

CORY T. FORBES

College of Education | College of Science
University of Texas at Arlington
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EDUCATION

Ph.D.	Science Education, University of Michigan School of Education Advisor and Committee Chair, Professor Elizabeth A. Davis Committee members, Professors Joe Krajcik, Jay Lemke, Michaela Zint	2009
M.S.	Natural Resources, University of Michigan School of Natural Resources & Environment Advisor and Committee Chair, Professor Michaela Zint	2009
M.S.	Science Education, University of Kansas School of Education Advisors, Professors James Ellis and Marc Mahlios	2002
Cert.	7-12 Teaching Certification in Biology, Chemistry, & General Science	2002
B.S.	Ecology & Evolutionary Biology, University of Kansas Advisor, Professor Val Smith	1999

PROFESSIONAL EXPERIENCE

<i>Chair and Fenton Wayne Robnett Endowed Professor of Science Education</i> (40% research, 40% teaching, 20% service)	2021-Present
<ul style="list-style-type: none">University of Texas at ArlingtonCollege of Education, Dept. of Curriculum & InstructionCollege of Science, Dept. of Earth and Environmental SciencesDirector, <i>STEM Education Research Collaboratorium and Resource Center</i>Faculty Affiliate, Institute for Sustainability and Global Impact (ISGI)	
<i>Associate Professor of Science Education</i> (50% research, 25% teaching) <i>Director, National Collaborative for Research on Food, Energy, & Water Education (NC-FEW) and Coordinator, IANR Science Literacy Initiative</i> (25% administration)	2014-2021
<ul style="list-style-type: none">University of Nebraska-Lincoln (UNL)School of Natural Resources, College of Agricultural Sciences and Natural Resources (CASNR), Institute for Agriculture and Natural Resources (IANR)Department of Teaching, Learning, and Teacher Education (TLTE), College of Education and Human Sciences (CEHS)Faculty Affiliate, Robert B. Daugherty Water for Food Global InstituteFaculty Affiliate, Nebraska Center for Research on Children, Youth, Families and Schools (CYFS)	
<i>Visiting Professor of Science Education</i>	Summer, 2019
<ul style="list-style-type: none">Leibniz Institute for Science and Mathematics Education at the University of Kiel (IPN), Germany	

Cory T. Forbes, Ph.D.

Chair, Dept. of Curriculum & Instruction | Fenton Wayne Robnett Endowed Professor of Science Education |
Director, *STEM Education Research Collaboratorium and Resource Center*

<i>Visiting Professor of Science Education</i>	Summer, 2013
<ul style="list-style-type: none">University of Augsburg (Germany), Institute for Didactic Research and Teacher Education, Primary Education and Didactics	
<i>Assistant Professor of Science Education (40% research, 40% teaching, 20% service)</i>	2009-2013
<ul style="list-style-type: none">University of Iowa College of Education, Dept. of Teaching and LearningFaculty Affiliate, Center for Global and Regional Environmental Research (CGRER)	
<i>Graduate research assistant – Professor Elizabeth A. Davis</i>	2004-2009
<ul style="list-style-type: none">University of Michigan School of EducationDoctoral Fellow, Center for Curriculum Materials in Science (CCMS; NSF CLT-0227557)	
<i>Secondary Science Teacher (9th-grade biology and physical science)</i>	2002-2004
<ul style="list-style-type: none">Chisholm Trail Junior High SchoolOlathe School District, Olathe, Kansas	
<i>Graduate research assistant - Professor Joseph Heppert</i>	2000-2002
<ul style="list-style-type: none">University of Kansas Center for Science EducationKansas Collaborative for Excellence in Teacher Preparation (KCETP; NSF DUE-9876676)	

ADMINISTRATIVE LEADERSHIP

Chair, Department of Curriculum and Instruction, UTA College of Education 2021-Present
Responsible for providing leadership supervising personnel, budget, and general operations of the department; facilitating the development and accomplishment of department goals; supporting faculty scholarship; assisting in the development of departmental grants; maintaining close affiliations with area school districts; working in a collegial manner with faculty, staff, and students; and providing vision and leadership for the department to achieve research excellence while continuing the tradition of its rigorous teaching programs.

Coordinator, Science Literacy Initiative, IANR, UNL 2014-2021
Director, National Collaborative for Research on Food, Energy, & Water Education (NC-FEW)

Provide leadership for the development of nationally and internationally recognized research, extension, and teaching programs fostering science literacy through development of innovative programs in food, fuel, water, landscapes, people, and the integrated stewardship of agriculture and natural resources

- Founding Director, *National Collaborative for Research on Food, Energy, and Water Education (NC-FEW)*. Supporting STEM teaching and learning about sustainable food, energy, and water systems through the development of K-16 STEM curriculum, education research and program evaluation, and nationwide engagement and capacity-building.
- Administrative development team for the new, interdisciplinary, 15-hour undergraduate Food, Energy, and Water in Society minor that offers UNL undergraduate students the opportunity to develop the knowledge and skills to analyze and make informed decisions about current and emerging real-world, STEM-based food, energy, and water issues. Established a new course identifier (SCIL) for Science Literacy program-affiliated courses.
- Secured \$400,000 in charitable donations from external stakeholders in support of the Science Literacy Initiative and established the Science Literacy Excellence Fund with the NU Foundation.

- Organizer, annual *STEMming into the Future* STEM outreach event at the Nebraska State Fair, involving 35+ organizations and reaching over 350,000 fairgoers.
- Supervisor and mentor for three pre-tenure STEM education faculty members and one full-time staff member
- Co-Coordinator, CASNR Masters of Applied Science program, Science for Educators specialization. Led efforts to reconstitute the program committee, redesign core curriculum, academic requirements, and faculty advising structure, and serve on college-wide MAS program committee.
- Project Director, UNL ORED Big Ideas Seed Grant to build capacity for long-term science literacy efforts. Lead a project team comprised of 10 UNL faculty representing 7 departments across 5 colleges (CASNR, CEHS, Engineering, Law, Arts and Sciences) and multiple interdisciplinary centers.
- Organizer, Science Literacy Seminar Series, which has brought 7 visiting scholars from the U.S. and Germany to UNL for invited presentations and engagement with UNL faculty.
- Lead development of external funding proposals for program-level capacity-building, evaluation, and education research efforts.
- Significant, ongoing engagement with UNL administration, faculty and graduate students from STEM, STEM education, social sciences, and humanities units, and external stakeholders.
- Provide budgetary oversight and fiscal accountability at the program level.
- Participant, 2016 *Academic Leadership Academy*, Pennsylvania State Center for the Study of Higher Education and the Higher Education Program. <http://sites.psu.edu/cshe/education/academic-leadership-academy/>

Elementary Science Coordinator, University of Iowa College of Education

2009-2013

- Coordinator for 7 sections/year of the 07E:162 – Elementary Science Teaching Methods course, including supervision of faculty and graduate student instructors, curriculum planning, facilities management, and both program-, department-, and college-level reporting.
- Science education representative on the Elementary Teacher Education program committee.
- Provided leadership for a 2-year redesign of the Elementary Teacher Education program, including the development of three new integrated science/pedagogy courses for undergraduate students preparing to become K-8 teachers.

EXTERNAL FUNDING

Current Projects

Senior Personnel, NSF DRK-12, BUILDING THE EPISTEMOLOGY OF ENGINEERING FOR STUDENTS WITH EXTENSIVE SUPPORT NEEDS (BEES; NSF DRK-12, DRL 2201407, \$770K, 07/01/2022 - 06/30/2025, awarded May, 2022). CO-PIs Bree Jimenez and Ginevra Courtade. Project BEES is an early stage design and development project focused on the teaching strand. This project will address engineering focused behaviors and mindsets of students with extensive support needs (ESN) in grades 3-5 who are underserved by current practices and often not responsive to typical science instruction. This 3-year, mixed-methods, design and development project has two major objectives: (1) to develop a framework to support teacher instruction of engineering-focused behaviors and mindsets for students with ESN, and (2) to use this framework to design, assess, and disseminate universally designed instructional materials. In particular, we propose four strands of work: (a) investigating teachers' engineering instruction, (b) developing a framework to support teacher development of students' engineering-focused behaviors and mindsets to support instruction of students with ESN, (c) conducting design-based implementation research to support universally designed engineering instruction and

instructional materials, (d) producing and disseminating the instructional support framework and materials.

Co-PI, NSF CYBERTRAINING: PILOT, JUSTICE IN DATA: AN INTENSIVE, MENTORED ONLINE BOOTCAMP DEVELOPING FAIR DATA COMPETENCIES IN UNDERGRADUATE RESEARCHERS IN THE WATER AND ENERGY SECTORS (CISE CyberTraining, OAC 2230054, \$300K, 01/01/2023 - 12/31/2024, awarded June, 2022). PI Jessica Eisma, UTA Department of Civil Engineering. This project involves an intensive week-long Findable, Accessible, Interoperable, Reusable (FAIR) data principles and introductory machine learning (ML) bootcamp for undergraduate students conducting summer research in the water or energy sector followed by two workshops with principal investigators. The goals of this program are: (1) to develop and test an accessible framework and instructional materials for expanding CI adoption among budding researchers, (2) to increase the use of FAIR principles and ML to solve civil engineering research problems, (3) to increase the diversity of the CI research workforce, and (4) to broaden the adoption of CI in established research laboratories. The virtual bootcamp and workshops, hosted by the University of Texas at Arlington (UTA), will serve up to 40 participants in two consecutive years. Participants are recruited from Hispanic-Serving Institutions (HSIs) and Historically Black Colleges and Universities (HBCUs). The bootcamp will cover high-impact topics for new CI users, for example large-scale data access, data analytics, and data visualization, and will introduce basic machine learning concepts. Bootcamp instructors continue to serve as mentors throughout participants' summer research experiences. At the end of the summer, a competition-based, online research symposium will be held where participants describe how they (1) applied FAIR principles in their summer research experience and (2) developed workflows and tools for research-related tasks (e.g., data download and organization). Bootcamp instructors and involved faculty will work with interested students to publish their developed workflows and tools through MyGeoHub, a geospatial modeling, data analysis, and visualization hub for research and education communities.

Principal Investigator, WATER EDUCATION, LEARNING, AND LITERACY (WELL) IN UNDERGRADUATE EDUCATION. A multi-year project focused on the iterative design, implementation, and study of an interdisciplinary course for non-majors – SCIL/AECN/ENVR/GEOG/NRES 109: *Water in Society* – at the University of Nebraska-Lincoln (UNL) focused on students' use of data-driven, computer-based modeling tools to reason and make decisions about contemporary socio-hydrologic challenges.

- \$300,000 the USDA-NIFA, Higher Education Challenge Grants program, *Supporting Undergraduate Teaching and Learning about Socio-Hydrological Challenges through Data-Driven Modeling*, 4/1/2020-10/31/2023 (awarded December, 2019)
- \$299,018 from the National Science Foundation, *Improving Undergraduate STEM Education, Fostering Undergraduate Students' Disciplinary Learning and Water Literacy*, (IUSE, NSF DUE-1609598), 8/1/2016-7/31/2019 (awarded June, 2016)
- \$53,000 from the Robert B. Daugherty Water for Food Global Institute at the University of Nebraska

Past Projects

Principal Investigator, HIGH SCHOOL STUDENTS' CLIMATE LITERACY THROUGH EPISTEMOLOGY OF SCIENTIFIC MODELING (CliMES; NSF DRK-12, (DRL 1720838/2203386 and 1719872), \$1.7M, 9/1/2017-8/31/2023, awarded May, 2017). Co-PI Mark Chandler, NASA Goddard Space Institute and Columbia University. A 5-year, mixed-methods, design-based research project to investigate teaching and learning through a high school climate education module designed around EzGCM (Easy Global Climate Modeling), a web-based climate modeling suite designed to provide non-scientists experiences with climate modeling. We will develop and implement a 6-week climate science module for secondary

science classrooms designed around EzGCM. Each year, we will collect and analyze evidence of students' model-based reasoning about the Earth's climate. The project will impact an anticipated 55 secondary teachers and 3000 secondary students over four years.

Director, NATIONAL COLLABORATIVE FOR RESEARCH ON FOOD, ENERGY, & WATER EDUCATION (NC-FEW) AND Coordinator, IANR Science Literacy (January, 2014-August, 2022). Institutional and national community of educators and education researchers focused on education in the Food-Energy-Water-Nexus. It advances efforts toward sustained, systemic, and interdisciplinary education and outreach efforts focused on FEW issues in a wide array of contexts, including K-12 classrooms, university settings, informal and non-formal learning environments, and in public spaces.

- \$750,000 NSF, Innovations in the Food-Energy-Water-Nexus (INFEWS) Research Coordination Network (INFEWS/T3 RCN #1856040, awarded August, 2019)
- \$300,000 in charitable gifts from external stakeholders
- \$150,000 UNL ARD Strategic Initiatives Fund
- \$79,200 USDA-NIFA subcontract
- \$49,300 UNL CASNR and Extension
- \$30,000 from USDA-NIFA Higher Education Challenge Grant (HEC)
- \$12,000 Multistate Research/UNL ARD
- \$10,500 from National STEM Education Centers (NSEC) network/APLU
- \$10,000 Big Ideas Seed Grant, UNL Office of Research and Economic Development
- \$10,000 Virginia Tech National Capitol Region

Principal Investigator, WATER EDUCATION LEADERS for SECONDARY SCIENCE (WELS²), 12/1/2016-9/30/2018 (awarded August, 2016). The WELS² project at the University of Nebraska-Lincoln (UNL) supports the development, implementation, and evaluation of a 15-month sustained professional development program for secondary STEM teachers in the state of Nebraska focused on teaching and learning about water resources. This integrated project is grounded in a partnership involving the Science Literacy Initiative, Robert B. Daugherty Water for Food Institute, UNL water scientists, the Groundwater Foundation, and four Nebraska school districts. The project will help catalyze a self-sustaining and non-exhaustive professional development model that leverages, builds upon, and enhances existing UNL programs, including on online master's degree for K-12 STEM educators, the Nebraska Collaborative for Food, Energy, & Water Education, and other grant-funded projects at UNL focused on K-16 teaching and learning about water.

- \$144,150 from the USDA-NIFA, Food, Agriculture, Natural Resources and Human Sciences Education and Literacy Initiative (ELI), PD-STEP track
- \$62,038 from Nebraska Title IIA Improving Teacher Quality State Grant (Nebraska Coordinating Commission for Postsecondary Education)

Principal Investigator, EXCELLENCE IN EDUCATION FOR FOOD, ENERGY, AND WATER (E²FEW), 2/1/2017-1/31/2020, awarded January, 2017). The 3-year E²FEW project at UNL supports the development, implementation, and evaluation of a 24-month sustained professional development program for postsecondary STEM science faculty. The program will complement and synergistically enhance the impact of the recently-established Food, Energy, and Water in Society (FEWS) undergraduate minor in the UNL College of Agricultural Sciences and Natural Resources, which will serve undergraduate students from across the university and provide integrated, multidisciplinary, learner-centered instruction in STEM with an emphasis on FEW issues. The faculty development program is designed around core tenets of effective undergraduate STEM instruction, including active learning, scientific

teaching strategies, and the use of Undergraduate Learning Assistants. The goals of the program, which will be rigorously evaluated as part of the project, are to a) increase implementation of innovative curricular and instructional components into existing FEWS minor courses and, through changes to these courses, b) positively impact students' learning. The project will catalyze a self-sustaining community of practice for instructional innovation around the FEWS minor and lay the foundation for future efforts to scale and evaluate the minor's impact.

