013

Teachers College, Columbia University, New York, NY

Department of Mathematics, Science, and Technology

Adjunct Instructor

January 2013 – May 2013

John Jay College of Criminal Justice, The City University of New York, New York, NY

Department of Sciences

Adjunct Instructor

August 2012 – December 2012

The City College of New York, The City University of New York, New York, NY

Department of Teaching, Learning, and Culture

Graduate Intern, Research and Development, Science Education
The College Board, New York, NY

April 2011– July 2011

- Responsible for research and writing related to science education policy and initiatives

Teacher

August 2008 – June 2010

Central Bucks School District, Warrington, PA

- Taught ninth-grade curriculum integrating elements of Earth and life sciences in thematic units
- Technology coach, supporting colleagues with technology integration including student-produced videos, podcasts, blogs, and Wikis

GRANTS & AWARDS

Awarded:

Principal Investigator, Bridging Preschool and Kindergarten Science: Exploring Play-based Engagement with Scientific and Engineering Practices in Early Learning Environments, Collaborative Research with the Maine Math and Science Alliance, NSF #2201673 (DRK-12/TTEST) \$951,413

Principal Investigator, Developing a Modeling Orientation to Science (DMOS): Teaching and Learning Variability and Change in Ecosystems, Collaborative Research with the Gulf of Maine Research Institute and Vanderbilt University, NSF #2010155 (DRK-12) \$515,164

Higher Education Partner, Teaching the Genome Generation (TtGG). NIH (SEPA)

Principal Investigator, Preschool Science and Engineering Practices (PreSEP) Project. Andrew W. Mellon Award for pre-tenure faculty research (2018 – 2019)

SCHOLARSHIP

Refereed Journal Articles

Miller, A.R., & Saenz, L.P. (under consideration) STEM in play: Developing and validating the Science and Engineering Practices Observation Protocol (SciEPOP). *Journal of Research in Science Teaching*.

Zangori, L., Miller, A.R., & Whitworth, B. (under consideration). Mind the (mentoring) gap: Exploring challenges to preservice and cooperating science teacher alignment with respect to teaching and standards-based reform. *Innovations in Science Teacher Education*.

Miller, A.R., & Eshoo, M. (2023). Reassessing Recess: Recognizing and Supporting Scientific and Engineering Practices in Play. *Science and Children*. 60(4), 76-82.

Miller, A.R., & Saenz, L.P. (2021). Exploring Relationships between Playspaces, Pedagogy, and Preschoolers' Play-based Scientific and Engineering Practices. Teaching and Learning of Science during the Early Years [Special Issue]. *The Journal of Childhood, Education & Society*, 2(3), 314-337.

Biggers, M., Miller, A.R., Zangori, L., & Whitworth, B.A. (2019). (Mis)alignments in mentorship: Exploring challenges to preservice science teacher preparation. *Journal of Science Teacher Education*, 30(4), 344-356.

*Miller, A. R., & Kastens, K. A. (2018). Investigating the impacts of targeted professional development around models and modeling on teachers' instructional practice and student learning. *Journal of Research in Science Teaching*, 55(5), 641-663. *Top 20 most read papers of 2017-2018, *Journal of Research in Science Teaching*, Wiley Publishing.

Refereed Book Chapter

Boda P.A., & Miller A.R. (2021). Educational technologies for multicultural science learning. In: Atwater M.M. (Ed.). *International Handbook of Research on Multicultural Science Education*. Springer International Handbooks of Education. New York: Springer.

Published Curricular Materials & Software

Miller, A.R., Saenz, L.P., & Xi, R.** (April, 2023). SciEPOP: Science and Engineering Practices Observation Protocol (Version 23.1) [iPad app] <https://www.apple.com/app-store/>

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Journal Articles in Progress

Saenz, L.P., Miller, A.R. (in preparation). Building a modeling orientation to science: A multiple case study. *International Journal of Science Education*. (≈20 pages)

Miller, A.R., Saenz, L.P., Harvey, M. & Voyer, C. (in preparation). Leveraging community science to foster epistemic empathy in teacher professional learning. *Teaching and Teacher Education*. (≈20 pages)

Miller, A.R. (in preparation). Reconceptualizing play as a community of practice: Implications for early learning environments. *Early Childhood Education Journal*. (≈10 pages)

Other Publications

Miller, A.R., & Graves, J.L. (2024, January 28). Opinion: Leave science curriculum as it is. *Portland Press Herald*.

