

CURRICULUM VITAE

Matthew M. Johnson

Associate Professor, Science Education
Center for Science and the Schools
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EDUCATION

- May 2016 **Ph.D., Curriculum, and Instruction (Science Education)**
Penn State University, College of Education, University Park, PA
Dissertation: “Failure is an Option: Reactions to Failure in Elementary
Engineering Design”
Dissertation Advisor: William S. Carlsen, Ph.D.
- December 2010 **M.Ed., Curriculum and Instruction (Science Education)**
Penn State University, College of Education, University Park, PA
- May 2003 **B.S., Education**
Clarion University of Pennsylvania, Dept. of Education, Clarion, PA
Certifications: Biology, Chemistry, Physics, General Science
- May 1999 **B.A., Biology**
Mercyhurst College, Department of Biology, Erie, PA

EMPLOYMENT

Academic Appointments

- 2016 – Present *Associate/Assistant Professor of Science Education* (promoted to associate
in 2021)
Center for Science and the Schools and College of Education, Penn State
University Park, PA
Instructor of SCIED/ENGR 110 course for preservice elementary teachers;
Modify curriculum, projects, and assessments; Attend Science Education
faculty meetings. In addition, duties of Research Associate seen below.
- 2011 – 2018 *Research Associate*
Center for Science and the Schools, Penn State, University Park, PA
Develop and implement teacher professional development programs
associated with STEM research grants; Pursue grant funding in
collaboration with STEM or education faculty; Prepare and oversee project
budgets; Provide professional development for STEM undergraduate and
graduate students in preparation for K-12 outreach activities; Oversee the
CSATS curriculum center; Write IRB proposals for data collection and
evaluation of education programs; Write evaluation reports for multiple

stakeholders; Coordinate the logistics for week-long summer professional development workshops; Establish close relationships with Pennsylvania school district administrators and teachers, Intermediate Units, and commonwealth campuses; Support implementation of curriculum with workshop attendees in their classrooms; Support teacher-led action research projects; Represent CSATS at College of Education strategic planning meetings and Science Education Wing renovation meetings; Co-instructed EDSGN 452, *Projects in Community Engineering*; Work closely with director and associate director on strategic planning for the center; Participate in professional associations and disseminate work; Plan and conduct research related to CSATS projects.

Secondary-Level Teaching Positions

2003-2011 *Secondary Science Teacher*
West Branch Area Jr. / Sr. High School, Morrisdale, PA
Taught middle school grade general science to all 8th graders; Taught Biology II, Advanced Biology, Practical Chemistry, Reproduction/Development and Microbiology; Co-advised Envirothon team; Advised the Science Club; Served on the Student Assistance Program (SAP) team; Co-chaired the School Improvement Plan team; Co-chaired the Data Analysis team.

University Assistantships in Science

2002 *Teaching Assistant*
Department of Biology, Clarion University, Clarion, PA
Collaborated with professor to plan, prepare, and teach cell biology lab; facilitated lab sessions.

2000-2001 *Research Assistant*
Department of Biochemistry, Microbiology, and Molecular Biology, Penn State University, University Park, PA
Studied red blood cell development in mice in a molecular hematology lab as a part of a graduate program in Biochemistry, Microbiology, and Molecular Biology; Published paper on the research; Presented at journal club.

1999-2000 *Teaching Assistant*
Department of Biochemistry, Microbiology, and Molecular Biology, Penn State University, University Park, PA
Taught introductory microbiology lab course (Micro 202), Wrote and presented short lectures; Generated summative assessments; Led recitation sessions for introductory genetics lecture course (Biol 222) to help students with problem sets.

GRANT PROPOSALS

Funded Proposals – Active (\$15,397,804)

Title: **Movement Compensation After Rotator Cuff Tear: What is Safe and What is Risky?**
Sponsor: NSF
Role: Senior personnel; co-author of proposal, lead of PD workshop and follow-up
PI: Meghan Vidt (PSU, Biomedical Engineering)
Award amount: \$357,218

Title: **CAREER: Sign-to-Speech: An Edge-IoT Platform and Software Library for Real Time Sign Language Recognition**
Sponsor: National Science Foundation
Role: Co-author of proposal, design and implement professional development program
PI: Mahanth Gowda (PSU, Electrical Engineering and Computer Science)
Award amount: \$500,000

Title: **Consortium for cultivating human and naturally regenerative enterprises (C-CHANGE) Using Dual-Polarization Radar Observations to Detect Entrainment Zone Depth and Verify Model Forecasts of Convective Boundary Layer Evolution**
Sponsor: USDA
Role: Co-PI; co-author of proposal, lead of PD workshop and evaluation
PI: Lisa Schulte-Moore (Iowa State, Ag and Biological Engineering)
Award amount: \$4,447,844

Title: **Using Dual-Polarization Radar Observations to Detect Entrainment Zone Depth and Verify Model Forecasts of Convective Boundary Layer Evolution**
Sponsor: NSF
Role: Senior personnel; lead of PD workshop and evaluation
PI: David Stensrud (PSU, Meteorology)
Award amount: \$768,015

Title: **Increasing understanding of COVID-19 through online learning modules for K-12 and community education**
Sponsor: Huck Life Sciences Institute/Social Sciences Research Institute
Role: PI
Award amount: \$50,286

Title: **Testing General Relativity with Gravitational Wave Observations**

Sponsor: National Science Foundation
Role: Lead of professional development workshop
PI: Bangalore Sathyaprakash (PSU, Physics)
Award amount: \$270,000

Title: **Practices of Engineers in Rural Schools Involving Students and Teachers (PERSIST) in Engineering**

Sponsor: National Science Foundation
Role: PI
Award amount: \$402,164

Title: **NSF Nanosystems Engineering Research Center on Advanced Self-Powered Systems of Integrated Sensor Technologies (ASSIST)**

Sponsor: National Science Foundation
Role: Senior personnel; lead of Penn State's precollege education team
PI: Veena Misra (North Carolina State University, Elect/Comp Eng)
Award amount: \$ ~5,000,000

Title: **CAREER: New control-theoretical approaches for cyber-physical privacy**

Sponsor: National Science Foundation
Role: Research associate; co-author of proposal; lead facilitator of PD
PI: Ming Zhu (PSU, Electrical and Computer Engineering)
Award amount: \$500,000