- \$138,000 from USDA-NIFA Higher Education Challenge Grant (HEC)
- \$10,000 from UNL UCARE undergraduate research program

Principal Investigator, UNDERSTANDING INHERITANCE IN CORN (UnICORN; June 1, 2014-Sept 30, 2019, awarded June, 2014). The 4-year UnICORN project involves a collaborative effort between UNL, USDA-NIFA, the national Agriculture in the Classroom (AITC) program, and school districts that emphasizes the science, technology, engineering, and mathematics (STEM) foundations of agricultural and natural resource systems. Project activities involve developing, implementing, and studying the impact of an 8-week, 3rd-grade science unit focused on a particular production system – corn – to promote student learning about core life sciences concepts emphasized in the Nebraska State Science Standards and Next Generation Science Standards (NGSS).

- \$386,600 from Hatch Multistate (regional) Research Project funds
- \$30,000 from the Nebraska Corn Board

Senior Personnel, NEBRASKA STEM: NOYCE ELEMENTARY STEM MASTER TEACHING FELLOWS PROGRAM FOR RURAL NEBRASKA, \$1.5M, 03/01/2018 - 02/28/2023, awarded March, 2018). NebraskaSTEM is a Track 3 MTF proposal among the University of Nebraska-Lincoln, Nebraska Educational Technology Association, North Bend Central Public Schools, Longfellow Elementary School, and Harvard Public Schools. NebraskaSTEM aims to enhance the capacity of Nebraska teachers to facilitate high-quality, science, technology, engineering, and mathematics learning opportunities for K- 6 students attending rural Nebraska schools. Fifteen highly qualified, certified elementary teachers who currently teach or intend to teach in high needs, rural Nebraska schools will be selected to become NebraskaSTEM NSF Master Teaching Fellows. During the first year of the five-year fellowship, at least twelve teachers will complete a master's degree in elementary education, with specialization in STEM, with up to three teachers who already possess master's degrees completing STEM and leadership graduate coursework. Ongoing mentorship and professional development during years two through five will provide MTFs with opportunities to apply and share their knowledge and skills as they implement high-quality STEM instruction in their classrooms and serve as STEM leaders in their local schools and communities. The overall goal of NebraskaSTEM is to enhance STEM learning for K-6 students in rural Nebraska schools.

Principal Investigator, MODELING HYDROLOGIC SYSTEMS IN ELEMENTARY SCIENCE (MoHSES; NSF DRL-1443223) and WATER FOR ELEMENTARY TEACHERS OF SCIENCE IN NEBRASKA (NE WETS), September 1, 2012 – August 31, 2017 (awarded August 2012). Five years of research and development to investigate elementary students' model-based reasoning about the water cycle and how elementary teachers scaffold students' model-based reasoning. The project leverages a partnership involving the University of Nebraska-Lincoln (UNL) and Michigan State University (MSU) science education programs, the Iowa Van Allen Science Teaching (VAST) Center and Grant Wood Area Education Agency (GWAEA), UNL's National Drought Mitigation Center (NDMC), the UI Center for Global and Regional Environmental Research (CGRER), and six school districts in Iowa and Nebraska.

- \$448,546 from the National Science Foundation (Discovery Research K-12)

- \$71,734 Nebraska Title IIA Improving Teacher Quality State Grant (Nebraska Coordinating Commission for Postsecondary Education)
- \$29,945 from UI Center for Global and Regional Environmental Research
- \$23,394 from the Iowa Measurement Research Foundation
- \$10,000 from UNL

Principal Investigator, REFLECTIVE ASSESSMENT FOR ELEMENTARY SCIENCE (RAES), March 2012 – June 2015 (awarded January 2012). Three years of research and development to investigate 3rd-6th-grade teachers' use of Reflective Assessment, a formative assessment strategy for science. It is grounded in a partnership between UNL, the UI Colleges of Education and Engineering, VAST and GWAEA, four school districts, and CGRER.

- \$477,812 from the Title IIA Improving Teacher Quality State Grant, State of Iowa Board of Regents
- \$39,932 from the Spencer Foundation (Small Grants Program)
- \$25,721 from University of Iowa College of Education

Principal Investigator, PROMOTING INQUIRY-BASED ELEMENTARY SCIENCE THROUGH COLLABORATIVE CURRICULUM CONSTRUCTION (PIESC3), August 2010 – July 2013 (May 2010). This project involves the development, implementation, and evaluation of a 2-year science professional development program for elementary teachers (K-5) in the Davenport Community School District (DCS) and research and development associated with reliability and validity testing of an inquiry observation protocol and scoring rubric for elementary science.

- \$134,978 from the Carver Charitable Trust
- \$73,168 from the UI CoE and VP for Research
- \$73,168 from Iowa Measurement Research Foundation and Iowa Math and Science Education Partnership

PEER-REVIEWED PUBLICATIONS

*co-author was current or former student

**co-author was former graduate advisor

Sole or shared first authorship indicated in bold

Refereed Journal Articles

1. Mostacedo-Marasovic, S.J.*, Mott, B.C.*, White, H.*, & Forbes, C.T. (in press). [Towards water literacy: Analysis of standards for teaching and learning about water and humans](#). In *Disciplinary and Interdisciplinary Science Education Research (DISER)*.
2. Böschl, F.*, Lange-Schubert, K., & Forbes, C.T. (2023). [Investigating scientific modeling practices in U.S. and German elementary science classrooms: A comparative, cross-national video-study](#). *Science Education*, 107(2), 368-400.
3. Mostacedo-Marasovic, S.J.*, Mott, B.C.*, White, H.*, & Forbes, C.T. (2023). [Towards water literacy: Analysis of standards for teaching and learning about water on Earth](#). *Journal of Geoscience Education*, 71(2), 192-207.
4. White, H.*, & Forbes, C.T. (2023). [An investigation of undergraduate students' spatial thinking about groundwater](#). *Journal of Geography in Higher Education*, 70(1), 101-113.
5. Carroll-Steward, K.*, Bhattacharya, D., Chandler, M.C., & Forbes, C.T. (2022). [Secondary science teachers' implementation of a curricular intervention when teaching with global climate models](#). *Journal of Geoscience Education*, 70(4), 474-489.

6. Mostacedo-Marasovic, S.J., Lally, D., Pettit, D.N., White, H., & Forbes, C.T. (2022). [Supporting undergraduate students' developing water literacy during a global pandemic: A longitudinal study](#). *Disciplinary and Interdisciplinary Science Education Research (DISER)*, 4(7).
7. Owens, D. C., Sadler, T. D., Pettit, D. N.*, & Forbes, C. T. (2022). [Exploring undergraduates' breadth of socio-scientific reasoning through domains of knowledge](#). *Research in Science Education*, 52, 1643–1658.
8. Sommers, A.*, White, H.*, Alred, A., Dauer, J., & Forbes, C.T. (2022). Faculty development, teaching, and student outcomes in undergraduate food, energy, and water systems (FEWS) courses. *Journal of College Science Teaching*, 51(6), 66-74.
9. White, H.*, Lally, D.*, & Forbes, C.T. (2022). [Investigating groundwater: Middle school students' mapping data-driven, computer-based models to socio-hydrologic phenomena](#). *Journal of Geoscience Education*, 70(1)101-113.
10. Bhattacharya, D., Carroll-Steward, K.*, & Forbes, C.T. (2021). [Climate education in secondary science: Comparison of model-based and non-model-based investigations of Earth's climate](#). *International Journal of Science Education*, 43(13), 2226-2249.
11. Bhattacharya, D., Carroll-Steward, K.*, & Forbes, C.T. (2021). [Empirical research on K-16 climate education: A systematic review of the literature](#). *Journal of Geoscience Education*, 69(3), 223-247.
12. **Forbes, C.T.**, Neumann, K., & Schiepe-Tiska, A. (2020). [Patterns of inquiry-based science instruction and student science achievement in PISA 2015](#). *International Journal of Science Education*, 42(5), 783-806.
13. Lally, D.* & Forbes, C.T. (2020). [Sociohydrologic systems thinking: An analysis of undergraduate students' operationalization and modeling of coupled human-water systems](#). *Water*, 12(4), 1040-1058.
14. Lally, D.*, Franz, T., & Forbes, C.T. (2020). [Undergraduate education about water and climate change: Students' use of a water balance model](#). *Journal of Sustainability Education*.
15. Owens, D., Pettit, D.* Lally, D.*, & Forbes, C.T. (2020). [Cultivating water literacy in STEM education: Undergraduates' socio-scientific reasoning about socio-hydrologic issues](#). *Water*, 12(10), 2857.
16. Baumfalk, B.*, Bhattacharya, D., Vo, T.*, Forbes, C.T., Zangori, L.*, & Schwarz, C. (2019). [Impact of model-based curriculum and instruction on 3rd-grade students' scientific explanations for the hydrosphere](#). *Journal of Research in Science Teaching*, 56(5), 570-597.
17. Cisterna, D., Forbes, C.T., & Roy, R. (2019). [Model-based teaching and learning about inheritance in 3rd-grade science](#). In *International Journal of Science Education*, 41(15), 2177-2199.
18. **Forbes, C.T.**, Cisterna, D., Bhattacharya, D., & Roy, R. (2019). [Modeling elementary students' ideas about heredity: A comparison of a curricular intervention](#). *American Biology Teacher*, 81(9), 626-635.
19. Lally, D.* & Forbes, C.T. (2019). [Modeling water systems in an introductory undergraduate course: Students' use and evaluation of data-driven, computer-based models](#). *International Journal of Science Education*, 41(14), 1999-2023.
20. Lally, D.*, Forbes, C.T., McNeal, K., & Soltis, N. (2019). [National Geoscience Faculty Survey 2016: Prevalence of systems thinking and scientific modeling learning opportunities](#). *Journal of Geoscience Education*, 67(2), 174-191.
21. Pettit, D.N.* & Forbes, C.T. (2019). [Values use of undergraduate students in socio-hydrological reasoning: A comparative study](#). *Natural Sciences Education*, 48(1), 1-12.
22. Soltis, N., McNeal, K., Forbes, C.T. & Lally, D.* (2019). [The relationship between active learning, course innovation, and teaching Earth systems thinking: A structural equation modeling approach](#). *Geosphere*, 15(5), 1703-1721.

23. Sommers, A. *, White, H. *, Alred, A., Dauer, J., & Forbes, C.T. (2019). [Teaching styles and student outcomes in undergraduate food, energy, and water systems \(FEWS\) courses](#). In *North American Colleges and Teachers of Agriculture (NACTA) Journal*, 63(2), 67-77.
24. Sutter, A.M.*, Dauer, J.M., Kreuziger, T., Schubert, J., Forbes, C.T. (2019). [Sixth-grade students' problematization of and decision-making about a wind energy socio-scientific issue](#). *International Research in Geographical and Environmental Education*, 28(3), 242-256.
25. Vo., T.*, Forbes, C.T., Zangori, L. *, & Schwarz, C. (2019). [A longitudinal investigation of primary inservice teachers' modelling the hydrological phenomena](#). *International Journal of Science Education*, 41(18), 2788-2807.
26. Sutter, A.M. *, Dauer, J.M., & Forbes, C.T. (2018). [Construal level and value-belief norm theories: Implications for undergraduate decision-making on a prairie dog socio-scientific issue](#). *International Journal of Science Education*, 40(9), 1058-1075.
27. Brandt, M. *, Forbes, C.T., & Keshwani, J. (2017). [Exploring elementary students' scientific knowledge of agriculture using Evidence-Centered Design](#). *Journal of Agricultural Education*, 58(3), 134-149.
28. Nelson, K. *, Sabel, J. *, Forbes, C.T., Grandgenett, N., Tapprich, W., & Cutucache, C.E. (2017). [How do undergraduate STEM mentors reflect upon their mentoring experiences in an outreach program engaging K-8 youth?](#) *International Journal of STEM Education*, 4(3), 1-13.
29. Sabel, J. *, Dauer, J., & Forbes, C.T. (2017). [Introductory biology students' use of enhanced answer keys and reflection questions to engage in metacognition and enhance understanding](#). *CBE--Life Sciences Education*, 16(3), 2-12.
30. Sabel, J. *, Vo, T. *, Alred, A., Dauer, J. & Forbes, C.T. (2017). [Undergraduate students' scientifically-informed decision-making about socio-hydrological issues](#). *Journal of College Science Teaching*, 46(6), 64-72.
31. Zangori, L. *, Vo, T. *, Forbes, C.T., & Schwarz, C. (2017). [Supporting 3rd-grade students' model-based explanations about groundwater: A quasi-experimental study of a curricular intervention](#). In *International Journal of Science Education*, 39(11), 1421-1442.
32. Dauer, J. & Forbes, C. T. (2016). [Making decisions about complex socioscientific issues: A multidisciplinary science course](#). *Science Education & Civic Engagement: An International Journal*, 8(2), 5-12.
33. Sabel, J. *, Forbes, C. T., & Flynn, M.L. (2016). [Elementary teachers' use of content knowledge to evaluate students' thinking in the life sciences](#). *International Journal of Science Education*, 38(7), 1077-1099.
34. Zangori, L. * & Forbes, C. T. (2016). [Development of an empirically-based learning performances framework for 3rd-grade students' model-based explanations about plant processes](#). *Science Education*, 100(6), 961-982.
35. Forbes, C.T., Sabel, J. *, & Biggers, M. * (2015). [Elementary teachers' use of formative assessment to support students' learning about interactions between the hydrosphere and geosphere](#). *Journal of Geoscience Education*, 63(3), 210-221.
36. Forbes, C.T., Sabel, J. *, & Zangori, L. * (2015). [Integrating life science content and instructional methods in elementary teacher education](#). *American Biology Teacher*, 77(9), 5-11.
37. Forbes, C.T., Zangori, L. *, Schwarz, C.V. (2015). [Empirical validation of integrated learning performances for hydrologic phenomena: 3rd-grade students' model-driven explanation-construction](#). *Journal of Research in Science Teaching*, 52(7), 895-921.
38. Sabel, J. *, Forbes, C.T., & Zangori, L. * (2015). [Promoting prospective elementary teachers' learning to use formative assessment for life science instruction](#). *Journal of Science Teacher Education*, 26(4), 419-445.