Invited Presentations

Miller, A.R. (2024, April 9). Exploring and supporting children's engagement with science and engineering through play: Implications for early elementary learning environments. Professional learning community on playful learning in early elementary grades, Maine Department of Education.

Miller, A.R. (2020, October 19). Leveraging scientific and engineering practices during COVID-era schooling. The Maine Science Teachers Association Speaker Series.

Miller, A.R. (2018, March 19). Theories of learning: Distributed cognition. University of Missouri graduate seminar: Learning Theories.

Miller, A.R. (2017, November 2). (Mis)alignments between preservice science teachers and mentor teachers during the student teaching practicum. Consortium for Excellence in Teacher Education (CETE) Annual Meeting. Brunswick, ME.

Miller, A.R. (2016, October 1). Practices in play: Fostering science learning in an early childhood play-based curriculum. National Association for the Education of Young Children (NAEYC), ME Regional Conference, Brunswick ME.

Miller, A.R. (2016, November). Investigating the impacts of targeted professional development around models and modeling on teachers' instructional practice. University of Wyoming Colloquium Series.

Peer-reviewed Conference Presentations & Proceedings:

Miller, A.R., Whitt, K.C., Larimore, R., Saenz, L., Makori, H. (2024, March). Using the Science and Engineering Observation Protocol (SciEPOP) to identify children's engagement with science and

engineering in early learning environments. Pre-conference workshop. NARST Annual International Conference, Denver, CO.

Saenz, L.P., Miller, A.R., Harvey, M., Voyer, C., Clarke, S.** (2023, April). Productive Struggle and Epistemic Empathy: Developing Teachers' Modeling Orientation in a Community Science Context. NARST Annual International Conference, Chicago, IL.

Chung, M. Miller, A.R., Kenyon, L. (2023, March). Supporting Play-Based Engagements with Science and Engineering Practices in Early Learning Environments. NSTA National Conference, Atlanta, GA.

Whitt, K.C., Kenyon, L., Miller, A.R., Saenz, L., & Larimore, R. (2023, January). Recognizing, Deepening, and Extending Play-Based Engagements with Science and Engineering Practices in Early Learning Environments. ASTE International Conference, Salt Lake City, UT.

Miller, A.R., & Saenz, L.P. (2022, April). Exploring Science and Engineering Practices in Preschoolers' Play: Implications for Equitable Early Learning Environments. AERA Annual Conference, San Diego, CA.

Saenz, L.P., & Miller, A.R. (2022, April). Validating the Science and Engineering Practices Observation Protocol (SciEPOP) for Play-based Learning Environments. AERA Annual Conference, San Diego, CA.

Miller, A.R., & Saenz, L.P. (2022, March). Using the Science and Engineering Practices Observation Protocol (SciEPOP) to Explore Play-based Early Learning Environments. NARST Annual International Conference, Vancouver, BC.

Miller, A.R., & Saenz, L.P. (2020, April). Validating the Preschool Scientific and Engineering Practices (PreSEP) Instrument for Play-based Learning Environments. AERA Annual Conference, San Francisco, CA. (In-person conference cancelled)

Miller, A.R. (2020, March). Using the Preschool Scientific and Engineering Practices (PreSEP) Instrument to Explore Preschoolers' Engagement with Elements of Modeling Practice. NARST Annual International Conference, Portland, OR. (In-person conference cancelled)

Miller, A.R., Saenz, L.P., & Eshoo, M. (2019, April). Developing an Instrument (PreSEP) to Explore Scientific and Engineering Practices in Preschoolers' Play. AERA Annual Conference, Toronto, Canada.

Miller, A.R., Saenz, L.P., & Eshoo, M. (2019, March). Developing the Preschool Scientific and Engineering Practices (PreSEP) Instrument to Explore STEM in Preschoolers' Play. NARST Annual International Conference, Baltimore, MD.

Miller, A.R., Zangori, L., Whitworth, B.A., Biggers, M., & Walsh, M.** (2019, January). Exploring (Mis)alignment in Inservice and Preservice Science Teacher Mentoring Relationships with Respect to Standards-based Reform. ASTE Annual Conference, Savannah, GA.

Miller, A.R., Zangori, L., Whitworth, B., & Biggers, M. (2018, March). Mind the Gap: Exploring (Mis)alignment in Inservice and Preservice Science Teacher Mentoring Relationships. NARST Annual International Conference, Atlanta, GA. March, 2018.