Title: **Estuarine metabolism and gas exchange determined from dissolved oxygen time series: Method development, field evaluation and application to historical**

Sponsor: National Science Foundation
Role: Research associate; co-author of proposal; lead facilitator of PD
PI: Raymond Najjar (PSU, Meteorology)
Award amount: \$899,401

Title: **RET Site: Building Education**

Sponsor: National Science Foundation
Role: Senior personnel; lead facilitator of PD
PI: Somayeh Asadi (PSU, Architectural Engineering)
Award amount: \$600,000

Title: **CAREER: Defining novel pathways for mitochondrial dynamics in an early-diverging eukaryote**

Sponsor: National Science Foundation
Role: Faculty; co-developer and lead implementer of teacher PD workshop
PI: Megan Povelones (PSU Brandywine, Biology)
Award amount: \$922,876

Title: **CAREER: Mechanobiology of mesenchymal-epithelial transition**
Sponsor: National Science Foundation
Role: Senior personnel; lead of planning, developing, and implementing workshop activities
PI: Esther Gomez (PSU, Biological Engineering)
Award amount: \$500,000

Title: **Boeing – Research Experiences for Teachers**
Sponsor: Boeing Corporation
Role: Design and implement professional development program
PI: Kathleen Hill
Award amount: \$180,000

Proposals in Review (~\$9,216,206)

Title: **CAREER: Isotope fractionation calculation in minerals: An efficient cluster approach**
Sponsor: NSF
Role: Design and implement professional development program
PI: Abu Asaduzzaman
Award amount: \$532,647

Title: **CAREER: Photocatalytic Optical Fibers**
Sponsor: NSF
Role: Design and implement professional development program
PI: Christian Pester
Award amount: \$500,000

Title: **CAREER: Competition-mediated Ecology and Evolution of a Model Phytopathogen**
Sponsor: NSF
Role: Design and implement professional development program
PI: Kevin Hockett
Award amount: \$1,027,257

Title: **CAREER: Spintronics Enabled Bayesian Framework to Accelerate Probabilistic Deep Learning**
Sponsor: NSF
Role: Design and implement professional development program
PI: Abhronil Sengupta
Award amount: \$500,000

Title: **CAREER: The Impact of Extracellular Polymeric Substances on Particle Transport in Aquatic Environments**
Sponsor: NSF
Role: Design and implement professional development program
PI: Matthew Rau

Award amount: \$567,307

Title: **CAREER: Achieving Resilience in Brittle Materials Through Bio-inspired Nested Cylindrical Structures**

Sponsor: NSF

Role: Design and implement professional development program

PI: Fariborz Tavangarian

Award amount: \$615,796

Title: **CAREER: Worker-aware Robotic Coadaptation to Ensure Physical Safety during Human-Robot Interaction in Construction**

Sponsor: NSF

Role: Design and implement professional development program

PI: Houtan Jebelli

Award amount: \$550,000

Title: **CAREER: Algorithms and Tools for Allele-Specific Transcript Assembly**

Sponsor: NSF

Role: Design and implement professional development program

PI: Mingfu Shao

Award amount: \$749,867

Title: **CAREER: Rethinking Algorithms for Micromechanical Deformation and Failure of Porous Materials**

Sponsor: NSF

Role: Design and implement professional development program

PI: Yashar Mehmani

Award amount: \$648,113

Title: **GOALI: Sustainability of Thermo-catalytic Decomposition of Natural Gas: Connecting Nanostructure and Kinetic Rates Through Active Sites**

Sponsor: NSF

Role: Design and implement professional development program

PI: Randy Vander Wal

Award amount: \$369,376

Title: **Creating Authentic Public health- related Student Investigations with Data (CAPSID)**

Sponsor: NSF

Role: PI

Award amount: \$1,165,488

Title: **RET Site: AI for the Understanding of Digital Biomarkers and Behavior**

Sponsor: NSF

Role: Co-PI
PI: Edgar Lobaton
Award amount: \$600,000

Title: **CAS-Climate: Can Supercritical CO₂ Bubble Sequestered in the Subsurface Leak?**

Sponsor: NSF
Role: Design and implement professional development program
PI: Yeshar Mehmani
Award amount: \$296,711

Proposals in Progress

Funded Proposals – Ended (~\$22,537,542)

Title: **Toward Solving Cosmic Particle Mysteries with Neutrinos and Gamma Rays**

Sponsor: National Science Foundation
Role: Co-PI; co-author of proposal, lead of PD workshop and evaluation
PI: Kohta Murase (PSU, Astronomy & Astrophysics)
Award amount: \$80,000

Title: **Infrared electro-optical spectroscopy of degradation pathways in organo-halide perovskite photovoltaics**

Sponsor: National Science Foundation
Role: Faculty; co-lead of PD workshop and evaluation
PI: John Asbury (PSU, Chemistry)
Award amount: \$395,396

Title: **Institute for CyberScience Seed Grant**

Sponsor: Penn State Institute for CyberScience
Role: Co-PI; co-lead of PD workshop and evaluation
PI: Annmarie Ward (PSU, CSATS)
Award amount: \$80,000

Title: **Developing a climatology of horizontal convective rolls over Oklahoma – Meteorology research**

Sponsor: National Science Foundation
Role: Senior personnel; co-lead of week-long PD workshop and evaluation
PI: David Stensrud (PSU, Meteorology)
Award amount: \$484,146

Title: **CarbonEARTH (Carbon Educators and Researchers Together for Humanity)**

Sponsor: National Science Foundation
Role: Senior personnel; led professional development for graduate students; worked with teachers in implementing new projects in the classroom

PI: Renee Diehl (PSU, Physics)
Award amount: \$3,000,000

Title: **Northeast Woody and Warm Season Biomass Consortium (NEWBio)**
Sponsor: United States Department of Agriculture
Role: Senior personnel; led professional development workshops and classroom implementation activities; wrote annual education report
PI: Tom Richard (PSU, Agriculture and Biological Engineering)
Award amount: \$18,323,000

Title: **Research on the Impacts of Engineering in Elementary**
Sponsor: Museum of Science, Boston
Role: Co-PI; performed quantitative research on student learning; presented at NARST meeting
PI: William Carlsen (PSU, Science Education)
Award amount: \$175,000

Unfunded Proposals

Title: **Data Training Core**
Sponsor: Board of Trustees of Indiana University
Role: Design and implement professional development program
PI: David Hunter
Award amount: \$1,093,644