39. Vo, T.* , Forbes, C.T., Zangori, L.* , & Schwarz, C. (2015). [Fostering 3rd-grade students' use of scientific models with the water cycle: Elementary teachers' conceptions and practices.](#) *International Journal of Science Education*, 37(15), 2411-2432.
40. Zangori, L.* & Forbes, C. T. (2015). [Exploring 3rd-grade students' model-based explanations about plant relationships within an ecosystem.](#) *International Journal of Science Education*, 37(18), 2942-2964.
41. Zangori, L.* , Forbes, C.T., & Schwarz, C.V. (2015). [Exploring the effect of embedded scaffolding within curricular tasks on 3rd-grade students' model-based explanations about hydrologic cycling.](#) *Science & Education*, 24(7-8), 957-981.
42. **Forbes, C.T.**, Lange, K., Möller, K., Biggers, M.* , Laux, M., & Zangori, L.* (2014). [Explanation-construction in 4th-grade classrooms in Germany and the United States: A cross-national comparative video study.](#) *International Journal of Science Education*, 36(14), 2367-2390.
43. Zangori, L.* & Forbes, C.T. (2014). [Scientific practices in elementary classrooms: 3rd-grade students' scientific explanations for seed structure and function.](#) *Science Education*, 98(4), 614-639.
44. Biggers, M.* , **Forbes, C.T.**, & Zangori, L.* (2013). [Elementary teachers' curriculum design and pedagogical reasoning for supporting students' comparison and evaluation of evidence-based explanations.](#) *The Elementary School Journal*, (114)1, 48-72.
45. **Forbes, C.T.** (2013). [Curriculum-dependent and curriculum-independent factors in preservice elementary teachers' adaptation of science curriculum materials for inquiry-based science.](#) *Journal of Science Teacher Education*, (24)1, 179-197.
46. **Forbes, C.T.**, Biggers, M.* , & Zangori, L.* (2013). [Investigating essential characteristics of scientific practices in elementary science learning environments: The Practices of Science Observation Protocol \(P-SOP\).](#) *School Science and Mathematics*, (113)4, 180-190.
47. Zangori, L.* & Forbes, C.T. (2013). [Preservice elementary teachers and explanation construction: Knowledge-for-practice and knowledge-in-practice.](#) *Science Education*, 97(2), 310-330.
48. Zangori, L.* , **Forbes, C.T.**, & Biggers, M.* (2013). [Fostering student sense-making in elementary science learning environments: Elementary teachers' use of science curriculum materials to promote explanation-construction.](#) *Journal of Research in Science Teaching*, (50)8, 887-1017.
49. Biggers, M.* & Forbes, C.T. (2012). [Balancing teacher and student roles in elementary classrooms: Preservice elementary teachers' ideas about the inquiry continuum.](#) *International Journal of Science Education*, 34(14), 2205-2229.
50. **Forbes, C.T.** & Davis, E.A.** (2012). [Operationalizing identity in action: A comparative study of direct versus probabilistic measures of curricular role identity for inquiry-based science teaching.](#) *International Journal of Science and Mathematics Education*, 10(2), 267-292.
51. Davis, E.A.** , Beyer, C., Forbes, C.T., & Stevens, S. (2011). [Understanding pedagogical design capacity through teachers' narratives.](#) *Teaching and Teacher Education*, 27(4), 797-810.
52. **Forbes, C.T.** (2011). [Preservice elementary teachers' adaptation of science curriculum materials for inquiry-based elementary science.](#) *Science Education*, 95, 1–29.
53. **Forbes, C.T.** & Zint, M.** (2011). [Elementary teachers' beliefs about, perceived competencies for, and reported use of scientific inquiry to promote student learning about and for the environment.](#) *Journal of Environmental Education*, 42(1), 30-42.
54. **Forbes, C.T.** & Davis, E.A.** (2010). [Curriculum design for inquiry: Preservice elementary teachers' mobilization and adaptation of science curriculum materials.](#) *Journal of Research in Science Teaching*, 47(7), 365-387.
55. **Forbes, C.T.** & Davis, E.A.** (2010). [Beginning elementary teachers' beliefs about the use of anchoring questions in science: A longitudinal study.](#) *Science Education*, 94(2), 365-387.

56. **Forbes, C.T.** & Davis, E.A.** (2008). [The development of preservice elementary teachers' curricular role identity for science teaching](#). *Science Education*, 92(5), 909-940.
57. **Forbes, C.T.** & Davis, E.A.** (2008). [Exploring preservice elementary teachers' critique and adaptation of curriculum materials in respect to socioscientific issues](#). *Science & Education*, 17(8-9), 829-854.
58. **Forbes, C.T.** (2004). [The value of peer mentoring in the development of beginning secondary science teachers: 3 case studies](#). *Mentoring & Tutoring Journal*, 12(2), 219-239.

Refereed Conference Proceedings

1. **Forbes, C.T.**, Chandler, M.C., Bhattacharya, D., Vo, T.*, & Griffin, J. (2018). Secondary students' model-based reasoning about Earth systems: Practice, epistemology, and conceptual understanding. In Kay, J. & Luckin, R. (Eds.), *Transforming learning, empowering learners: Proceedings of the 13th International Conference of the Learning Sciences (ICLS 2018), Volume 3*, (pp. 1397-1398). London: International Society of the Learning Sciences.
2. McKenney, S., van Aalst, J., & Forbes, C.T. (2016). Realizing research-practice connections: Three cases from the learning sciences. In Looi, C-K, Polman, J., Cress, U., and Reimann, P. (Eds.), *Transforming learning, empowering learners: Proceedings of the 12th International Conference of the Learning Sciences (ICLS 2016), Volume 1*, (pp. 639-646). Singapore: International Society of the Learning Sciences.
3. **Forbes, C.T.**, Schwarz, C., & Zangori, L.* (2014). Development of an empirically-based learning performances framework for 3rd-grade students' model-based explanations about hydrologic cycling. In Polman, J. L., Kyza, E. A., O'Neill, D. K., Tabak, I., Penuel, W. R., Jurow, A. S., O'Connor, K., Lee, T., and D'Amico, L. (Eds.), *Learning and becoming in practice: The International Conference of the Learning Sciences (ICLS) 2014, Volume 1*, (pp. 46-53). Boulder, CO: International Society of the Learning Sciences.
4. Zangori, L.*, Forbes, C.T., & Schwarz, C. (2014). Investigating the effect of curricular scaffolds on 3rd-grade students' model-based explanations for hydrologic cycling. In Polman, J. L., Kyza, E. A., O'Neill, D. K., Tabak, I., Penuel, W. R., Jurow, A. S., O'Connor, K., Lee, T., and D'Amico, L. (Eds.), *Learning and becoming in practice: The International Conference of the Learning Sciences (ICLS) 2014, Volume 2*, (pp. 942-946). Boulder, CO: International Society of the Learning Sciences.
5. **Forbes, C.T.**, Madeira, C.A., & Slotta, J.D. (2010). Activity-theoretical research on science teachers' expertise and learning. In Gomez, K., Lyons, L., & Radinsky, J. (Eds.), *Learning in the Disciplines: Proceedings of the 9th International Conference of the Learning Sciences (ICLS 2010), Volume 1*, (pp. 651-658). Chicago, IL: International Society of the Learning Sciences.

Refereed Practitioner Articles

1. Bhattacharya, D., Chandler, M., Carroll-Steward, K.*, & Forbes, C.T. (2020). Investigating the phenomenon of increasing surface air temperatures using a global climate modeling approach. *The Science Teacher*, 88(1), 58-66.
2. Cisterna, D., Ingram, E., Bhattacharya, D., Roy, R., & Forbes, C.T. (2020). Decoding the cornfield: Building students' ideas about plant inheritance and variation. *Science and Children*, 58(2), 45-50.
3. Scherer, H. H., Forbes, C. T., Sintov, N., & Wang, H.-H. (2020). The Food-Energy-Water-Nexus: A new way to help students think about resource management in AFNR education. *The Agricultural Education Magazine*, 92(5), 5-8.
4. Lange-Schubert, K., Böschl, F.*, Vo, T.*, & Forbes, C.T. (2019). Mehr als Matchbox?! Modelle und Modellieren in der Grundschule [More than Matchbox?! Models and modeling in elementary school]. *Chemie*, 30(171), 33-37.

5. Bhattacharya, D., Carroll-Steward, K.*, Sutter, A.*, Chandler, M., & Forbes, C.T. (2018). [Climate literacy: Insights from research on K-16 climate education](#). *Green Schools Catalyst Quarterly*, V(4), 26-35.
6. **Forbes, C.T.**, Brozovic, N., Franz, T., Lally, D.*, & Pettitt, D.* (2018). Water in Society: An interdisciplinary course to support undergraduate students' water literacy. *Journal of College Science Teaching*, 48(1), 36-42.
7. **Forbes, C.T.**, Vo, T.*, Zangori, L.*, & Schwarz, C. (2015). Supporting students' scientific modeling when learning about the water cycle, *Science and Children*, 53(2), 42-49.
8. Lange, K., Forbes, C.T., Helm, K., & Hartinger, A. (2014). Forschen heißt auch Modellieren! Wie kann das im naturwissenschaftlichen Sachunterricht der Grundschule aussehen? [Inquiry includes modelling - how can this look in elementary classrooms?]. *Grundschulunterricht*, 4, 17-22.
9. Zangori, L.*, Forbes, C.T., & Biggers, M.* (2012). This is inquiry...right? Strategies for effectively adapting elementary science lessons. *Science and Children*, 50(1), 48-53.

Book Chapters

1. Olsen, A. A., Mostacedo-Marasovic, S.-J., & Forbes, C. T. (accepted). Analyzing various person-fit and item-fit statistics to assess complex, model-based climate learning outcomes for secondary students. In X. Liu, & W. Boone (Eds.), *Advances in Applications of Rasch Measurement in Science Education*. Springer Nature.
2. Osborne J. et al. (2021). [PISA 2015: What can science education learn from the data?](#) In Levrini O., Tasquier G., Amin T.G., Branchetti L., Levin M. (Eds), *Engaging with Contemporary Challenges through Science Education Research. Contributions from Science Education Research*, vol 9. Springer, Cham. https://doi.org/10.1007/978-3-030-74490-8_7
3. **Forbes, C.T.** (2020). Conclusion: Reflections on science teacher education for reform-based elementary science. In E.A. Davis, C. Zembal-Saul, & S. Kademian (Eds.), *Sensemaking in Elementary Science: Supporting Teacher Learning* (pgs. 251-265). Routledge; New York.
4. **Forbes, C.T.**, Chandler, M., Blake, J., Bhattacharya, D., Carroll-Steward, K.*, Johnson, V., DeGrand, T., Mason, W., and Murrow, B. (2020). Fostering climate literacy with global climate models in secondary science classrooms: Insights from a collaborative partnership. In J. Henderson & A. Drewes (Eds.), *Teaching Climate Change in the United States* (pgs. 29-43). Routledge; New York.
5. **Forbes, C.T.**, Lange-Schubert, K., Böschl, F., & Vo, T.* (2019) Supporting primary students' developing modeling competency for water systems. In A. Upmeier zu Belzen, D. Krüger, & J. van Driel (Eds.), *Towards a Competence-based View on Models and Modeling in Science Education* (pgs. 257-273). Springer.
6. Teasdale, R., Scherer, H., Holder, L., Boger, R., & Forbes, C.T. (2018). [Research on teaching about Earth in the context of societal problems](#). In K. St. John (Ed.), *Community Framework for Geoscience Education Research* (pgs. 49-60). National Association of Geoscience Teachers. Retrieved from https://doi.org/10.25885/ger_framework/5.
7. Lange-Schubert, K., Schubert, J., Böschl, F., & Forbes, C.T. (2016). Wasser – Boden – Interaktionen: Durch wissenschaftliches Beobachten, Untersuchen und Modellieren über den Wasserkreislauf lernen [Water – soil interactions: Learning through scientific monitoring, investigating, and modeling on the water cycle]. In M. Adamina, M. Hemmer, & J.C. Schubert, (Eds.), *Die Geographische Perspektive Konkret – Begleitband 3 zum Perspektivrahmen Sachunterricht* (pgs. 29-42). Bad Heilbrunn: Klinkhardt.
8. **Forbes, C.T.** & Biggers, M.* (2015). What kind of science teacher will I be? Teachers' curricular role identity for elementary science. In L. Avraamidou (Ed.), *Studying Teacher Identity: Theoretical Perspectives and Methodological Approaches* (pgs. 129-152). Sense Publishers; Rotterdam.

9. **Forbes, C.T.** & Davis, E.A. (2010). Beginning elementary teachers' curriculum design and development of pedagogical design capacity for science teaching: A longitudinal study. In L.E. Kattington (Ed.), *Handbook of Curriculum Development* (pgs. 209-232). Nova Science Publishers; New York.

WORKSHOPS, SESSIONS, AND SYMPOSIA

Co-Covener, Making Sense of Methodologies and Theoretical Frameworks in Geoscience Education Research, 2021 GSA Annual Meeting, Denver, CO.	2022
Co-Covener, Making Sense of Methodologies and Theoretical Frameworks in Geoscience Education Research, 2021 GSA Annual Meeting, Portland, OR.	2021
Organizer and facilitator, Panel Symposium, <i>A National Collaborative for Research on Food, Energy, and Water Education</i> , annual meeting of the North American Association for Environmental Education (NAAEE), Tucson, AZ. (Virtual presentation due to COVID-19)	2020
Co-Covener, Making Sense of Methodologies and Theoretical Frameworks in Geoscience Education Research, 2020 GSA Annual Meeting, Montreal, CA. (Virtual due to COVID-19).	2020
Faculty Mentor (invited), Summer School for Doctoral Students, European Science Education Research Association (ESERA), Crete, Greece.	2019
Organizer and facilitator (invited), <i>Theory in Education Research: The Reciprocity of Scholarly Thought and Action</i> , Education Research Colloquium, School of Humanities, Social and Education Sciences, European University, Cyprus.	2019
Co-organizer and facilitator, 3-day morning workshop, <i>Advancing Transdisciplinary Dialogue in Geoscience Education Research</i> , 2018 Earth Educators Rendezvous, University of Kansas.	2018
Invited participant, <i>Geoscience Education Research (GER) Grand Challenges and Strategies Workshop</i> , Earth Educators' Rendezvous (EER), Albuquerque, NM.	2017
Organizer and facilitator, Structured Poster Session, <i>Food, Energy, and Water Education: Research, Development, Extension, and Outreach</i> , Water for Food Global Conference, NCDC231 Annual Meeting, University of Nebraska-Lincoln.	2017
Invited participant, <i>FEW Nexus Workshop on Integrated Science, Engineering & Policy: A Multi Stakeholder Dialogue</i> , Texas A&M University, College Station, Texas.	2017
Organizer and facilitator, Structured Poster Session, <i>Supports for Elementary Teachers Implementing NGSS: Challenges and Opportunities across Science, Technology, and Engineering</i> , NSF DRK-12 PI Meeting, Washington, DC.	2016
Organizer and facilitator, Structured Poster Session, <i>Scientific Modeling across the K-12 Continuum: Alignment between Theoretical Foundations and Classroom Interventions</i> , NSF DRK-12 PI Meeting, Washington, DC.	2016
Invited participant, <i>Learning by Design Workshop</i> , Supported by award # #1347814 (WIDER: Adopting Research-Eased Instructional Strategies for Enhancing STEM Education), University of Nebraska-Lincoln	2016
Invited discussant, Related Paper Set, <i>Supporting Teachers to Facilitate Student Sensemaking in Elementary Science Classrooms</i> , NARST, Baltimore, MD.	2016
Invited participant, <i>International Workshop on Scientific Modeling</i> , University of	2015

Augsburg, Germany, German Research Foundation (DFG).	
Invited participant, <i>Workshop: Tightening Research-Practice Connections: Taking ISLS findings to Public Debate</i> , International Conference of the Learning Sciences, Boulder, Colorado.	2014
Invited participant, <i>Writing an Application for an IES Grant: A Workshop</i> , 2013 AERA meeting, Institute for Education Sciences.	2013
Invited participant, Doctoral Consortium, International Conference of the Learning Sciences, Utrecht, the Netherlands.	2008
Facilitator, <i>Teacher Identity & Use of Curriculum Materials</i> , 2006 CCMS Knowledge Sharing Institute, Ann Arbor, MI.	2006
Facilitator, <i>Science Education Policy</i> , 2006 CCMS Knowledge Sharing Institute, Ann Arbor, MI.	2006

PRESENTATIONS

Invited Presentations

- Forbes, C.T. (invited, 2021, March). *Enhancing teaching and learning about water in K-16 classrooms: A view across projects*. World Water Day Invited Presentation, University of Texas at Arlington. **(Virtual presentation due to COVID-19)**
- Forbes, C.T. (invited, 2020, August). *Sustainability education in the Food-Energy-Water-Nexus*. Invited presentation at Association for the Advancement of Sustainability in Higher Education (AASHE) Webinar Series. **(Virtual presentation due to COVID-19)**
- Forbes, C.T. (invited, 2020, July). *Standards for teaching and learning about water: A view across disciplines*. Invited presentation at the 2020 Earth Educators' Rendezvous (EER) session *The Water-Literate Citizen: Help Develop a New Framework Document for Water Literacy*. **(Virtual presentation due to COVID-19)**
- Forbes, C.T. (invited, 2020, June). *Interdisciplinary research in the Food-Energy-Water-Nexus: Model-based decision-making about coupled human-natural water systems*. Invited presentation at the 2020 International Conference of the Learning Sciences (ICLS) workshop *Improving science education through interdisciplinary collaborations between learning sciences and discipline-based education research: A workshop for new and established interdisciplinary researchers*. **(Virtual presentation due to COVID-19)**
- Forbes, C.T. (invited, 2020, April). *Research on education in the Food-Energy-Water-Nexus: Opportunities and challenges for STEM educators and education researchers*. Invited presentation at the Center for Research in Mathematics and Science Teacher Development, University of Louisville, Louisville, KY. **(COVID-19 related cancellation)**
- Forbes, C.T. (invited, 2020, April). *Education research in the Food-Energy-Water-Nexus: Transdisciplinary opportunities for geography education*. Invited presentation at the 2020 meeting of the American Association of Geographers (AAG) session *Transformative Research in Geography Education*. **(COVID-19 related cancellation)**
- Forbes, C.T., Scherer, H., Wang, H-H., & Sintov, N. (invited, 2020, June). *A national collaborative for food, energy, & water education*. Virtual presented at the 2020 annual meeting of the Network of STEM Education Centers (NSEC). **(Virtual presentation due to COVID-19)**
- Forbes, C.T. (invited, 2019, October). *Teaching and learning about socio-hydrological systems in an introductory undergraduate water course*. Invited presentation at the 2019 Consortium of Universities for the Advancement of Hydrologic Science (CUAHSI) Fall Cyberseminar Series.