Miller, A.R. (2016, April). Examining the Relationship between Physical Models and Students' Science Practices. NARST Annual International Conference, Baltimore, MD.

Miller, A.R., & Kastens, K.A. (2015, April). Measuring the effectiveness of teaching interventions aimed at supporting students' analogical reasoning around physical models. NARST Annual International Conference, Chicago, IL.

Kastens, K.A., & Miller, A.M. (2015, July). Using physical models to build Earth Science students' competency around the science practice of modeling. Earth Educators' Rendezvous, National Association of Geoscience Teachers. Boulder, CO.

Rivet, A. E., Lyons, C. A., & Miller, A. R. (2014, June). Using Models for Reasoning and Content Learning: Patterns of Bootstrapping Towards Earth Science Understandings. The International Conference of the Learning Sciences (ICLS), Boulder, CO.

Other Presentations

Miller, A.R., & Saenz, L.P. (2022, December). Exploring Science and Engineering Practices in Play. Maine AEYC Annual Conference, Bangor, ME.

Miller, A.R. (2019, July). Exploring Nascent Modeling Practice in Preschoolers' Play. Gordon Conference on Visualization in Science and Education. Lewiston, ME.

RESEARCH INTERESTS

- Design-based research methods
- Models and modeling
- Science and engineering practices (*Next Generation Science Standards*)
- Cognitive apprenticeship, situated learning and communities of practice
- Science teacher education.
- Earth science and environmental education.

COURSES TAUGHT

Undergraduate:

- Teaching and Learning (Fall 2019, 2020, 2021, 2022)
- Advanced Seminar in Education: Theories of Learning (Spring 2018, 2021)
- Curriculum Development (Fall 2017, 2019, 2020)
- Educating All Students (Spring 2016, 2023/ Fall 2016, 2017, 2021, 2022)
- Bowdoin Teacher Scholars Seminar – Student Teacher Supervision (Spring 2016, 2017, 2020, 2021)
- Contemporary American Education (Fall 2014/ Spring 2015, 2017, 2022)
- Science Education: Purpose, Policy, Potential (Fall 2016/ Spring 2015, 2018, 2020, 2022, 2023)
- Environmental Science: Sustainability (Spring 2013)
- Elementary Science Methods (Fall 2012)

Graduate:

- Physical Science Curriculum and Methods for High School (Spring 2013)
- Physical Science Curriculum and Methods for Middle School (Fall 2012)

SERVICE TO THE COLLEGE

Committees

- Campus Planning & Design Committee (2023-present)
- Accessibility Task Force (2022-2023)
- External Evaluator, Bowdoin College Children's Center (2022-2023)
- Search Committee, Education Department (2022)
- Ad hoc Search Committee Member, Chemistry (2022)

- Institutional Review Board, Bowdoin College (2019 – 2022)
- Advisory Committee, Bowdoin College Children’s Center (2016 – 2022)
- Search Committee Chair, Education Department (2019 – 2020)
- Working Group for Faculty Mentoring, Bowdoin College (2017 – 18)
- Working Group for Classroom Visitation, Bowdoin College (2016 – 17)

PROFESSIONAL SERVICE AND AFFILIATIONS

Committees

- Executive Board, Maine Science Teachers Association (2024 – present)
- Maine DOE Steering Committee for the Revision of the Maine State Science Standards (2023)
- Membership Committee, NARST: A Global Organization for Improving Science Teaching and Learning through Research. (2017 – 2021)
- Working Group for the Multilingual Mainers program (2019)
- Maine DOE Executive Committee for Revision of the Maine State Science Standards (2017)

Journal and Conference Reviews:

- International Journal of Science Education (ad hoc)
- Science Education (ad hoc)
- Journal of Research in Science Teaching (ad hoc)
- NARST: A Global Organization for Improving Science Teaching and Learning through Research. Annual International Conference.

Professional Memberships:

- NARST: A Global Organization for Improving Science Teaching and Learning through Research
- The International Society of the Learning Sciences (ISLS)
- American Educational Research Association (AERA)
- Association for Science Teacher Education (ASTE)
- National Science Education Leadership Association (NSELA)
- National Science Teachers Association (NSTA)
- Consortium for Excellence in Teacher Education (CETE)
- Teacher Educator Association of Maine (TEAME)