Title: **Collaborative Research: CPS: Medium: Wide-Area Monitoring, Protection, and Control in a Sparsity-Driven Neuromorphic Computing Platform**
Sponsor: National Science Foundation
Role: Design and implement professional development program
PI: Nilanjan Chaudhuri (PSU, Electrical and Computer Engineering)
Award amount: \$768,974

Title: **CAREER: Spatial and temporal biomechanics of muscle following tendon injury**
Sponsor: National Science Foundation
Role: Co-author of proposal, design and implement professional development program
PI: Meghan Vidt (PSU, Biomedical Engineering)
Award amount: \$554,408

Title: **CAREER: High-loading defect-free molecular sieve membranes prepared via capillary condensation**
Sponsor: National Science Foundation
Role: Co-author of proposal, design and implement professional development program
PI: Xueyi Zhang (PSU, Chemical Engineering)
Award amount: \$505,951

Title: **CAREER: Photocatalytic Optical Fibers**
Sponsor: National Science Foundation
Role: Design and implement professional development program
PI: Christian Pester (PSU, Chemical Engineering)
Award amount: \$500,000

Title: **CAREER: Origami-driven manufacturing of freeform, ruggedized 3D flexible electronics**
Sponsor: National Science Foundation
Role: Design and implement professional development program
PI: Xin Ning (PSU, Aerospace Engineering)
Award amount: \$500,000

Title: **CAREER: The Impact of Biogenic Particles and Biofilms on the Formation and Fate of Particle Aggregates in Aquatic Environments**
Sponsor: National Science Foundation
Role: Design and implement professional development program
PI: Matthew Rau (PSU, Mechanical Engineering)
Award amount: \$539,601

Title: **CAREER: Comprehensive and Scalable Co-Design Methods for Enabling Zero-Carbon Buildings**
Sponsor: National Science Foundation
Role: Evaluator
PI: Gregory Pavlak (PSU, Architectural Engineering)
Award amount: \$510,030

Title: **CAREER: A Feature Knowledge System to Accelerate the Innovation of High-Performance Components using Hybrid Additive Manufacturing**
Sponsor: National Science Foundation
Role: Design and implement professional development program
PI: Saurabh Basu (PSU, Industrial and Manufacturing Engineering)
Award amount: \$500,000

Title: **CAREER: High-Energy Multimessenger Particle Astrophysics**
Sponsor: National Science Foundation
Role: Co-author of proposal, design and implement professional development program
PI: Kohta Murase (PSU, Physics and Astronomy/Astrophysics)
Award amount: \$937,018

Title: **CAREER: Spintronics Enabled Bayesian Framework to Accelerate Probabilistic Deep Learning**
Sponsor: National Science Foundation

Role: Design and implement professional development program
PI: Abhronil Sengupta (PSU, Electrical Engineering and Computer Science)
Award amount: \$504,415

Title: **CAREER: Achieving Resilience in Brittle Polymers Through Bio-inspired Nested Cylindrical Structures**

Sponsor: National Science Foundation
Role: Design and implement professional development program
PI: Fariborz Tavangarian (PSU Harrisburg, Mechanical Engineering)
Award amount: \$ 773,268

Title: **CAREER: A Novel Computational Framework for Large-scale Dam Structural Analysis**

Sponsor: National Science Foundation
Role: Design and implement professional development program
PI: Pinlei Chen (Penn State, Civil and Environmental Engineering)
Award amount: \$581,080

Title: **CAREER: Developing an implicit solvent model depicting solvated protein interactions utilizing the normal mode analysis approaches**

Sponsor: National Science Foundation
Role: Design and implement professional development program
PI: Hyuntae Na (Penn State Harrisburg, Computer Science)
Award amount: \$477,380

Title: **A New Microscopic View of Memory, Annealing, and Yielding in Disordered Solids.**

Sponsor: NSF
Role: Senior personnel; co-author of proposal, lead of PD workshop and follow-up
PI: Nathan Keim (PSU, Physics)
Award amount: \$497,584

Title: **REU/RET Site: Building Engineering – Summer Undergraduate Research Experience (BE-SURE)**

Sponsor: National Science Foundation
Role: Precollege education
PI: Somayeh Asadi (PSU, Architectural Engineering)
Award amount: \$ 441,626

Title: **Revealing the central engine of energetic supernovae through multi-messenger high-energy emission**

Sponsor: National Science Foundation
Role: Research associate; co-author of proposal; lead facilitator of PD

PI: Kohta Murase (PSU, Physics and Astronomy/Astrophysics)
Award amount: \$665,842

Title: **Unified view of high-energy multi-messenger sources**
Sponsor: NSF
Role: Research associate; co-author of proposal; lead facilitator of PD
PI: Kohta Murase (PSU, Physics and Astronomy/Astrophysics)
Award amount: \$661,376

Title: **PA SMART 2020: STEM+CS Institutes for Pennsylvania**
Sponsor: Pennsylvania Department of Education
Role: Co-PI; co-author of proposal, lead of PD workshops
PI: Amanda Smith (PSU, CSATS)
Award amount: \$497,007

Title: **CAREER: PhenChip: A framework for direct, multiplexed phenotyping of bacteria**
Sponsor: NSF
Role: Faculty associate; co-author of proposal, lead of PD program
PI: Seyedehaida Ebrahimi (PSU, Electrical Engineering)
Amount: \$500,000

Title: **CAREER: Non-invasive measurement of force production from individual skeletal muscles**
Sponsor: National Science Foundation
Role: Research associate; co-author of proposal; lead facilitator of PD
PI: Daniel Cortes (PSU, Mechanical Engineering)
Award amount: \$500,000

Title: **CAREER: Wearable technology for American Sign Language translation: An end to end system**
Sponsor: National Science Foundation
Role: Research associate; co-author of proposal; lead facilitator of PD
PI: Mahanth Gowda (PSU, Electrical Engineering and Computer Science)
Award amount: \$549,876

Title: **CAREER: High-loading defect-free molecular sieve membranes prepared via capillary action**
Sponsor: National Science Foundation
Role: Research associate; co-author of proposal; lead facilitator of PD
PI: Xueyi Zhang (PSU, Chemical Engineering)
Award amount: \$500,000