- Forbes, C.T. (invited, 2019, June). *PISA 2015: Secondary science teaching and learning for scientific literacy*. Invited presentation at the 2019 ESERA Summer School, Crete, Greece.
- Forbes, C.T., Scherer, H., Wang, H-H., Millenbah, K., Sintov, N., & Li, C. (invited, 2018, June). *A national collaborative for food, energy, & water education*. Poster presented at the 2018 annual meeting of the National Network of STEM Education Centers (NSEC).
- Forbes, C.T., Bhattacharya, D., & Chandler, M.A. (2017). *Climate Literacy through Epistemology of Scientific Modeling (CliMES): Promoting understanding of Earth's climate among secondary students using global climate models*. Invited session presented at the Climate Literacy and Energy Awareness Network (CLEAN).
- Forbes, C.T. (invited, 2017, November). *Scientific modeling for K-16 Earth systems education: Theoretical perspectives and empirical insights*. Invited presentation at the Center for Science and Technology in Education (CSTE), University of Maryland, College Park, MD.
- Forbes, C.T. (invited, 2017, June). *A national collaborative for food, energy, & water education: Opportunities and strategic visioning*. Invited presentation at the 2017 annual meeting of the National Network of STEM Education Centers (NSEC).
- Forbes, C.T. (invited, 2016, April). *Cultivating science literacy in the nexus: Multidisciplinary STEM education across food, energy, and water*. Invited presentation at 2016 Annual Symposium of the Global Food Security Consortium, Iowa State University, Ames, IA.
- Forbes, C.T. (invited, 2016, January). *Teaching and learning about water in elementary science learning environments: A view across projects*. Invited presentation at SRI International, Menlo Park, CA.
- Forbes, C.T. (invited, 2015, December). *Fostering science literacy in the elementary grades: Educational research on third-grade students' learning about plants*. Invited presentation at the UNL Department of Agronomy and Horticulture Seminar Series.
- Forbes, C.T. (2014, September). *Discipline-based education research on teaching and learning in elementary science learning environments*. Invited presentation at the UNL School of Natural Resources Seminar Series.
- Forbes, C.T. (2014, June). *Supporting teachers' use of curriculum materials for science: Empirically-grounded perspectives on teachers' curriculum design competencies*. Invited presentation at the International Conference of New Teacher Competencies, Center for Knowledge Creation on Teacher Development and Curriculum Design and the National Institute for Curriculum Development in The Netherlands, University of Twente, Enschede, the Netherlands.
- Forbes, C.T. (2014, March). *Discipline-based research on elementary science learning environments designed to foster students' learning about water systems*. Invited presentation at the UNL Discipline-Based Educational Research (DBER) Group Seminar.
- Forbes, C.T. (2013, June). *Supporting elementary teachers' to engage in 'high-leverage' instructional practices: Theory and research on teachers' use of elementary curriculum materials*. Invited presentation at the University of Augsburg, Augsburg, Germany.
- Forbes, C.T. (2013, April). *Supporting teachers to attend to students' ideas in elementary science learning environments: The Reflective Assessment for Elementary Science in Iowa (RAES-Iowa) project*. Invited presentation at the Lawrence Hall of Science, Full Option Science System (FOSS) group.
- Forbes, C.T. (2013, March). *Multifaceted approaches to research and development on elementary students' formulation and evaluation of scientific explanations*. Invited presentation at Florida State University College of Education.
- Forbes, C.T. (2012, May). *Integrated educational research and development to foster effective teaching and learning in K-8 science learning environments*. Invited presentation at the Center for Global and Regional Environmental Research (CGRER) Advisory Board Meeting, Iowa City, IA.

- Forbes, C.T. (2012, January). *Fostering sense-making in K-8 science learning environments through curriculum and instruction: An evolving research agenda*. Invited presentation at the University of Essen (NWU-Essen), Essen, Germany. Sponsored by the German Research Foundation (DFG).
- Forbes, C.T. (2012, February). *Fostering sense-making in K-8 science learning environments through curriculum and instruction: An evolving research agenda*. Invited presentation at the University of Münster (WWU-Münster), Münster, Germany. Sponsored by the German Research Foundation (DFG).
- Forbes, C.T. (2010, December). *Investigating and promoting elementary teachers' use of science curriculum materials to teach science as inquiry*. Invited presentation at the Dean's Annual Emeriti Faculty Symposium, University of Iowa College of Education.

Peer-Reviewed Conference Presentations

- Böschl, F., Vo, T., Lange-Schubert, K., & Forbes, C.T. (2022). *Empirically grounding a learning performances framework for K-5 students' modeling competency using evidence-centered design*. Paper presented at the National Association of Research in Science Teaching (NARST) Conference, Vancouver, Canada.
- Carroll Steward, K., Bhattacharya, D., Forbes, C.T., & Chandler, M.A. (2022). *Teachers' use and adaptation of a model-based climate curriculum: A three-year longitudinal study*. Paper presented at the annual meeting of the National Association of Research in Science Teaching (NARST) Conference, Vancouver, Canada.
- Mostacedo-Marasovic, S.J., Lally, D., Petitt, D.N., White, H. & Forbes, C.T. (2022, December 12th). *Supporting Undergraduate Students' Developing Water Literacy During a Global Pandemic: A Longitudinal Study* [Poster Presentation]. AGU Fall Meeting 2022, Chicago, Illinois.
- Mostacedo-Marasovic, S.J., Mott, B., White, H. & Forbes, C.T. (2022). *Transdisciplinary Water Education: A View Across Standards for Teaching and Learning to Foster Water Literacy* [Conference session]. IHE PhD Symposium 2022, Online & Delft, The Netherlands.
- Mostacedo-Marasovic, S.J., White, H. & Forbes, C.T. (2022). *The Food-Energy-Water (FEW) Nexus: Using Hydroviz to Support Undergraduate Students' Learning about Complex Socio-Hydrologic Issues* [Poster Presentation]. GSA Connects 2022, Denver, Colorado.
- Mostacedo-Marasovic, S.J., White, H. & Forbes, C.T. (2022, December 12th). *The Food-Energy-Water (FEW) Nexus: Using Hydroviz to Support Undergraduate Students' Learning about Complex Socio-Hydrologic Issues* [Poster Presentation]. AGU Fall Meeting 2022, Chicago, Illinois.
- Mostacedo-Marasovic, S.J., Mott, B., White, H. & Forbes, C.T. (2022). *Transdisciplinary Water Education: A View Across Standards for Teaching and Learning to Foster Water Literacy* [Poster Presentation]. Earth Educators Rendezvous, Twin Cities, Minnesota.
- Mostacedo-Marasovic, S.J., Olsen, A. & Forbes, C.T. (2022). *Supporting secondary students' understanding of Earth's climate system and global climate change using Easy Global Climate Modeling*. GSA Connects 2022, Denver, Colorado.
- Mostacedo-Marasovic, S.J., Olsen, A. & Forbes, C.T. (2022). *Supporting secondary students' understanding of Earth's climate system and global climate change using Easy Global Climate Modeling*. Earth Educators Rendezvous, Twin Cities, Minnesota.
- Mostacedo-Marasovic, S.J., White, H. & Forbes, C.T. (2022). *The Food-Energy-Water (FEW) Nexus: Using Hydroviz to Support Undergraduate Students' Learning about Complex Socio-Hydrologic Issues* [Poster Presentation]. Earth Educators Rendezvous, Twin Cities, Minnesota.
- Böschl, F.; Lange-Schubert, K. & Forbes, C. (2021). *Untersuchung von Modellierungsprozessen im naturwissenschaftlichen (Sach)Unterricht - eine deutsch-amerikanische Videovergleichsstudie*.

- Digitale Jahrestagung der Gesellschaft für Empirische Bildungsforschung (digiGEBF21), März-Dezember 2021, Frankfurt am Main, Germany.
- Böschl, F.; Lange-Schubert, K.; Vo, T. & Forbes, C. T. (2021, August/September). Development of an empirically grounded learning performances framework for primary students' modeling competence of water. Poster presented at the 2021 (digital) annual meeting of the European Science Education Research Association (ESERA), 30.08.-03.09.2021, Braga, Spain.
- Carroll Steward, K., Bhattacharya, D., Forbes, & C.T., Chandler, M.A. (2021, October). *Using model-based climate simulations in secondary science classrooms*. Poster presented at North American Association for Environmental Education (NAAEE), Virtual.
- Carroll Steward, K., Bhattacharya, & D., Forbes. (2021, October). *Teaching and Learning Using Climate Simulation in secondary science classrooms*. Oral presentation at Nebraska Association of Science Teachers (NATS), Crete, NE.
- Carroll Steward, K., Bhattacharya, D., Forbes, & C.T., Chandler, M.A. (2021, October). *The effectiveness of model-based teaching practices on student achievement among the dimensions of epistemic and content knowledge*. Oral Presentation at Geological Society of America (GSA), Portland, OR.
- Carroll Steward, K., Bhattacharya, D., Forbes, & C.T., Chandler, M.A. (2021, October). *Teachers' use and adaptation of a model-based climate curriculum*. Oral Presentation at Geological Society of America (GSA), Portland, OR.
- Carroll Steward, K., Bhattacharya, D., Forbes, & C.T., Chandler, M.A., (2021, December). *Use of a model-based climate curriculum module*. Oral Presentation at American Geophysical Union (AGU), New Orleans, LA.
- Carroll Steward, K., Bhattacharya, D., Forbes, C.T., & Chandler, M.A. (2021, March). *Secondary science teachers implementation of a curricular intervention when teaching with global climate models*. Oral presentation at the annual meeting of the National Association of Research in Science Teaching (NARST). (Virtual presentation due to COVID-19)
- Mostacedo-Marasovic, S.J., Lally, D., Petitt, D.N., White, H. & Forbes, C.T. (2021, October 10-13). *Supporting Undergraduate Students' Developing Water Literacy During a Global Pandemic: A Longitudinal Study* [Poster Presentation]. GSA Connects 2021, Portland, Oregon.
- Mostacedo-Marasovic, S.J., Mott, B., White, H. & Forbes, C.T. (2021, October 10-13). *Transdisciplinary Water Education: A View Across Standards for Teaching and Learning to Foster Water Literacy* [Poster Presentation]. GSA Connects 2021, Portland, Oregon.
- Mostacedo-Marasovic, S.J., Lally, D., Petitt, D.N., White, H. & Forbes, C.T. (2021, July 12-16). *Water in Society: A Five-Year Evaluation Study of an Interdisciplinary Course to Support Undergraduate Students' Water Literacy* [Poster Presentation]. Earth Educators Rendezvous 2021. Online.
- Mostacedo-Marasovic, S.J., Mott, B., White, H. & Forbes, C.T. (2021, July 12-16). *Water – related standards for teaching and learning to support K-12 to lifelong water literacy* [Poster Presentation]. Earth Educators Rendezvous 2021. Online.
- White, H. & Forbes, C.T. (2021, July). *An Investigation of Undergraduate Students' Spatial Thinking about Groundwater*. Oral presentation at 2021 Earth Educators Rendezvous. (Virtual presentation due to COVID-19)
- Bhattacharya, D., Carroll Steward, K., Chandler, M.A. & Forbes, C.T. (2020, April). *Using a global climate model-EzGCM to promote understanding of the Earth's changing climate*. Experiential session presentation at the annual meeting of the National Science Teachers Association (NSTA), Boston, MA. (COVID-19 related cancellation of conference)
- Bhattacharya, D., Carroll Steward, K., Chandler, M.A. & Forbes, C.T. (2020, April). *CLEAN: A collection of climate and energy educational resources: Guiding teachers toward climate and energy*

- education*. Short course session presentation at the annual meeting of the National Science Teachers Association (NSTA), Boston, MA. (COVID-19 related cancellation of conference)
- Bhattacharya, D., Forbes, C.T., Carroll Steward, K. (2020, July). *Model-based teaching and learning about Earth's climate in secondary science classrooms*. Poster presentation at the 2020 Earth Educators Rendezvous. (Virtual presentation due to COVID-19)
- Bhattacharya, D., Forbes, C.T., Carroll Steward, K. (2020, March). *Modelling, assessment, and promotion of climate literacy*. Presentation at the annual meeting of the National Association for Research in Science Teaching (NARST), Portland, OR. (Covid-19 related cancellation of conference)
- Bhattacharya, D., Carroll Steward, K., Forbes, C.T., & Chandler, M.A. (2020, March). *Climate education in secondary science: A comparison of model-based and non-model-based investigations of global climate data*. Presentation at the annual meeting of the National Association of Research in Science Teaching (NARST), Portland, OR. (Covid-19 related cancellation of conference)
- Böschl, F.; Lange-Schubert, K. & Forbes, C. (2020, March). *An exploratory comparative video-study of scientific modeling in elementary/primary classrooms in the U.S. and Germany*. Paper accepted for presentation at the 2020 annual meeting of the National Association for Research in Science Teaching (NARST), Portland, Oregon. (Virtual presentation due to COVID-19)
- Böschl, F.; Lange-Schubert, K. & Forbes, C. (2020, March). *Untersuchung von Modellierungsprozessen im naturwissenschaftlichen (Sach)Unterricht - eine deutsch-amerikanische Videovergleichsstudie [Investigating scientific modeling in elementary/primary science education – a comparative video-study between the U.S. and Germany]*. Jahrestagung der Gesellschaft für Empirische Bildungsforschung (GEBF) [Annual conference of the Association for Empirical Educational Research (GEBF)], Potsdam, Germany. (COVID-19 related cancellation of conference)
- Böschl, F.; Lange-Schubert, K. & Forbes, C. T. (2020, March). *Modellierungsprozesse im naturwissenschaftlichen (Sach)Unterricht*. 29. Jahrestagung der Gesellschaft für Didaktik des Sachunterrichts e.V., 05.03.-07.03.2020, Augsburg, Germany.
- Carroll Steward, K., Bhattacharya, D., Forbes, C.T., & Chandler, M.A. (2020, March). *Secondary science teachers' implementation of a curricular intervention when teaching with global climate models*. Presentation at the annual meeting of the National Association of Research in Science Teaching (NARST), Portland, OR. (Covid-19 related cancellation of conference)
- Forbes, C.T., Campbell, T., & Roehrig, G. (2020, January). *Educator preparation in the Food-Energy-Water-Nexus: Building capacity for research through transdisciplinary networks*. Presentation at the annual meeting of the Association for Science Teacher Education (ASTE), San Antonio, TX.
- Forbes, C.T., Franz, T., Lally, D., Petitt, D. (2020, July). *Fostering undergraduate students' water literacy: Discipline-based education research in a transdisciplinary water course*. Poster presentation at the 2020 Earth Educators Rendezvous. (Virtual presentation due to COVID-19)
- Forbes, C.T., Neumann, K., Schipe-Tiska, A. (2020, March). *Inquiry-based science instruction and student science achievement in PISA 2015*. Paper accepted for presentation at the 2020 annual meeting of the National Association for Research in Science Teaching (NARST), Portland, OR. (COVID-19 related cancellation of conference)
- Forbes, C.T., Scherer, H., Sintov, N., & Wang, H-H. (2020, April). *A national collaborative for research food, energy, & water education*. Poster presented at annual meeting of the American Association of Geographers (AAG), Denver, CO. (COVID-19 related cancellation of conference)
- Forbes, C.T., Scherer, H., Sintov, N., & Wang, H-H. (2020, June). *A national collaborative for research food, energy, & water education*. Paper presented at annual meeting of the North American Colleges and Teachers of Agriculture (NACTA), Las Cruces, NM. (COVID-19 related cancellation of conference)

- Lally, D. & Forbes, C.T. (2020, March). *Socio-hydrologic systems thinking: An analysis of undergraduate students' operationalization and modelling of coupled human-water systems*. Presentation at the Annual meeting of the National Association for Research in Science Teaching (NARST), Portland, OR. (COVID-19 related cancellation of conference)
- Lally, D., Pettitt, D., & Forbes, C.T. (2020, March). *Cultivating water literacy in undergraduate STEM education: Students' socio-scientific Reasoning about socio-hydrologic issues*. Presentation at the annual meeting of the National Association for Research in Science Teaching (NARST), Portland, OR. (COVID-19 related cancellation of conference)
- Sommers, A.S., White, H., Dauer, J., Forbes, C.T. (2020, June). *Teaching and learning in undergraduate food, energy, and water systems (FEWS) courses*. Presentation at the annual meeting of the North American Colleges and Teachers of Agriculture (NACTA), Las Cruces, NM. (COVID-19 related cancellation of conference)
- White, H. & Forbes, C.T. (2020, October). *An investigation of undergraduate students' spatial thinking about groundwater*. Paper presented at the annual meeting of The Geological Society of America (GSA), Montreal, Canada. (Virtual presentation due to COVID-19)
- White, H., Lally, D., & Forbes, C.T. (2020, March). *Investigating groundwater: 7th-grade students' mapping models to phenomena*. Presentation at the annual meeting of the National Association for Research in Science Teaching (NARST), Portland, OR. (COVID-19 related cancellation of conference)
- White, H., Mostacedo, J., & Forbes, C.T. (2020, October). *Fostering undergraduate students' water literacy: Discipline-based education research in a transdisciplinary water course*. Poster presented at the annual meeting of the North American Association for Environmental Education (NAAEE), Tucson, AZ. (Virtual presentation due to COVID-19)
- Bhattacharya, D., Carroll Steward, K., Forbes, C.T., & Chandler, M.A. (2019, July). *Promoting student understanding of the Earth's climate through model-based learning in secondary geoscience classrooms*. Poster presented at Earth Educators' Rendezvous (EER), Nashville, TN.
- Bhattacharya, D., Forbes, C.T., Chandler, M.A., & Carroll Steward, K. (2019, September). *Developing secondary students reasoning about the phenomenon of global climate change using model and data-based activities*. Paper presented at the annual international meeting of the Geological Society of America (GSA), Phoenix, AZ.
- Carroll Steward, K., Bhattacharya, D., Forbes, C.T., Chandler, M.A. (2019, October). *Secondary teachers' implementation of a model-based climate curriculum unit*. Paper presented at annual meeting of the North American Association for Environmental Education (NAAEE), Lexington, KY.
- Carroll Steward, K., Bhattacharya, D., Forbes, C.T., Chandler, M.A. (2019, September). *Model-based teaching and learning about Earth's climate: Two secondary teachers' implementation of a curriculum unit*. Paper presented at the annual international meeting of the Geological Society of America (GSA), Phoenix, AZ.
- Carroll Steward, K., Bhattacharya, D., Forbes, C.T., Chandler, M.A. (2019, September). *Model-based teaching and learning about Earth's climate: Two secondary teachers' implementation of a curriculum unit*. Presentation at the annual meeting of the Nebraska Academy of Science (NATS), Kearney, NE.
- Carroll Steward, K., Bhattacharya, D., Forbes, C.T., Chandler, M.A. (2019, July). *Model-based teaching and learning about Earth's climate: Two secondary teachers' implementation of a curriculum unit*. Paper presented at Earth Educators' Rendezvous (EER), Nashville, TN.
- Forbes, C.T., Scherer, H., Sintov, N., & Wang, H-H. (2019, October). *A national collaborative for research food, energy, & water education*. Poster presented at annual meeting of the Geological Society of America (GSA), Phoenix, AZ.

- Lally, D., Forbes, C.T. (2019, September) *Socio-hydrologic systems thinking: Student operationalization, evaluation, and model analysis*. Paper presented at the 2019 Geological Society of America (GSA), Phoenix, AZ.
- Petitt, D.N., Owens, D., Lally, D., & Forbes, C.T. (2019, September). *Students' socio-hydrological reasoning about socio-hydrological issues*. Paper presented at the 2019 Geological Society of America (GSA) annual meeting, Phoenix, AZ.
- Sommers, A.S., White, H., Dauer, J., & Forbes, C.T. (2019, September). *Undergraduate teaching and learning about food, energy, and water systems: Instructional styles and student outcomes*. Paper presented at the 2019 Geological Society of America (GSA) annual meeting, Phoenix, AZ.
- White, H., Lally, D., Forbes, C.T. (2019, September). *7th-grade students' understanding of a groundwater modeling tool*. Paper presented at the 2019 Geological Society of America (GSA) annual meeting, Phoenix, AZ.
- Böschl, F., Lange-Schubert, K., & Forbes, C. T. (2019, August). *Investigating scientific modeling practices in primary science: A comparative study of the U.S. and Germany*. Paper presented at the 2019 annual meeting of the European Science Education Research Association (ESERA) 2019, Bologna, Italy.
- Forbes, C.T., Neumann, K., Schipe-Tiska, A. (2019, August). *Science teaching and learning: Analysis of PISA data from the United States and Germany*. Paper presented at the 2019 annual meeting of the European Science Education Research Association (ESERA) 2019, Bologna, Italy.
- Bhattacharya, D., Forbes, C.T., Chandler, M.A., Carroll Steward, K., & Sutter, A.M. (2019, April). *Promoting model-based climate literacy in secondary geo-science classrooms*. Poster presented at the annual meeting of the National Association of Research in Science Teaching (NARST), Baltimore, MD.
- Bhattacharya, D., Forbes, C.T., Chandler, M.A., & Carroll Steward, K. (2019, April). *Using a Global Climate Model, EzGCM to promote understanding of the Earth's changing climate*. Experiential session presented at the annual conference for National Science Teacher Education (NSTA), St. Louis, MO.
- Lally, D. & Forbes, C.T. (2019, April). *Modeling systems in an introductory undergraduate course: Students' use and evaluation of data-driven, computer-based models*. Presentation presented at the 2018 North American Research in Science Teaching (NARST) Annual International Conference, Baltimore, MD.
- Böschl, F.; Lange-Schubert, K. & Forbes, C.T. (2019, March). *Untersuchung von Modellierungsprozessen im naturwissenschaftlichen (Sach)Unterricht – Eine deutsch-amerikanische Vergleichsstudie*. 28. Jahrestagung der Gesellschaft für Didaktik des Sachunterrichts e.V., Lüneburg.
- Bhattacharya, D., Forbes, C.T., Chandler, M., Carroll-Steward, K. (2018, December). *Student learning outcomes using model-based climate literacy in secondary geo-science classrooms*. Poster presented at the 2018 annual meeting of the American Geophysical Union (AGU), Washington, DC.
- Holder, L.N., Boger, R.A., Scherer, H.H., Forbes, C.T., & Teasdale, R. (2018, December). *Research on teaching about Earth in the context of societal problems*. Poster presented at the 2018 annual meeting of the American Geophysical Union (AGU), Washington, DC.
- Huyck Orr, C., Scherer, H.H., Forbes, C.T., & Bruckner, M.Z. (2018, December). *Teaching about food, water, and energy in the context of sustainability: Opportunities and connections with the InTeGrate STEP center*. Poster presented at the 2018 annual meeting of the American Geophysical Union (AGU), Washington, DC.

- Bhattacharya, D., Forbes, C., Chandler, M., Carroll-Steward, K. (2018, November). *Developing secondary students' understanding of the Earth's climate through computer-based global climate models*. Paper presented at the 2018 Geological Society of America annual meeting (GSA), Indianapolis, IN.
- Lally, D., Pettitt, D.N., Forbes, C., Brozovic, N., Franz, T. (2018, November). *Investigating undergraduate students' reasoning about socio-hydrological issues: Results from a transdisciplinary water course*. Poster presented at the 2018 Geological Society of America annual meeting (GSA), Indianapolis, IN.
- Lally, D., Forbes, C., McNeal, K.S., Soltis, N. (2018, November). *National survey of geoscience teaching practices 2016: Current trends in geoscience instruction of scientific modeling and systems thinking*. Paper presented at the 2018 Geological Society of America annual meeting (GSA), Indianapolis, IN.
- Soltis, N.A., McNeal, K.S., Forbes, C., Lally, D. (2018, November). *The relationship between active learning course innovation and teaching earth system thinking: A structural equation modeling approach*. Paper presented at the 2018 Geological Society of America annual meeting (GSA), Indianapolis, IN.
- Teasdale, R., Scherer, H.H., Forbes, C., Boger, R.A., Holder, L.N. (2018, November). *A call for more geoscience education research on teaching about Earth in the context of societal problems*. Poster presented at the 2018 Geological Society of America annual meeting (GSA), Indianapolis, IN.
- Bhattacharya, D. Forbes, C.T., Chandler, M.A., Carroll-Steward, K., & Sutter, A.M. (2018, October). *Promoting model-based climate literacy in secondary geo-science classrooms*. Paper presented at the annual meeting of the North American Association for Environmental Education (NAAEE), Spokane, WA.
- Bhattacharya, D. Forbes, C.T., Chandler, M.A., Carroll-Steward, K., & Sutter, A.M. (2018, October). *Student learning outcomes using model-based climate literacy in secondary geoscience classrooms*. Poster presented at the annual meeting of the North American Association for Environmental Education (NAAEE), Spokane, WA.
- Forbes, C.T., Lie, C., Busch, K.C., Stevenson, K. (2018, October). *A National Collaborative for Food, Energy, and Water Education Research*. Invited panel symposium at the annual meeting of the North American Association for Environmental Education (NAAEE), Spokane, WA.
- Forbes, C.T., Scherer, H., Li, C., Millenbah, K., Sintov, N., & Wang, H-H. (2018, July). *Building a National Collaborative for Food, Energy, and Water Education (NC-FEW): Insights from a national conference*. Poster presented at the Earth Educators Rendezvous (EER), Lawrence, KS.
- Lally, D., Forbes, C.T., McNeal, K., & Soltis, N. (2018, July). *National Survey of Geoscience Teaching Practices 2016: Current trends in geoscience instruction of scientific modeling and systems thinking*. Presentation at the Earth Educators Rendezvous (EER), Lawrence, KS.
- Pettitt, D., Lally, D., Forbes, C.T., Brozovic, N., & Franz, T. (2018, July). *Water in society: undergraduate learning and reasoning about socio-hydrological issues*. Paper presented at the Earth Educators Rendezvous (EER), Lawrence, KS.
- Forbes, C.T., Bhattacharya, D., Chandler, M.A., & Sutter, A. M. (2018, June). *High school students' climate literacy through epistemology of scientific modeling (CLiMES)*. Poster presented at the Discovery Research PreK-12 PI meeting, Washington, D.C.
- Bhattacharya, D., Ingram, E., Forbes, C., Cisterna, D. (2018, March). *Using agriculture as a context for teaching genetics in elementary classrooms: Insights from UniCORN (Understanding Inheritance in CORN)*. Paper presented at the annual meeting of the National Science Teachers Association (NARST/NSTA sponsored session), Atlanta, GA.

- Petitt, D., Lally, D., Forbes, C.T., Brozovic, N., & Franz, T. (2018, March). *Undergraduate students' learning and reasoning about socio-hydrological issues*. Poster presented at the annual meeting of the National Association of Research in Science Teaching (NARST), Atlanta, GA.
- Vo, T., Bhattacharya, D., Baumfalk, B., Zangori, L., Welch, G., Forbes, C., (2018, April). *Examining the impact of a modeling enhanced water unit on 3rd grade students' scientific explanations*. Paper presented at the annual meeting of the American Educational Research Association (AERA), New York City, NY.
- Böschl, F., Vo, T., Forbes, C.T., Lange-Schubert, K., (2018, March). *Development of an empirically grounded learning performance framework for elementary students' modeling competency of water*. Paper presented at the annual meeting of the National Association of Research in Science Teaching (NARST), Atlanta, GA
- Vo, T., Forbes, C.T., (2018, March). *A mixed methods comparison of elementary students' model based explanations about water*. Paper presented at the annual meeting of the National Association of Research in Science Teaching (NARST), Atlanta, GA.
- Cisterna, D., Bhattacharya, D., Vo, T., Zangori, L., & Forbes, C.T., (2018, March). *Examining multiple programs to supporting K-12 teachers' instruction about water using scientific models*. Submitted to the National Association of Research in Science Teaching (NARST), 2018 Annual International Conference, Atlanta, GA.
- Bhattacharya, D., Forbes, C.T., Ingram, E., Hawley, L., Stevens, J. & Cisterna, D. (2018, March). *Developing 3rd-grade students' understanding of inheritance using a model-based curriculum*. Paper presented at the annual meeting of the National Association of Research in Science Teaching (NARST), Atlanta, GA.
- Bhattacharya, D., Forbes, C.T., Ingram, E., Hawley, L., Stevens, J. & Cisterna, D. (2018, March). *Supporting scientific modeling practices in elementary science instruction about inheritance*. Poster presented at annual meeting of the National Association of Research in Science Teaching (NARST), Atlanta, GA.
- Lally, D., Dauer, J.M., Forbes, C.T., (2018, March). *Helping undergraduate students' CREATE understanding of scientific and popular media articles about contemporary water issues*. Poster presented at the annual meeting of the National Association of Research in Science Teaching (NARST), Atlanta, GA.
- Lally, D., Forbes, C.T., (2018, March). *Water in society: Making water issues matter to undergraduate students*. Session presented at the annual meeting of the National Science Teachers Association (NSTA), Atlanta, GA.
- Lally, D., Forbes, C.T., McNeal, K., (2018, July). *National survey of geoscience teaching practices 2016: Current trends in geoscience instruction of scientific modeling and systems thinking*. Submitted to the 2018 Earth Educators Rendezvous (EER), Lawrence, KS.
- Vo, T. & Forbes, C. T. (2018, January). *Supporting K-12 teachers' instruction about water using scientific modeling: Looking across multiple projects*. Paper presented at the annual meeting of the Association for Science Teacher Education (ASTE), Baltimore, MD.
- Bhattacharya, D., Forbes, C.T., Chandler, M. & Roehrig, G. (2017, December). *Promoting climate literacy among in-service secondary science teachers requires epistemological knowledge and understanding*. Paper presented at the 2017 annual meeting of the American Geophysical Union (AGU), New Orleans, LA.
- Bhattacharya, D., Derowitsch A., Forbes, C.T., Ingram, E., & Kegley, M. (2017, September). *Using corn as a model organism to foster elementary students' understanding of core concepts about plant life cycle, inheritance and genetic variation*. Presentation at the annual meeting of the Nebraska Association of Teachers of Science (NATS), Kearney, NE.