Title: **Center for Renewable Energy Storage Systems and Technology**
Sponsor: National Science Foundation
Role: Research associate; co-author of proposal; lead facilitator of PD
PI: Lynden Archer (Cornell, Chemical and Biomolecular Engineering)
Award amount: \$5,543,500

Title: **Arctic plant phenology – Learning by Engaging Students in visual Examination of Expansive Data Sets (APPLE SEEDS)**
Sponsor: National Science Foundation
Role: Senior personnel; facilitator of PD
PI: Kathleen Hill (PSU, CSATS)
Award amount: \$1,219,538

Title: **CO-developed Middle-level Program Integrating Learning Experiences for Rural Students in Computer Science (COMPILERS-CS)**
Sponsor: National Science Foundation
Role: Senior personnel; facilitator of PD
PI: Kathleen Hill (PSU, CSATS)
Award amount: \$999,681

Title: **RET Site: CLUSTER – Classroom teachers Using Supercomputers Through Experiences in Research**
Sponsor: National Science Foundation
Role: Co-PI; lead author on proposal
PI: Reuben Kraft (PSU, Mechanical and Nuclear Engineering)
Award amount: \$599,468

Title: **PAsmart – Advancing K-12 computer science and STEM education**
Sponsor: Pennsylvania Department of Education
Role: Senior personnel; lead facilitator of PD
PI: Kathleen Hill (PSU, CSATS)
Award amount: \$497,007

Title: **CAREER: High-loading MOF membranes for gas separation**
Sponsor: National Science Foundation
Role: Senior personnel; co-author of proposal; plan and implement PD
PI: Xueyi Zhang (PSU, Chemical Engineering)

Title: **CAREER: Integrated research and education on implantable focused and microscopic ultrasound neuromodulation**
Sponsor: National Science Foundation
Role: Senior personnel; co-author of proposal, lead facilitator of PD
PI: Medhi Kiani (PSU, Electrical engineering)

Title: **CAREER: Biomechanical mechanisms of upper limb movement following rotator cuff tear**
Sponsor: National Science Foundation
Role: Senior personnel; co-author of proposal, lead facilitator of PD
PI: Meghan Vidt (PSU, Biomedical engineering)

Title: **Growing STEMs: Integrating agriculture projects to support science, technology, engineering and math learning in K-12**
Sponsor: USDA
Role: PI, lead author of proposal

Title: **Co-developed middle-level program integrating learning experiences for rural students in computer science (COMPILERS-CS)**
Sponsor: National Science Foundation
Role: Co-PI; co-developer and co-facilitator of PD
PI: Kathleen Hill (PSU, CSATS)

Title: **Effect of co-variance errors in land surface variables on modeling mesoscale convective system events**
Sponsor: National Science Foundation
Role: Senior personnel; plan and implement PD
PI: David Stensrud (PSU, Meteorology)

Title: **Dynamic interplay between bacteriocin-mediated bacterial competition and plant host-pathogen interactions**
Sponsor: National Science Foundation
Role: Co-PI; plan and implement teacher PD
PI: Kevin Hockett (PSU, Plant Pathology)

Title: **Inhibition of the Rayleigh-Bernard instability in cylindrical geometries via axial vibration**
Sponsor: National Science Foundation
Role: Research associate; co-author of proposal
PI: Robert Smith (PSU, Applied Research Laboratory)

Title: **Research in Energy and Environmental Sustainability in Teams of Researchers and Educators (RESTORE)**
Sponsor: National Science Foundation
Role: Senior personnel; lead author of proposal
PI: Rachel Brennan (PSU, Environmental Engineering)
Award amount: \$599,343

Title: **CBio: Chesapeake Biomass Consortium for Sustainable Energy and Water Quality Protection**
Sponsor: United States Department of Agriculture
Role: Other professional; co-author of proposal
PI: Tom Richard (PSU, Agriculture and Biological Engineering)
Award amount: \$15,000,000

Title: **RET Site: CLUSTER – Classroom teachers Using Supercomputers Through Experiences in Research**
Sponsor: National Science Foundation
Role: Co-PI; lead author on proposal

PI: Conrad Tucker (PSU, Engineering design)
Award amount: \$599,468

Title: **Using Digital Innovation to Revitalize K-12 STEM Education through High Performance Computing (HPC-in-K12)**

Sponsor: University Strategic Plan RFP
Role: Co-PI, co-developer of professional development
PI: Kathy Hill (PSU, CSATS)
Award amount: \$220,600

Title: **Revealing the Connection between Astrophysical Explosions and Fast Radio Bursts**

Sponsor: National Science Foundation
Role: Research associate, lead of K-12 professional development and evaluation
PI: Kohta Murase (PSU, Physics and Astronomy & Astrophysics)
Award amount: \$679,097

Title: **Inhibition of the Rayleigh-Benard Instability in Cylindrical Geometries via Axial Vibration**

Sponsor: National Science Foundation
Role: Senior personnel, lead of K-12 professional development and evaluation
PI: Robert Smith (PSU, Applied Research Lab)
Award amount: \$387,000

Title: **CAREER – All-acoustic multi-modality minimally-invasive implants for high-resolution neuromodulation and neuroimaging**

Sponsor: National Science Foundation
Role: Senior personnel; co-author of proposal; lead of planning, developing, and implementing workshop activities
PI: Mehdi Kiani (PSU, Electrical engineering)
Award amount: \$500,000

PUBLICATIONS

Manuscripts in Preparation

Johnson, M.M., Martin, K.D., Lewis, T.M., Cesare, A.M. A free, online course for students to learn about COVID-19. *The Science Teacher*.

Manuscripts in Review

Johnson, M.M., Hill, K.M. (in review). Increasing impact on society through K-12 teacher professional development programs. In *Handbook of Broader Impacts*. Susan Renoe and Laurie Van Egeren, editors.