- Baumfalk, B., Forbes, C.T., Bhattacharya, D., Vo, T., & Welch, G. (2017, November). *Applying a systematic approach to measuring intervention fidelity*. Paper presented at the 2017 annual meeting of the American Evaluation Association (AEA), Washington, D.C.
- Bhattacharya, D., Forbes, C.T., Ingram, E. (2017, January). *Using corn as a model organism to foster 3rd-grade students' learning of inheritance*. Experiential session presented at the 2017 annual meeting of the Association of Science Teacher Education (ASTE), Des Moines, IA.
- Bhattacharya, D., Ingram, E., Forbes, C.T., Wolken, T., & Kegley, M. (2017, April). *Using corn to foster elementary students' understanding of plant life cycle, inheritance and genetic variation*. Paper presented at the 2017 annual meeting of the National Association of Research in Science Teaching (NARST), San Antonio, TX.
- Bhattacharya, D., Vo, T., Baumfalk, B., Zangori, L., Welch, G., Forbes, C., (2017, August) *Impact of a model-based curricular intervention on elementary students' explanations for the hydrosphere*. Paper presented at the 2017 annual meeting of the European Science Educational Research Association (ESERA) 2017 conference, Dublin, Ireland.
- Böschl, F.; Forbes, C. T.; Lange-Schubert, K., Vo, T., Gogolin, S. (2017, August). *Model-based learning in primary science: A collaborative approach to exploring strategies for assessing scientific modeling*. Paper presented at the annual meeting of the European Science Education Research Association (ESERA), Dublin, Ireland.
- Chandler, M, Bhattacharya, D., Forbes, C., Sohl, L., Zhou, J. & Bush, D. (2017, June). *Using Global Climate Models in the classroom*. Workshop presented at the 2016 Climate Generation Summer Institute, Climate Generation: A Will Steger Legacy, Minneapolis, MN.
- Forbes, C., Bhattacharya, D., Vo, T., Baumfalk, B., Zangori, L., Welch, G., (2017, April). *Impact of model-based science instruction on 3rd grade students' scientific explanations for hydrologic cycling*. Paper presented at the 2017 annual meeting of the National Association of Research in Science Teaching (NARST), San Antonio, TX.
- Forbes, C.T., Brozović, N., Franz, T., Lally, D., & Petitt, D. (2017, June). *Transdisciplinary undergraduate water education: Pedagogical reflections*. Paper presented at the 2017 meeting of the North American Colleges and Teachers of Agriculture Conference (NACTA), Purdue University, West Lafayette, IN.
- Forbes, C.T., Brozović, N., Franz, T., Lally, D., & Petitt, D. (2017, April). *Fostering undergraduate students' disciplinary learning and science literacy*. Poster presented at the 2017 meeting of the Water for Food Global Conference, Lincoln, NE.
- Forbes, C.T., Foster, D., Millenbah, K., Scherer, H., & Wang, H-H. (2017, June). *A national collaborative for food, energy, and water education*. Poster presented at the 2017 annual meeting of the North American Colleges and Teachers of Agriculture (NACTA), West Lafayette, IN.
- Forbes, C.T., Lange-Schubert, K., Vo, T., Gogolin, S., Böschl, F. (2017, August). *Model-based learning in primary science: A collaborative approach to exploring strategies for assessing scientific modelling*. Paper presented at the 2017 annual meeting of the European Science Education Research Association (ESERA), Dublin, Ireland.
- Forbes, C.T. & Li, C. (accepted). *A national collaborative for food, energy, and water education*. Symposium to be presented at the 2017 annual meeting of the North American Association of Environmental Education, San Juan, PR. **CONFERENCE CANCELLED**
- Forbes, C.T. & Scherer, H. (2017, July). *Education in the Food-Energy-Water-Nexus: A transdisciplinary community*. Paper presented at the 2017 Earth Educators' Rendezvous, Albuquerque, NM.
- Lally, D., Petitt, D., Forbes, C.T., Brozović, N., & Franz, T. (2017, July). *Water in Society: Interdisciplinary Undergraduate Teaching and Learning about Water*. Paper presented to the 2017 Earth Educators' Rendezvous, Albuquerque, NM.

- Lally, D. Sabel, J., Forbes, C., Dauer, J. (2017, April). *Undergraduate students' use and understanding of scientific and popular media articles*. Poster presented at the 2017 annual meeting of the National Association of Research in Science Teaching (NARST), San Antonio, TX.
- Peterson, A.M., Dauer, J.M., Kreuziger, T., Schubert, J., & Forbes, C.T. (accepted). *Student problematization and decision-making on a wind energy socio-scientific issue*. Poster to be presented at the 2017 annual meeting of the North American Association of Environmental Education, San Juan, Puerto Rico. **CONFERENCE CANCELLED**
- Peterson, A.M., Forbes, C.T., Schubert, J., & Kreuziger, T. (2017). *Student conceptualization of and decisions about a wind energy socio-scientific issue*. Poster presented at the 2017 annual meeting of the European Science Education Research Association (ESERA), Dublin, Ireland.
- Peterson, A.M. & Forbes, C.T. (2017). *Using construal theory to characterize middle-school students' decision-making about wind energy*. Paper presented at the 2017 annual meeting of the National Association for Research in Science Teaching (NARST), San Antonio, TX.
- Peterson, A.M., Dauer, J.M., & Forbes, C.T. (2017). *Using construal theory to understand students' problematization of a prairie dog socio-scientific issue*. Poster presented at the *Midwest Fish and Wildlife Conference*, Lincoln, NE.
- Petitt, D., Lally, D., Forbes, C.T., Brozovic, N., & Franz, T. (2017, October). *Transdisciplinary students' learning & reasoning about socio-hydrological issues in an undergraduate water course*. Poster presented at the 2017 annual meeting of the Geological Society of America (GSA), Seattle, WA.
- Sabel, J., Dauer, J., & Forbes, C. (2017, April). *Introductory biology students' use of rubrics and reflection questions to engage in metacognition and enhance understanding*. Paper presented at the 2017 annual meeting of the National Association of Research in Science Teaching (NARST), San Antonio, TX.
- Vo, T., Forbes, C.T, Zangori, L., Schwarz, C. (2017, August) *A case study investigating elementary teachers' learning to engage in model-based instruction*. Paper presented at the 2017 annual meeting of the European Science Education Research Association (ESERA) 2017 conference, Dublin, Ireland.
- Vo, T. & Forbes, C. T., (2017, July). *Supporting K-12 teachers' instruction about water using scientific modeling: A view across programs*. Poster presented at 2017 Earth Educators' Rendezvous, Albuquerque, New Mexico.
- Vo, T., Forbes, C. T., Zangori, L., Schwarz, C.V (2017, April). *Exploring elementary teachers' conceptualizations and practices around model-based instruction of the water cycle: A three-year longitudinal multi-case study*. Paper presented at the 2017 annual meeting of the American Educational Research Association (AERA), San Antonio, TX.
- Vo, T., Forbes, C.T, Zangori, L., Schwarz, C. (2017, April). *A 3-year longitudinal multi-case study exploring three elementary teachers' model-based science instruction about water*. Paper presented at the 2017 annual meeting of the National Association of Research in Science Teaching (NARST), San Antonio, TX.
- Vo, T., Forbes, C.T, Zangori, L., Schwarz, C. (2017, April). *Comparing 3rd and 5th grade students' model-based explanations about water*. Poster presented at the 2017 annual meeting of the National Association of Research in Science Teaching (NARST), San Antonio, TX.
- Bhattacharya, D., Forbes, C.T., & Ingram, E. (2016, October). *Teaching lifecycles using modeling. Results from UNICORN-Using corn as a model organism to foster 3rd-grade students' learning of genetics and inheritance*. Experiential session presented at the regional conference for National Science Teacher Education (NSTA), Minneapolis, MN.
- Brandt, M., Forbes, C., & Keshwani, J. (2016, April). *Operationalizing science in applied contexts: Developing measures for elementary students' understanding of STEM dimensions of food*

- systems*. Paper presented at the 2016 annual meeting of the National Association of Research in Science Teaching (NARST), Baltimore, MD.
- Chandler, M, Bhattacharya, D., Forbes, C., Sohl, L., Zhou, J. & Bush, D. (2016, June). *Using Global Climate Models in the classrooms*. Workshop presentation at the Climate Generation Summer Institute 2016, Climate Generation: A Will Steger Legacy, Minneapolis, MN.
- Forbes, C.T. (2016, July). *Science literacy for the 21st Century: An institutional initiative to science-informed decision-making about food, energy, and water*. Presentation at the 2016 Summer Institute, Science Education for New Civic Engagements and Responsibilities, Chicago, IL.
- Forbes, C.T., Brozovic, N., Franz, T., Lally, D., & Pettit, D. (2016, October). *Fostering undergraduate students' disciplinary learning and science literacy*. Poster to be presented at the 2016 meeting of the Geological Society of America (GSA), Denver, CO.
- Forbes, C.T., Dauer, J., Dauer, J., & Keshwani, J. (2016, January). *Grow, eat, learn: Fostering science literacy through food, energy, and water in Nebraska and beyond*. Poster presented at the 16th National Conference and Global Forum on Science, Policy, and the Environment: The Food-Energy-Water Nexus, Washington, DC.
- Forbes, C., Keshwani, J., Brandt, M., & Wolken, T. (2016, June). *Translating Applied STEM Research into Secondary Science (TASRs)*. Presentation at the 2016 annual meeting of the National Agriculture in the Classroom Organization (NAITC), Litchfield Park, AZ.
- Forbes, C.T., Vo, T., Zangori, L., & Schwarz, C.V. (2016, June). *Modeling Hydrologic Systems in Elementary Science (MoHSES) project*. Poster presented at the 2016 NSF DR K-12 PI Conference, Washington, DC.
- Ingram, E., Morrow, M., Forbes, C., & Brandt, M. (2016, June). *Pollinators in the High School Biology Classroom*. Presentation at the 2016 annual meeting of the National Agriculture in the Classroom Organization (NAITC), Litchfield Park, AZ.
- Peterson, A.M., Dauer, J.M., & Forbes, C. T. (2016, October). *Using construal theory to understand student problematization of two socio-scientific issues*. Poster presented at the UNL STEM Education Retreat, Lincoln, NE.
- Sabel, J., Vo, T., Alred, A., Dauer, J., & Forbes, C. (2016, April). *Undergraduate students' scientifically-informed decision-making about water-based socioscientific issues*. Poster presented at the 2016 annual meeting of the National Association of Research in Science Teaching (NARST), Baltimore, MD.
- Sabel, J., Forbes, C., & Zangori, L. (2016, April). *Use of structured formative assessment assignments to engage preservice teachers with life science concepts*. Paper presented at the 2016 annual meeting of the National Association of Research in Science Teaching (NARST), Baltimore, MD.
- Vo, T., Forbes, C. T. (2016, April). *Learning to support students' model-based learning about the water cycle: A three-year longitudinal case study of two 3rd-grade teachers*. Paper presented at the 2016 annual meeting of the National Association of Research in Science Teaching (NARST), Baltimore, MD.
- Zangori, L. & Forbes, C. T. (2016, April). *Development of an empirically-based learning performances framework for 3rd-grade students' model-based explanations about plant processes*. Poster presented at the 2016 annual meeting of the National Association of Research in Science Teaching (NARST), Baltimore, MD.
- Zangori, L., Vo, T., Forbes, C.T., Schwarz, C.V. (2016, April). *Exploring links between 3rd-grade students' model-based explanations and teachers' model-based science instruction about groundwater*. Paper presented at the 2016 annual meeting of the National Association of Research in Science Teaching (NARST), Baltimore, MD.

- Biggers, M. & Forbes, C. T. (2015, April). *Curriculum planning and enactment in elementary science: Beyond fidelity of implementation*. Paper presented at the annual meeting of the National Association for Research in Science Teaching (NARST), Chicago, IL.
- Brandt, M., Keshwani, J., Forbes, C., & Luck, J. (2015, June). *Increasing production with precision agriculture*. Paper presented at the annual meeting of the National Agriculture in the Classroom (NAITC), Louisville, KY.
- Dauer, J. & Forbes, C.T. (2015, July). *A socioscientific framework for teaching a general science literacy course*. Poster presented at the annual meeting of the Society for the Advancement of Biology Education Research (SABER), Minneapolis, MN.
- Forbes, C. T., Schwarz, C. V., Zangori, L., & Vo, T. (2015, March). *Using models to support elementary students' learning about water*. Paper presented at the annual meeting of the National Science Teachers Association (NSTA), Chicago, IL.
- Forbes, C.T., Vo, T., & Bernadt, T. (2015, Sept). *Supporting students' learning about water: Model-based scientific inquiry*. Presentation at the annual meeting of the Nebraska Association of Teachers of Science (NATS), Fremont, NE.
- Forbes, C. T., Vo, T., Schwarz, C. V., & Zangori, L. (2015, April). *Exploring elementary teachers' knowledge and practices for model-based science instruction about the water cycle*. Paper presented at the annual meeting of the American Educational Research Association (AERA), Chicago, IL.
- Forbes, C. T., Zangori, L., Vo, T. & Schwarz, C. V. (2015, April). *Studying the impact of a design intervention on 3rd-grade students' model-based explanations for water systems*. Paper presented at the annual meeting of the National Association for Research in Science Teaching (NARST), Chicago, IL.
- Sabel, J., Forbes, C. T. (2015, April). *Elementary teachers' use of life science content knowledge to inform formative assessment instructional decisions*. Paper presented at the annual meeting of the National Association for Research in Science Teaching (NARST), Chicago, IL.
- Sabel, J., Forbes, C., & Dauer, J. (2015, November). *Using rubrics in undergraduate biology courses to advance understanding of complex biological concepts*. Paper presented at the annual meeting of the National Association of Biology Teachers (NABT), Providence, RI.
- Sabel, J., Forbes, C., & Dauer, J. (2015, July). *Using rubrics in undergraduate biology courses to advance understanding*. Poster presented at the annual meeting of the Society for the Advancement of Biology Education Research (SABER), Minneapolis, MN.
- Sabel, J., Forbes, C., & Zangori, L. (2015, November). *Preservice teachers' engagement with life science concepts within structured formative assessment assignments*. Paper presented at the Biology Education Research Symposium at the annual meeting of the National Association of Biology Teachers (NABT), Providence, RI.
- Sabel, J., Forbes, C. T., & Zangori, L. (2015, April). *Preservice teachers' use of content knowledge and formative assessment in a life science methods course*. Paper presented at the annual meeting of the American Educational Research Association (AERA), Chicago, IL.
- Sabel, J., Forbes, C.T., & Zangori, L. (2015, April). *Content knowledge and formative assessment integration in a life sciences methods course for preservice teachers*. Paper presented at the annual meeting of the National Association for Research in Science Teaching (NARST), Chicago, IL.
- Vo, T., Forbes, C. T., Zangori, L., & Schwarz, S. (2015, April). *Engaging students in scientific practices: The role of teachers in providing opportunities for student learning*. Paper presented at the annual meeting of the National Association for Research in Science Teaching (NARST), Chicago, IL.