Peer-reviewed Publications

- Johnson, M.M., Kelly, G.J., & Cunningham, C.M.** (2021). Failure and improvement in elementary engineering. *Journal of Research in STEM Education*, 7(2), pp-pp. 69-92 <https://doi.org/10.51355/jstem.2021>.
- Johnson, M.M.**, Lewis, T.M., Cunningham, C.C., Balesdent, C.G. (2021). “A methodological approach for researching online teacher professional development.” Proceedings of the *American Society of Engineering Education Mid-Atlantic Regional Conference*.
- Johnson, M.M.**, Cesare, A.M., Knowles, G., Wood, T. (2019). “Investigating optimization as an engineering practice in a middle school classroom.” Proceedings of the *American Society of Engineering Education Annual Conference*.
- Johnson, M.M.** (2019). “Learning from Failure in Elementary Engineering Design Projects.” In *Theory and Methods for Sociocultural Research in Science and Engineering Education*. Gregory Kelly and Judith Green, editors. Routledge.
- Johnson, M.M.**, Croom-Perez, T., Perez, A.A., Antonison, E., Tekeley, C., Edelman, R. (2017). “From Fish Tank to Fuel Tank: Engineering photobioreactors in the classroom”. *Science Scope*. 40 (6), 41-49.
- Galyamova, A., **Johnson M.M.**, Chohan, B.S., Sykes, D.G. (2019). The construction and characterization of a conductivity meter for use in high school and undergraduate science labs. *The Chemical Educator*. 24:22-26.
- Engstrom, T., **Johnson, M.M.**, Russin, T., Ecklund, P. (2015). “A computer-controlled classroom model of an atomic force microscope”. *The Physics Teacher*. 56 (9), 536-538.
- Zhang D, **Johnson M.M.**, Miller C.P., Pircher T, Geiger J.N., Wojchowski DM. (2001). “An optimized system for studies of EPO-dependent murine pro-erythroblast development”. *Experimental Hematology*. 29(11), 1278-88.
- McDonald, C.M., **Johnson M**, Schunk, D., Kreuter, R., Wigton, B., Chohan, B. and Sykes, D. (2011) “A portable, low-Cost, LED fluorimeter for middle school, high school, and undergraduate chemistry labs”. *Journal of Chemical Education* 88 (8), 1182-1187.
- Dominguez V, McDonald C, **Johnson M**, Schunk D, Kreuter R, Wigton, B, Chohan B and Sykes D. (2010). “The characterization of a custom-built coulometric Karl-Fischer titrator”. *Journal of Chemical Education*. 87(9), 987-991.
- De A.; Khan, M.N.I, Nagaranjan, K., Saki, A.A., Alam, M., Wood, T.S., **Johnson, M.M.**, Saripalli, M.V., Xia, Y., Cutler, S., Ghosh, S., Hill, K.M., Ward, A.R. (2020). “Hands-on cybersecurity curriculum using a modular training kit”. **Voted Best Paper** in Proceedings of the *American Society of Engineering Education Annual Conference*.

Other Publications (not peer reviewed)

- Johnson, M.M.** (2021). Today’s students aren’t learning how science happens. That’s a problem in a pandemic. *EdSurge*. <https://www.edsurge.com/news/2021-03-12->

[today-s-students-aren-t-learning-how-science-happens-that-s-a-problem-in-a-pandemic.](#)

Johnson, M.M., Cesare, A.M., Lewis, T.M, Hill, K.M. (2020). COVID-19 presents a real-time educational opportunity: Engaging middle and high school students in learning how science happens. *Insights from Experts*. <https://covid-19.ssri.psu.edu/articles/covid-19-presents-real-time-educational-opportunity>

INVITED TALKS

Johnson, M.M. (March, 2018). *The Myth of the Scientific Method: Using research projects to teach STEM in K-12*. Millennium Café, University Park, PA.

Johnson, M.M., (May, 2016). *Engineering Design in the Elementary Classroom: Failure IS an Option*. Engineering Education Symposium, Museum of Science. Boston, MA.

Johnson, M.M. (April 2014). *A model for understanding and planning STEM education outreach*. North-Holland Provincial Network for Primary Science and Technology Education. University of Amsterdam. Amsterdam, Netherlands.

PEER-REVIEWED PRESENTATIONS AND POSTERS

2021

Johnson, M.M. and Hill, K.M. (April, 2021). K-12 teachers using authentic STEM practices in the classroom based on research immersion experiences. *Annual NARST Conference*.

Johnson, M.M., Lewis, T.M., Cesare, A.M. (April, 2021). The development of free, online educational modules about COVID-19. *2021 STEAM Leadership Conference*.

Johnson, M.M., Lewis, T.M., Cunningham, C.C., Balesdent, C.G. (April, 2021). “A methodological approach for researching online teacher professional development.” *American Society of Engineering Education Mid-Atlantic Regional Conference*.

2020

Johnson, M.M., Hill, K.M.; Cesare, A., Lewis, T. (accepted). K-12 teachers using authentic STEM practices in the classroom based on research immersion experiences.” *2020 International NARST Conference*, Portland, OR (conference cancelled)

Johnson, M.M., Smith, A.J., Hill, K.M. (accepted). ENGINE – A Rural STEM Learning Ecosystem for Disseminating Research Impacts. A poster to be presented at the Assessing Research Impacts in Society (ARIS) Annual Summit (conference cancelled)

2019

Hill, K.M., **Johnson, M.M.**, and Smith, A.J, (August 2019). *Examining the MASTER Model as a tool for supporting teachers to translate research experiences into practices-based curriculum*. Paper presented at the meeting of the European Science Education Research Association, Bologna, Italy.

Johnson, M.M., Wood, T.S., Cesare, A., Knowles, G., Wood, T. (June 2019). *Investigating optimization as an engineering practice in a middle school classroom*. Poster presented at the American Society of Engineering Education Conference.

Johnson, M.M. (May 2019). *STEM Competitions as Broader Impacts*. National Alliance for Broader Impacts Summit, Tucson, AZ.

Johnson, M.M. (April 2019) *Penn State's Precollege Education Program* (poster). ASSIST NSF Site Visit, Charlottesville, VA.

Zinnen, T., Tangen, T., **Johnson, M.M.**, Jesse, E. (February 2019). *Making Research University Campuses "Destinations for Exploration."* American Association for the Advancement of Science Annual Meeting, Washington, D.C.

2018

Johnson, M.M. (May 2018) *Penn State's Precollege Education Program* (poster). ASSIST NSF Site Visit, Raleigh, NC

Johnson, M.M. and Hill, K.M. (April 2018). *Design research as a methodology for broader impacts research*. National Alliance for Broader Impacts Summit, Providence, RI.

Johnson, M.M. and Hill, K.M. (April 2018). *NABI feedback on broader impacts and STEM outreach journal* (poster). National Alliance for Broader Impacts Summit, Providence, RI.

2017

Hill, K.M., **Johnson, M.M.**, Smith, A., and Ward, A., (August 2017). Supporting teachers to translate research experiences into practices-based instruction. Paper presented at European Science Education Research Association, Dublin, Ireland.

Johnson, M.M. and Carlsen, W.S. (April 2017). *Success is not the only goal: Failure and improvement in elementary engineering*. International NARST conference, San Antonio, TX.

Hill, K.M., **Johnson, M.M.**, Ward, A.R., and Smith A. (April 2017). *Challenges of teachers developing and implementing practices-based student investigations*. International NARST conference, San Antonio, TX.

Hill, K.M., and **Johnson, M.M.** (April 2017). *The development of a peer-reviewed journal for broader impacts*. National Alliance for Broader Impacts Summit, Stevenson, WA.

2016

Johnson, M.M. (June 2016). *Creating university partnerships in providing effective teacher professional development in energy education*. National Energy Education Summit, Washington, D.C.

Ward, A.R., and **Johnson, M.M.** (April 2016). *Promoting improved communication to non-technical audiences using a systems-based model*. National Alliance for Broader Impacts Summit, Philadelphia, PA.

2015

Kortenaar, M., Allen, J.P., Wolfe, B., Decker, R., Breen, M., Nichol, C., **Johnson, M.M.**, Faltens, T., Hehr, L. (June 2015). *Creating and implementing K-12 teacher professional development*. NISENet Network-wide annual meeting. St. Paul, MN.

Johnson, M.M. (June 2015). *Using NISE Net kits to develop classroom lessons*. A poster presented at the NISENet Network-wide annual meeting. St. Paul, MN.

Ward, A.R., and **Johnson, M.M.** (April 2015) *Promoting strategic STEM education outreach programming using a systems-based STEM education outreach model*. Broader Impacts Summit, University of Wisconsin, Madison, WI

Johnson, M.M., and Carlsen, W.S (April 2015). *Feedback from failure: teacher discourse moves in reaction to “unsuccessful” elementary engineering projects*. International NARST Conference, Chicago, IL

Johnson, M.M., Bug, L., and Ward, A.R. (February 2015). *Enhancing T-S partner understanding of the systems nature of STEM research*. International Teacher Scientist Partnership Conference, San Francisco, CA

2014

Wilberding, S., **Johnson, M.M.**, Dere, A. and Perez, A.A. (June 2014). *Penn State’s CarbonEARTH program. GK-12 and Beyond: Mapping the Future for Teachers, Students and Scientists*, Penn State University, University Park, PA

Johnson, M.M. and Carlsen, W.S. (April 2014) *Characterizing the views of NOS and OTS of scientists teaching elementary school science*. Poster presented at International NARST conference, Pittsburgh, PA.

Carlsen, W.S., and **Johnson, M.M.** (April 2014). *Elementary Science Learning through Engineering Design: Effects Explored Using HLM*. Paper presented at International NARST Conference, Pittsburgh, PA.

2013

Johnson, M.M. and Ward, A.R. (December 2013). *STEM education outreach and its application in broader impacts*. Pennsylvania Science Teachers’ Association Conference, Penn State University, University Park, PA

Johnson, M.M. (December 2013). *What is engineering?* Pennsylvania Science Teachers’ Association Conference, Penn State University, University Park, PA

Ward, A.R., **Johnson, M.M.** and Bug, L. (May 2013). *Promoting University-wide strategic, cohesive STEM education outreach programming*. Broader Impacts Summit. University of Missouri, Columbia, MO.

Ward, A.R and **Johnson, M.M.** (February 2013). *Examining a model for enhancing K-12 teachers' understanding of scientific research.* International Teacher-Scientist Partnership Conference, Boston, MA.

2012

Johnson, M.M. and Ward, A.R. (August 2012). *Using short-term research projects in the classroom.* CarbonEARTH summer workshop, Penn State University, University Park, PA

Johnson, M.M. (May 2012). *Humanitarian Engineering and Social Entrepreneurship (HESE) K-12 Pilot Program: "Growing STEMs"* Northwest PA STEM conference, Edinboro University of Pennsylvania, Edinboro, PA.

2011

Johnson, M.M. and Ward, A.R. (August 2011). *Using short-term research projects in the classroom.* CarbonEARTH summer workshop, Penn State University, University Park, PA

Johnson, M.M. (May 2011). *Best-practices in immersion experiences in science.* NSF Earth Space Science Partnership (ESSP) program meeting. Penn State University, University Park, PA

TEACHER PROFESSIONAL DEVELOPMENT AND OUTREACH PROGRAMS

CSATS Summer Research Experience for STEM Teachers Program

Professional development-focused program that engages teachers in authentic research projects with academic or industry researchers for six weeks in the summer, weekly workshops focused on improving teaching pedagogy, curriculum development, and presentations of their technical work to non-technical audiences. Co-designed, redesigned, and co-lead the professional development workshops, assisted teachers in curriculum development based on their research and aligned with their teaching context, reviewed work products submitted by the teachers, provided follow-up support during the academic year, and supported teachers in conducting action research projects to evaluate the effectiveness of their curriculum implementation.

Summer 2021

- Penn State University Park and North Carolina State University/virtual – machine learning in robots, light optimization for artwork, energy useage and air quality of buildings, energy efficiency in windows, quantifying daylighting, optimizing building glazing (BUILDING; NSF) sustainable agriculture, determining reaction kinetics of methane pyrolysis, soil health indicators, modeling organic residues and soil carbon (C-CHANGE; USDA); nighttime pH change in Chesapeake (NSF); development of a human breast phantom for cancer visualization (Cancer Institute; NIH)

Summer 2020

- Penn State University Park/virtual – machine learning (ASSIST; NSF), conservation of liver enzyme transcription factors in bats (Boeing); energy efficiency and air quality; measuring window efficiency; modeling future climate readiness of buildings;

circadian lighting; using augmented reality; optimization of window glazing (BUILDING; NSF); relation of income effects on cancer screening (cancer research, Penn State Cancer Institute)

Summer 2019

- Penn State University Park - nano-scale materials engineering for wearable devices (ASSIST; NSF), developing automated systems through object recognition software (ASSIST; NSF), potential for polyphenols to prevent in gastrointestinal cancer (cancer research, Penn State Cancer Institute), mechanisms of HPV in causing cervical cancer (cancer research, Penn State Cancer Institute)