- Zangori, L. & Forbes, C. T. (2015, November). *Exploring third-grade students' model-based explanations about plant processes*. Paper presented at the 2015 annual meeting of the National Association of Biology Teachers (NABT), Providence, RI
- Zangori, L. & Forbes, C. T. (2015, April). *Exploring 3rd-grade students' model-based explanations about the interactions between plant processes and the hydrosphere*. Paper presented at the annual meeting of the National Association for Research in Science Teaching (NARST), Chicago, IL.
- Zangori, L. & Forbes, C. T. (2015, April). *Exploring 3rd-grade students' model-based explanations about the interactions between plant processes and the hydrosphere*. Paper presented at the annual meeting of the American Educational Research Association (AERA), Chicago, IL.
- Zangori, L. Forbes, C., Schwarz, C. V., & Vo, T. (2015, April). *Supporting 3rd-grade students' model-based explanations about the water cycle: A quasi-experimental study of a curricular intervention*. Paper presented at the annual meeting of the American Educational Research Association (AERA), Chicago, IL.
- Sabel, J., Forbes, C. T., & Zangori, L. (2014, November). *Preservice teachers' use of content knowledge to inform formative assessment strategies in an integrated life sciences methods course*. Paper presented at the annual meeting of the National Association of Biology Teachers (NABT), Cleveland, OH.
- Vo, T., Forbes, C.T., Schwarz, C. (2014, October). *Fostering 3rd-grade students' use of scientific models with the water cycle: Teachers' conceptions and practices*. Paper presented at the annual meeting of the Geological Society of America (GSA), Vancouver, BC.
- Forbes, C.T., Schwarz, C., Zangori, L., & Vo., T. (2014, August). *Modeling Hydrologic Systems in Elementary Science (MoHSES) project*. Poster presented at the 2014 NSF DR K-12 PI Conference, Washington, DC.
- Forbes, C.T., Zangori, L., & Schwarz, C. (2014, April). *Mapping concepts to systems: Fostering 3rd-grade students' use of models to explain hydrologic phenomena*. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Pittsburgh, PA.
- Forbes, C. T., Schwarz, C., & Zangori, L. (2014, April). *Development of an empirically grounded learning performances framework for 3rd-grade students' model-based explanations about water*. Paper presented at the annual meeting of the American Educational Research Association, Philadelphia, PA.
- Sabel, J., Forbes, C.T., & Biggers, M. (2014, April). *Elementary teachers' implementation of formative assessment strategies: Supporting students' learning about water and Earth materials*. Poster presented at the annual meeting of the National Association for Research in Science Teaching, Pittsburgh, PA.
- Vo, T., Forbes, C.T., Zangori, L., & Schwarz, C. (2014, April). *Elementary teachers conceptions and practices: Fostering students' use of scientific models of the water cycle*. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Pittsburgh, PA.
- Zangori, L., Forbes, C. T., & Schwarz, C. (2014, March). *Elementary students' model-based explanations for botanical components of the water cycle*. Poster presented at the annual meeting of the National Association of Research Teaching, Pittsburgh, PA.
- Zangori, L., Forbes, C.T., & Schwarz, C. (2014, April). *Investigating the effect of curricular scaffolds on 3rd-grade students' model-based reasoning about the water cycle*. Poster presented at the annual meeting of the American Educational Research Association, Philadelphia, PA.
- Sabel, J., Forbes, C. T., & Zangori, L. (2013, November). *Design of an integrated teaching and learning biological sciences course for prospective elementary teachers*. Poster presented at the annual meeting of the National Association of Biology Teachers, Atlanta, GA.

- Zangori, L., Forbes, C.T., & Schwarz, C. (2013, November). *Elementary students' model-based explanations about the water cycle*. Paper presented at the annual meeting of School Science and Mathematics, San Antonio, TX.
- Forbes, C.T., Biggers, M., & Zangori, L. (2013, August). *Teachers' reasoning about students' sensemaking in elementary science learning environments*. Paper presented at the bi-annual meeting of the European Association for Research on Learning and Instruction, Munich, Germany.
- Biggers, M., Forbes, C.T., & Zangori, L. (2013, April). *Elementary teachers' ideas about, planning for, and implementation of learner-guided and teacher-guided inquiry*. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Rio Grande, Puerto Rico.
- Biggers, M., Forbes, C.T., & Zangori, L. (2013, April). *Investigating variations of inquiry in elementary science classrooms: Establishing validity/reliability of a modified observation protocol*. Poster presented at the annual meeting of the National Association for Research in Science Teaching, Rio Grande, Puerto Rico.
- Forbes, C.T., Lange, K., Möller, K., Biggers, M., Laux, M., & Zangori, L. (2013, April). *A comparative study of early learners' engagement in scientific practices in the U.S. and Germany*. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Rio Grande, Puerto Rico.
- Forbes, C.T., Long, K.J., Kennedy, C.A., Bancroft, J., Soldat, C., Biggers, M., & Sabel, J. (2013, April). *Supporting elementary teachers' learning to use formative assessment for science: The RAES- Iowa professional development model*. Poster presented at the annual meeting of the National Association for Research in Science Teaching, Rio Grande, Puerto Rico.
- Yarker, M.B., Stanier, C.O., Forbes, C. & Park, S. (2013, January). *Challenges teachers encounter when using models to teach weather and climate in middle school classrooms*. Paper presented at the American Meteorological Society annual meeting, Austin, TX.
- Zangori, L., Forbes, C.T., & Biggers, M. (2013, April). *Elementary students' explanation construction of seed structure and function: A concurrent mixed methods study*. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Rio Grande, Puerto Rico.
- Zangori, L., Forbes, C.T., & Biggers, M. (2013, April). *Elementary teachers' use of science curriculum materials to foster explanation construction*. Poster presented at the annual meeting of the National Association for Research in Science Teaching, Rio Grande, Puerto Rico.
- Zangori, L., Forbes, C.T., & Biggers, M. (2013, April). *Elementary teachers' use of science curriculum materials to promote students' sense making: An embedded mixed methods study*. Paper presented at the annual meeting of the American Educational Research Association, San Francisco, CA.
- Yarker, M.B., Stanier, C.O., Forbes, C.T. & Park, S. (2012, December). *Strategies for effective implementation of science models into 6-9 grade classrooms on climate, weather, and energy topics*. Poster presented at the fall meeting of the American Geophysical Union, San Francisco, CA.
- Biggers, M., Forbes, C.T., & Zangori, L. (2012, April). *Elementary teachers' curriculum design and pedagogical reasoning for supporting students' comparison and evaluation of evidence-based explanations*. Paper presented at the annual meeting of the American Educational Research Association, Vancouver, BC.
- Forbes, C.T., Biggers, M., & Zangori, L. (2012, April). *Investigating essential characteristics of scientific practices in elementary science learning environments: The Practices of Science Observation Protocol (P-SOP)*. Paper presented at the annual meeting of the American Educational Research Association, Vancouver, BC.

- Forbes, C.T., Biggers, M., & Zangori, L. (2012, April). *Toward an empirically-based learning progression: Defining progress variables and measureable levels of elementary teachers' pedagogical content knowledge for science*. Paper presented at the annual meeting of the American Educational Research Association, Vancouver, BC.
- Aguirre-Mendez, C., Promyod, N., Forbes, C.T., Biggers, M., & Zangori, L. (2012, March). *Characteristics of scientifically-oriented questions and the nature of inquiry in elementary classrooms: A multiple-case study*. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Indianapolis, IN.
- Biggers, M. & Forbes, C.T. (2012, March). *Elementary teachers' ideas about, planning for, and implementation of learner-guided and teacher-guided inquiry*. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Indianapolis, IN.
- Biggers, M., Zangori, L., & Forbes, C.T., (2012, March). *Exploring scientific explanations: Promoting students' Sense-making in elementary classrooms*. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Indianapolis, IN.
- Forbes, C.T., Biggers, M., & Zangori, L. (2012, March). *Elementary teachers' enactment of science curriculum materials: Investigating early learners' engagement in scientific practices*. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Indianapolis, IN.
- Pinney, B., Suh, J-K., Tseng, C-M., Forbes, C.T., Biggers, M., & Zangori, L. (2012, March). *Dichotomous inquiry practices: Characterizing teaching practice based on essential features of inquiry*. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Indianapolis, IN.
- Yarker, M.B., Stanier, C.O., Forbes, C.T. & Park, S. (2012, March). *Mapping model to argument-based inquiry as an approach to support middle school teachers in teaching climate, weather, and energy topics*. Paper presented at the annual meeting of National Association for Research in Science Teaching, Indianapolis, IN.
- Zangori, L., Biggers, M., & Forbes, C.T. (2012, March). *This is inquiry...right? Five essential features to modify a science lesson*. Paper presented at the annual meeting of the National Science Teachers Association, Indianapolis, IN.
- Zangori, L. & Forbes, C.T., (2012, March). *Learning to support elementary students' scientific reasoning: Preservice elementary teachers and the evidence-explanation continuum*. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Indianapolis, IN.
- Yarker, M.B., Stanier, C.O., Forbes, C.T. & Park, S. (2012, January). *Preparing middle school teachers to effectively use science models to support learning about climate, weather, and energy topics*. Poster presented at the annual meeting of the American Meteorological Society, New Orleans, LA.
- Yarker, M.B., Stanier, C.O., Forbes, C.T. & Park, S. (2011, December). *Utilizing an approach to model-based inquiry for a professional development on climate weather and energy topics for Iowa middle school teachers*. Poster presented at the annual conference of the Iowa Educational Research & Evaluation Association, Ames, IA.
- Forbes, C.T. (2011, September). *Elementary teachers' curriculum design and pedagogical design capacity for reform-based science: Research across the teacher professional continuum*. Paper presented at the bi-annual meeting of the European Science Education Research Association, Lyon, France.

- Forbes, C.T., Biggers, M., & Zangori, L. (2011, September). *Promoting and investigating elementary teachers' PCK for inquiry-based science*. Paper presented at the bi-annual meeting of the European Science Education Research Association, Lyon, France.
- Forbes, C.T. (2011, April). *The influence of curriculum-independent factors on preservice elementary teachers' adaptation of science curriculum materials*. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Orlando, FL.
- Biggers, M. & Forbes, C.T. (2011, April). *Preservice elementary teachers' learning about the five essential features of classroom inquiry*. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Orlando, FL.
- Forbes, C.T., Biggers, M., & Zangori, L. (2011, April). *Supporting elementary teachers' evaluation and adaptation of science curriculum materials: The PIESC3 professional development model*. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Orlando, FL.
- Yarker, M. & Forbes, C.T. (2011, January). *Rethinking model-based inquiry in terms of weather and climate computer models*. Paper presented at the annual meeting of the American Meteorological Society, Seattle, WA.
- Biggers, M. & Forbes, C.T. (2011, January). *Preservice elementary teachers' learning about essential features of inquiry-based teaching and learning*. Paper presented at the annual meeting of the Association for Science Teacher Education, Minneapolis, MN.
- Forbes, C.T., Biggers, M., & Zangori, L. (2011, January). *Promoting inquiry-based elementary science through collaborative curriculum co-construction: The PIESC3 Project*. Paper presented at the annual meeting of the Association for Science Teacher Education, Minneapolis, MN.
- Forbes, C.T., Gasaway, K., Biggers, M., & Zangori, L. (2010, August). *Promoting inquiry-based elementary science through collaborative curriculum co-construction*. Poster presented at the 2nd annual Iowa Science and Mathematics Teacher Educators Summit, Grinnell, IA.
- Forbes, C.T. (2010, March). *Preservice elementary teachers' adaptation of science curriculum materials for inquiry*. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Philadelphia, PA.
- Forbes, C.T., Madeira, C.A., Davis, E.A., & Slotta, J.D. (2009, April). *Activity-theoretical research on science teachers' learning: Challenges and opportunities*. Paper presented at the annual meeting of the American Educational Research Association, San Diego, CA.
- Forbes, C.T. & Davis, E.A. (2009, April). *Preservice elementary teachers' curriculum design and development of pedagogical design capacity for inquiry: An activity-theoretical perspective*. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Garden Grove, CA.
- Forbes, C.T. & Zint, M. (2009, April). *Elementary teachers' beliefs about, perceived capacities for, and reported use of scientific inquiry to promote student learning about and for the environment*. Poster presented at the annual meeting of the National Association for Research in Science Teaching, Garden Grove, CA.
- Forbes, C.T. & Davis, E.A. (2009 January). *Preservice elementary teachers' use of science curriculum materials: Initial attempts at curriculum design for inquiry-oriented science teaching*. Paper presented at the annual meeting of the Association for Science Teacher Education, Hartford, CT.
- Forbes, C.T. & Davis, E.A. (2008, March). *Beginning elementary teachers' learning to use questions and questioning in inquiry-oriented science teaching: A longitudinal study*. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Baltimore, MD.

- Forbes, C.T. & Davis, E.A. (2008, January). *Preservice elementary teachers' curricular role identity for science teaching: A multi-year study*. Poster presented at the annual meeting of the Association for Science Teacher Education, St. Louis, MO.
- Forbes, C.T. & Davis, E.A. (2007, April). *Beginning elementary teachers' learning through the use of science curriculum materials: A longitudinal study*. Paper presented at the annual meeting of the National Association for Research in Science Teaching, New Orleans, LA.
- Davis, E.A., Beyer, C., Forbes, C.T., Stevens, S. (2007, April). *Promoting pedagogical design capacity through teachers' narratives*. Paper presented at the annual meeting of the National Association for Research in Science Teaching, New Orleans, LA.
- Forbes, C.T. & Davis, E.A. (2007, January). *Exploring preservice elementary teachers' role identity development in respect to the use of science curriculum materials*. Paper presented at the annual meeting of the Association for Science Teacher Education, Clearwater Beach, FL.
- Forbes, C. T. & Davis, E.A. (2006, June). *Mapping the teacher professional continuum through the use of science curriculum materials: Novice elementary teachers' curriculum-specific learning and role identity development*. Poster presented at the 4th Annual CCMS Knowledge Sharing Institute, Ann Arbor, MI.
- Forbes, C.T. & Davis, E.A. (2006, January). *Exploring preservice elementary teachers' critique and adaptation of science curriculum materials in respect to socioscientific issues*. Paper presented at the annual meeting of the Association for Science Teacher Education, Portland, OR.
- Forbes, C.T. (2004, March). *Peer mentoring: Shared experiences help new teachers succeed*. Paper presented at the STEMTEC Teacher Preparation PI Conference, Washington, DC.
- Forbes, C.T., Heppert, J.A., & Webber, G.K. (2002, March). *Informal learning environments as resources for supporting early career teachers in inquiry-based instruction*. Paper presented at the STEMTEC Pathways to Change Conference, Washington, DC.