Summer 2018

- Penn State University Park - nano-scale engineering (ASSIST; NSF), climate modeling using supercomputing resources (meteorology; Boeing, CSATS), mutated microsatellites (cancer research, Penn State Cancer Institute), embryonic development (PS Brandywine biology; Boeing)

Summer 2017

- Penn State University Park - nano-scale engineering (ASSIST; NSF), climate modeling (meteorology; NSF), Drosophila mortality rate following traumatic brain injury (biology, Boeing), conservation and sustainability in tropical rainforest of Costa Rica (CHANCE; Boeing)
- Pittsburgh Industry - nuclear engineering (Westinghouse), sealants (Callery), hyper-saturated aqueous solutions (Eckert Technologies Group, LLD)

Summer 2016

- Penn State University Park - nano-scale engineering (ASSIST; NSF), Drosophila mortality rate following traumatic brain injury (biology, Boeing), conservation and sustainability in tropical rainforest of Costa Rica (CHANCE; Boeing)
- Penn State Harrisburg – produce grown in hydroponic systems (biology; Boeing), effect of light on seed germination (biology, Boeing), ecological impact of road salt (microbiology; Boeing)
- Pittsburgh Industry - nuclear engineering (Westinghouse), sealants (Callery), hyper-saturated aqueous solutions (Eckert Technologies Group, LLD)

Summer 2015

- Penn State University Park – energy harvesting using piezoelectricity, poling of piezoelectric thin films, and facial recognition using neural networks (ASSIST; NSF)

Summer 2014

- Penn State University Park – developing piezoelectric thin films without lead and designing cantilevers for energy harvesters (ASSIST; NSF)

Summer 2013

- Penn State University Park – testing novel piezoelectric thin films and simulating resonating cantilevers for energy harvesters (ASSIST; NSF)

Summer 2012

- Penn State Harrisburg – tissue culture in fig plants (Boeing)
- Penn State Hershey – effects of a drug on dopamine receptor (Boeing)

CSATS Young Scholar Program

Program for two rising seniors (in high school) to conduct STEM research, establish networks within the university, and to better prepare them for applying to science or engineering programs at competitive universities. Developed application and interview protocols, established and maintained compliance with Penn State Youth Programs, maintained AD-03 exemption status, conducted orientation, set up meetings with faculty, admissions, and

financial aid offices, escorted students to observe undergraduate classes, supported students in developing posters and technical talks for annual university-wide symposia, conducted follow-up discussions, and wrote letters of recommendation when asked.

Summer 2019

- Penn State University Park – developing object recognition routine to identify recyclable plastic containers (ASSIST; NSF)

Summer 2018

- Penn State University Park – developing an autonomous machine to navigate a map and applying machine knowledge to human glucose issues (ASSIST; NSF)

Summer 2017

- Penn State University Park – investigating social and medical factors of migraine sufferers that influence willingness to use mobile health resources (ASSIST; NSF)

Summer 2016

- Penn State University Park – predicting movement of energy harvesters based on output signals and augmenting images for improve effectiveness of convolutional neural networks (ASSIST; NSF)

Summer 2015

- Penn State University Park – designing and 3D printing casings for sensors (ASSIST; NSF)

Summer 2014

- Penn State University Park – analyzing activity data and calorie intake using Google Glass for the development of an application (ASSIST; NSF)

Summer 2013

- Penn State University Park – comparing stress exposure to cortisol levels in migrant farmworkers (ASSIST; NSF)

Week-long Workshops for Secondary Teachers

Contributed to the design and development of storyline for 5 days of lectures and activities. Facilitated workshop activities with teachers, conducted evaluation, and supported teacher implementation of these lessons during the academic year.

Summer 2021

- Physical Anthropology (NSF-funded; lead)

Fall 2020

- Elementary environmental engineering (NSF-funded; lead)

Summer 2020

- Elementary environmental engineering (NSF-funded; lead) (cancelled due to COVID)

Summer 2019

- Advancing cybersecurity (NSF-funded; co-lead)

Summer 2018

- Using radar to analyze weather (NSF-funded, co-lead)

Summer 2017

- Bioenergy and bioproducts. (NEWBio; lead)

Summer 2016

- Bioenergy and bioproducts. (NEWBio; lead)

Summer 2015

- Bioenergy and bioproducts. (NEWBio; lead)

Summer 2014

- Bioenergy and bioproducts. (NEWBio; co-lead)

Summer 2013

- Bioenergy and bioproducts. (NEWBio; co-lead)

Online Course for Precollege Teachers and their Students

2020

- **The Science of COVID-19** – secured funding and led team of science educators and content experts in the development of a freely available online course that uses the work being done by virologists, epidemiologists, and public health scientists on COVID-19 as a way to teach users about the relevant disciplinary knowledge through their participation in the practices of scientists.

Tailored Professional Development for School Districts/Universities

2019

- PA Smart targeted grant – developed and implemented workshop to support Philipsburg-Osceola teachers in learning how to include LittleBits in their engineering class (lead)

2020-21

- University of Missouri – GRAD 9070 – *Essentials for Public Engagement* – developed and implemented a 3-hour workshop for science and engineering graduate students interested in developing workshops and/or learning activities for K-12 audiences.

2017-18

- Rural PA STEM Collaborative (in collaboration with IU-10 and IU-17) – developed and implemented workshop activities to introduce the engineering practices to 3rd – 6th grade teachers during Day-2 of the four-day series (lead for Day 2).

i-STEAM Workshops for Teachers – one-day workshops for teachers designed and implemented during the academic year

2019-2020

- Putting one foot in front of the other – (Anne Martin)
- Designing Wearable Devices – (no collaborator)
- Now you see it, not you don't: Investigating our disappearing sea ice – (Sukyong Lee)
- Is your refrigerator running...efficiently? An integrated STEM approach to understanding energy efficiency – (Alex Rattner)

2018-2019

- Mitochondria in motion: Beyond the powerhouse – (Megan Povelones)
- Now you see it, not you don't: Investigating our disappearing sea ice – (Sukyong Lee)
- Molecular mechanism of diabetes – (Ira Ropson)
- Designing Wearable Devices – (co-lead with Taylor Wood)
- Using computational modeling to predict photovoltaic material behavior – session at Nanodays teacher workshop (Ismaila Dabo)