POST-SECONDARY TEACHING EXPERIENCE

SCIL 800 Experiential Learning in Food, Energy, & Water Systems II (Grad, UNL)	Summer, 2018
SCIL/AECN/ENVR/GEOG/NRES 109 Water in Society (Undergrad, UNL)	Spring, 2017-2021
NRES 898 Teaching and Learning about Water Systems (Grad, UNL)	Summer, 2015, 2017
SCIL 101 Science and Decision-Making for a Complex World (Undergrad, UNL)	Fall, 2014, 2016
07E:158 Teaching and Learning in the Biological Sciences (Undergrad, U. of Iowa)	Fall, 2013
07S:273 Introductory Mixed Methods Data Analysis with Atlas.Ti	Fall, 2013 (proposed)
SU/WP Inquiry Learning and Teaching in Elementary Science Classrooms in the United States (Undergrad, U. of Augsburg, Germany)	Summer, 2013
MoHSES Teacher Professional Development Workshop (Grad, U. of Iowa)	Summer, 2013
07E:340 Advanced Topics in Teaching and Learning (RAES-Iowa Teacher Professional Development Workshop, Grad, U. of Iowa)	2012-2014
07S:355/356 Research Apprenticeship in Science Education (Grad, U. of Iowa)	Spring, 2011, 2013
07S:255 Inquiry in Science Learning Environments (Grad, U. of Iowa)	Fall, 2010, 2012
07S:254 Theory and Research on Curriculum Materials for Science (Grad, U. of Iowa)	Spring, 2012
PIESC ³ Teacher Professional Development Workshop (Grad, U. of Iowa)	Summer, 2011-2012
07E:162 Methods: Elementary School Science (Undergrad, U. of Iowa)	2010-2014
07E/S:350 Seminar Science Education (Grad, U. of Iowa)	Spring, 2010

07S:151 Science Teaching & Practicum with Early Learners (Undergrad, U. of Iowa)	Fall 2009, 2011
EDUC 421, Teaching of Science in Elementary School (Undergrad, U. Michigan)	2004-2007
KCETP Microbiology Teacher Professional Development Workshops (Grad, U. Kansas)	2001, 2002
Physics 116 Laboratory (Undergrad, U. Kansas)	Fall, 2001
Biology 102 Laboratory (Undergrad, U. Kansas)	1998-1999

HONORS, AWARDS, AND RECOGNITION

UT-System STARs Award	2021
Fulbright Core U.S. Scholar	2018-2022
SENCER Leadership Fellow, National Center for Science & Civic Engagement	2017
Nominee, NABT Four-Year College and University Section Research in Biology Education Award	2016
NARST Early Career Research Award	2014
Nominee, 2015 AERA Div. C Early Career Award	2014
NARST/NSTA “Research worth Reading” recognition for paper entitled ‘Fostering student sense-making in elementary science learning environments: Elementary teachers’ use of science curriculum materials to promote explanation-construction (Zangori, Forbes, & Biggers, 2013)	2014
Nominee, NARST Outstanding Paper Award	2013
Summer Research Fellowship, University of Iowa International Programs	2012
Old Gold Summer Fellowship, University of Iowa	2010
Nominee, Dimond Outstanding Dissertation Award University of Michigan School of Education	2010
Rackham Predoctoral Fellowship Awardee University-wide fellowship that provides one year of support to advanced doctoral candidates currently working on dissertation research. Students are nominated by their departments and approximately 72 fellowships are awarded out of 250 nominees each year.	2008-2009

ADVISEES AND GRADUATE STUDENT COMMITTEES

Current Graduate Advisees

1. Silvia Jessica Mostacedo Marasovic – Ph.D., School of Natural Resources, University of Nebraska-Lincoln

Past Postdoctoral Researchers

1. Dante Cisterna – Ph.D., Science Education, Michigan State University (2015)
2. Ranu Roy – Ph.D., Science Education, Indiana University (2018)
3. Devarati Bhattacharya – Ph.D., Science Education, University of Minnesota (2015)

Past Graduate Advisees

1. Kim Carroll-Steward – Ph.D., School of Natural Resources, University of Nebraska-Lincoln - 2022
2. Holly White – M.S., School of Natural Resources - 2021
3. Amie Sommers - Ph.D., School of Natural Resources - 2021
4. Jonathan Anderson – M.A.S., University of Nebraska-Lincoln - 2020

5. Diane Lally – Ph.D., School of Natural Resources – 2020 – Research Advisor for the University Training Consortium (UTC), Eastern Kentucky University
6. Tina Vo – Ph.D., Teaching, Learning, and Teacher Education – 2018 – Assistant Professor of Science Education, University of Nevada-Las Vegas *participant, 2017 Sandra K. Abell Institute for Doctoral Students
7. Kari Nelson – Ph.D., Teaching, Learning, and Teacher Education – 2018 - University of Nebraska Medical Center
8. Destini Petitt – M.S., School of Natural Resources – 2018 – Ph.D. student, Dept. of Geography and Earth Sciences at the University of North Carolina-Charlotte
9. Ashley (McKinzie) Peterson – M.S., Natural Resource Sciences (Science Literacy) – 2017 – Distance Education Specialist, UNL Dept. of Agronomy & Horticulture
10. Jaime Sabel, Ph.D., Science Education – 2016 – Assistant Professor of Biology Education, University of Memphis
11. Molly Brandt, M.A.S. - 2016 – Undergraduate Advisor, College of Agricultural Sciences and Natural Resources (CASNR), University of Nebraska-Lincoln
12. John Brummer, M.A.S. – 2016 – Secondary science teacher, NE
13. Laura Zangori, Ph.D. Science Education - 2015 – Assistant Professor of Science Education, University of Missouri-Columbia *participant, 2013 Sandra K. Abell Institute for Doctoral Students
14. Mandy Biggers, Ph.D. Science Education- 2013 – Assistant Professor of Science Education, Texas Women’s University *participant, 2011 Sandra K. Abell Institute for Doctoral Students
15. Dave Pierson, M.S. Science Education – 2013 – Secondary science teacher, Mediapolis School District, Iowa

Doctoral Committees

1. Silvia Jessica Mostacedo Marasovic (current, Chair) UTA EES Ph.D. Student
2. Kim Carroll-Steward (2022, Chair) – UNL SNR Ph.D. Student
3. Jennifer Davis (2022, member) – UNL Ed.D. Student
4. Amie Sommers (2021, Co-Chair) - UNL SNR Ph.D. Student
5. Diane Lally (2020, Chair). *GEOSCIENCE EDUCATION RESEARCH: TRENDS AND APPLICATIONS IN UNDERGRADUATE COURSES.*
6. Tina Vo (2018, Chair). *Using Scientific Models to Support Elementary Science Teaching & Learning about Water.*
7. Kari Nelson (2018, Co-Chair). *The Impact of Mentoring on Undergraduate STEM Mentors.*
8. Jaime Sabel, Ph.D. (2016, Chair). *Use of Scaffolds to Support Undergraduate Students in Learning and Understanding Biological Concepts.*
9. Zangori, Laura, Ph.D. (2015, Chair). *Exploring 3rd-Grade Students’ Model-Based Reasoning about Plant Growth and Development*
10. ChingMei Tseng, Ph.D. (2014, Member). *The Effect of the Science Writing Heuristic Approach Reflected in Students’ Critical Thinking Skills*
11. Mandy Biggers, Ph.D. (2013, Chair). *Elementary Teachers’ Ideas about, Planning for, and Implementation of Learner-directed and Teacher-directed Inquiry*
12. Morgan Yarker, Ph.D. (2013, Co-Chair). *Mapping Argument-Based Inquiry to Model-Based Inquiry Approaches: Teachers’ Use of Science Models in Middle-School Classrooms about Climate, Weather, and Energy Concepts*
13. Nattida Promyod, Ph.D. (2013, Member). *Investigating the Shifts in Thai Teachers’ Views of Learning and Pedagogical Practices while Adopting an Argument-based Inquiry Approach*

14. Saeyeol Yoon, Ph.D. (2012, Member). *Dual Processing and Discourse Space: Exploring Fifth Grade Students' Language, Reasoning, and Understanding through Writing*
15. Matt Benus, Ph.D. (2011, Member). *The Teacher's Role in the Establishment and Refinement of Dialogue Over Time in Classrooms using Science Argumentation*
16. Juan Diaz, Jr., Ph.D. (2011, Member). *Examining Student-generated Questions in an Elementary Science Classroom*
17. Ying-Chih Chen, Ph.D. (2011, Member). *Examining the Integration of Talk and Writing for Student Knowledge Construction through Argumentation*
18. William Bennet, Ph.D. (2011, Member). *Multimodel Representation Contributes to the Complex Development of Science Literacy in a College Biology Class*
19. Jeong Yoon Jang, Ph.D. (2011, Member). *The Effect of Using a Structured Reading Framework on Middle School Students' Conceptual Understanding Within The Science Writing Heuristic Approach*

Masters Thesis Committees

1. Holly White, M.S. Natural Resource Sciences (2021, Chair)
2. Megan Cramer, M.A.S. (2019, Member). *EXPERIENTIAL LEARNING TOOLS FOR 5th GRADE SCIENTIFIC CONCEPTS*.
3. Destini Petitt, M.S. Natural Resource Sciences (2018, Chair). *A Comparative Study of the Role of Value in Reasoning about Socio-Hydrological Issues in Undergraduate Students from Developed and Developing Countries*.
4. Ashley (McKinzie) Peterson, M.S. Natural Resource Sciences (2017, Co-Chair). *Problematizing Socio-Scientific Issues: An Approach to Understanding Student Decision-Making Using Construal Level Theory*
5. Ashley Alred, M.S. Natural Resource Sciences (2016, Member). *Undergraduates' Learning and Reasoning about Agricultural and Natural Resources Socioscientific Issues*
6. Molly Brandt, M.A.S. (2016, Chair). *Elementary Students' Knowledge about STEM Dimensions of Agriculture*
7. David Pierson, M.S. Science Education (2013, Chair). *Elementary Teachers' Assessment Actions and Elementary Science Education: Formative Assessment Enactment in Elementary Science*

Visiting Graduate Students

1. Nikky Niky Murcia Suarez (Ph.D. student, LaSalle University, Columbia; Summer, 2023)
2. Florian Böschl (Ph.D. student, University of Leipzig, Germany; Summer, 2018)
3. Mira Laux (Ph.D. student, University of Münster, Germany; Summer 2012)

SERVICE AND PROFESSIONAL ACTIVITIES

Program, Department, College, and University

Classroom Technology Modernization Project	2022-2023
Search Committee Member, EES, NTT faculty position (UTA)	2022-2023
Faculty Fellow for Student Success	2020-2021
ACE 8 Leadership Fellow	2019-2020
UNL Sustainability Initiative Curriculum Workshop	2019-2020
Graduate Committee, CASNR Master of Applied Science Program	2015-2018
UNL Research Council/Grant Proposal Reviewer (ORED)	2015-2018

- Interdisciplinary Research Grants
- Hatch Multistate Funding Program

- UNL STEM Education Seed Grants
- Vice Chair & committee member, Graduate Committee, School of Natural Resources 2015-2018
- CIRTL@Nebraska Steering Committee (Center for the Integration of Research, Teaching, and Learning) <http://www.cirtl.net/> 2016-2018
- Organizer and Facilitator, *Grading Homework, Exams, Lab Reports or Problem Sets* workshop, UNL Campus-wide Workshops for Graduate Teaching Assistants 2014-2017
- Organizing Committee, UNL STEM Education Research Retreat 2015-2017
- Panelist, UNL Research Development Fellows Program (RDFP), Office of Research and Economic Development 2017
- Session organizer/facilitator, Preparing Future Faculty (PFF) Program 2017
- Undergraduate Committee, School of Natural Resources 2015-2016
- Chair, K-12 Curriculum Development Specialist Search Committee 2015
- Co-Chair, STEM Education Professor of Practice Search Committee 2016
- Science and Ag Literacy Extension Educator Search Committee, UNL Extension Prairie Corridor on Haines Branch Committee 2014
- Organizer, Graduate Student Research Symposium (UI College of Education) 2010-2013
- UI COE Elementary Science Coordinator – Elementary Teacher Education Program Committee 2009-2013
- UI COE Faculty Search Committee, Tenure-track Assistant Professor Position, Science Education 2010-2011
- UI COE Faculty Search Committee, Department of Psychological and Quantitative Foundations 2011
- UI Review Committee, 2013 UI International Programs Summer Research Fellowship 2012
- Organizer and Facilitator, RefWorks workshop, UI COE faculty and graduate students 2010, May
- Organizer and Facilitator, Atlas.Ti workshop, UI COE faculty and graduate students 2010, May
- UI COE Ad-Hoc Committee to develop online Elementary Education M.A. program 2009
- State, National, and International*
- Associate Editor, *Journal of Research in Science Teaching* (JRST) 2020-present
- Education & Outreach Committee, Consortium of Universities for the Advancement of Hydrologic Science (CUAHSI) 2019-present
- Executive Board, Geoscience Education Research Division, NAGT 2019-2022
- Advisory Board Member, USDA-funded Smart Foodscapes project 2021-present
- Advisory Board Member, NSF-funded Science Assessments for Language Diversity in Early Elementary Classrooms (SALDEE) 2022-present
- Advisory Board Member, NSF-funded *National Collaborative for Research on Food, Energy, & Water Education* project 2022-present
- Conference Planning Committee, NSF DRK-12 PI Meeting 2022-present
- Faculty Mentor, ESERA Summer School for Doctoral Students 2019
- Earth Educators Rendezvous (EER) 2018 Conference Planning Committee 2017-2018
- Reviewer, ESERA Summer School for Doctoral Students 2017-2019
- Co-Chair, National Association for Research in Science Teaching Outstanding Doctoral Research Award Selection Committee 2015-2018
- Grant Proposal Reviewer, National Science Foundation 2010-present
- Division of Research on Learning (DRL) - Discovery-Research K-12, Math-Science Partnership/STEM + Computing Partnerships, CAREER, REESE, EHR Core Research

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- Division of Undergraduate Education (DUE) - Improving Undergraduate STEM Education: Pathways into Geoscience (IUSE: GEOPATHS)
 - NARST Conference New Member Mentor 2015-2017
 - Grant Proposal Reviewer, USDA-NIFA, Professional Development Delivery Model for Department of Defense Education Activity Leadership Department of Defense Schools 2016
 - Editorial Board member, *Journal of Research in Science Teaching* (JRST) 2012-2015
 - Grant Proposal Reviewer, Nebraska Coordinating Commission for Postsecondary Education (CCPE), Title IIA Teacher Quality grants program 2015
 - Invited Participant, STEM Strategy Meeting, Nebraska Dept. of Education 2015
 - Senior Reviewer, International Conference of the Learning Sciences 2014
 - National Association for Research in Science Teaching JRST Award Committee 2012-2013
 - Association for Science Teacher Education Oversight Committee 2008
 - Reviewer, International Conference of the National Association for Research in Science Teaching (NARST) 2007-present
 - Reviewer, International Conference of the Association for Science Teacher Education 2009
 - Ad-hoc Journal Reviewer 2008-present
 - American Biology Teacher, Curriculum Inquiry, Educational Researcher, Elementary School Journal, International Journal of Science Education, Journal of Educational Psychology, Journal of Environmental Education, Journal of Teacher Education, Science Education, Teaching and Teacher Education*
 - Reviewer, Intel Science Talent Search (Intel STS), Society for Science & the Public 2014
- State and Community Outreach*
 - STEM Nova/Supernova award mentor, Scouts BSA 2015-present
 - Participant, *STEMming into the Future* K-12 outreach event 2015-2016
 - Volunteer, UNL School of Natural Resources annual *NaturePalooza* outreach event 2014, 2015
 - Professional Development, NE Educational Service Units, Science Cadre meetings 2014-2021
- Consulting*
 - Curriculum Developer, NSF-funded Impacts of Deglobalization on the Sustainability of Regional Food, Energy, Water Systems 2020-2021
 - External evaluator, Nutrients for Life K-12 STEM curriculum 2015-2016
 - Curriculum materials reviewer, Learning Design Group, Lawrence Hall of Science 2015
 - Science4Us, advisory board member and curriculum materials reviewer 2011-2014
 - P-SOP Training, NSF MSP evaluation team, Auburn University 2012, Nov
 - P-SOP Training, Workgroup Möller, PLUS Project, University of Münster, Germany 2012, January
 - Teacher mentor and supervisor, Real World Externships for STEM Teachers program, Iowa Math and Science Education Partnership 2011-2012
 - Curriculum materials reviewer, Biological Science Curriculum Study (BSCS) 2011, 2008
 - Implementation team for field trials of ISIOP observation protocol Education Development Center (EDC) 2010
 - Book Reviewer, NSTA 2015-2016
- Memberships*
 - American Educational Research Association (AERA)
 - European Science Education Research Association (ESERA)

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Geological Society of America (GSA)

National Association of Geoscience Teachers (NAGT)

National Association for Research in Science Teaching (NARST)

National Science Teachers Association (NSTA)

Science Teachers Association of Texas (STAT)