2017-2018

- It's a matter of truss. Designing structures – (Gordon Warn)
- Messages from the skies: A physics investigation – (Kohta Murase)
- Catastrophic cyclones: Using GIS to investigate the impacts of hurricanes – (Carolyn Hultquist)
- Designing a computer chip: session of Nanodays teacher workshop (Taylor Wood)

2016-17

- Catching the sun: Physical and chemical investigations of materials for solar power – (John Asbury)
- Nanotechnology goes to space: session at Nanodays teacher workshop – (Randall McEntaffer)
- Everyone engineers: Designing bridges – (no collaborator)
- Bioproducts: Biodegradable packing peanuts – session of New and Beginning Agriculture teacher workshop (no collaborator)

2015-2016

- Biological mimics: Why biologists, chemists, physicists, mathematicians, and engineers need to get along: session at Nanodays teacher workshop – (Allyson Marianelli)
- Next generation energy storage: Batteries for our future – (Seth Berbano and Kathleen Hill)
- Bioproducts: Biodegradable packing peanuts – session at Pennsylvania Association of Agriculture Educators annual conference – (no collaborator)

2014-2015

- How nanotechnology helped catch the emerald ash borer – session at Nanodays teacher workshop – (Michael Domingue)
- Everyone engineers: Designing bridges – (no collaborator)
- How do researchers “see” things we can’t see: Tools of nanotechnology – (Victoria Altstadt)
- Authentic classroom research using Google Glass – (Siddharth Advani, Vijay Narayanan)

2013-2014

- Lotus effect – session of Nanodays teachers workshop – (no collaborator)
- Bioenergy: Going green with algae and cyanobacteria – (Adam Perez)
- Nanoelectronics – (Ryan Keech)

2012-2013

- Everyone engineers: Cleaning an oil spill – (no collaborator)
- Gecko feet – session at Nanodays teacher workshop (no collaborator)
- Nanotechnology from a chemist’s perspective – (Trevor Goff)

2011-2012

- Everyone engineers: Cleaning an oil spill – (Christine Cunningham)

COLLEGE TEACHING EXPERIENCE

Spring 2022

- **SCIED 596 – Independent Studies** – an independent course about conducting an autoethnography about engaging in engineering practices

Spring 2021

- **SCIED 596 – Independent Studies** – an independent course about a qualitative research approach called *Interactional ethnography*

Fall 2019-21

- **SCIED 855 – Precollege Engineering Education** – an online graduate course about teaching engineering in K-12 settings

Fall 2016-2018

- **SCIED/ENGR 110 – Introduction to Engineering for Educators** – a course for preservice elementary teachers that counts as a science content credit

Spring 2012

- **EDSGN 452 – Projects in Community Engineering** – a course for undergraduates in the Humanitarian Engineering and Social Entrepreneurship program that worked with middle school students to co-develop an indoor garden for residents of a senior-living facility

Fall 2000

- **BIOL 222 – Genetics** – a course for undergraduates about basic genetics principles. I designed and taught the recitation and met twice weekly with students

Spring 2000

- **MICRO 202 – Microbiology Lab** – a laboratory course on the basics of microbiology. I designed the introductions and exams, and implemented the laboratory activities to parallel the instructors of other sections of the course

ADVISING

Minyoung Gil (2st year Ph.D student) – co-Advisor with Carla Zembal-Saul

SERVICE TO THE PROFESSION

2021	NSF panel reviewer, Division of Engineering Education and Centers
2020-present	Chair, Awards Committee, Center for Advancing Research Impacts in Society
2020	Provided feedback to PDE in a workshop about the science standards
2019	NSF panel reviewer, Division of Undergraduate Education
2018-19	Awards Committee, Center for Advancing Research Impacts in Society
2019-present	Reviewer, ARIS Fellowships Program, Center for Advancing Research Impacts in Society
2019	Reviewer, <i>Community Development</i>
2019	Reviewer, <i>Journal of Pre-College Engineering Education Research</i>
2018-present	Proposal reviewer, American Society of Engineering Education annual meeting
2016-present	Proposal reviewer, Broader Impacts Summit, National Alliance for Broader Impacts
2015-present	Planning committee – Broader Impacts Summit, National Alliance for Broader Impacts
2014-present	Proposal reviewer, International NARST Conference

SERVICE TO THE DEPARTMENT/UNIVERSITY

2020 Interview committee – Eberly College of Science Outreach Director

2019	Attended meetings with YES engineering curriculum development team
2019	Presented at the Eberly College of Science Outreach showcase on broader impacts
2019	Interview committee – YES engineering curriculum group
2016-2018	Planning committee - Science education wing & Curriculum Center
2018	Interview committee member, College of Education Proposal generalist 2 search
2017	Interview committee member, CSATS director search
2017, 2020	Interview committee member, Eberly College of Science Outreach Director search
2016-2019	Presented at CAREER grant workshop with engineering faculty
2012-present	Member, Eberly College of Science Outreach Council
2011-present	CSATS Outreach luncheons held monthly with PSU outreach groups across campus

SERVICE TO THE COMMUNITY

2020-present	Committee member, Philipsburg Elks Lodge and Country Club, greens committee and representative to Central Counties Golf Association
2018-present	Volunteer, Philipsburg-Osceola school district volleyball booster club
2017-2018	Volunteer, YMCA backpack program – providing food for families in need
2016-present	Board of Directors, CenClear Child Services, Inc.
2014-2017	Committee member, Philipsburg Elks Lodge and Country Club, greens committee
2014	Science fair judge, Bellwood-Antis STEM days
2013-2016	Volunteer, First United Presbyterian Church of Philipsburg – I ran the audio controls and recorded services
2013, 2015-18	Volunteer coach, Philipsburg-Osceola Junior Olympic Softball
2013	Co-chair of committee, Philipsburg-Osceola Area School District superintendent search

PROFESSIONAL DEVELOPMENT ACTIVITES

2020-2021

- Penn State Supervision Level I Program – a training focused on preparing new managers, considering the leadership, diversity, communication, conflict, and feedback

2019-20

- Research Development Series Workshops (grant writing and budgeting) – College of Education
- Mentoring Catalyst training, University of Wisconsin-Madison
- National Science Foundation Webinar – EHR Core Program
- Partners in Science conference

2018-2019

- DataCamp computer programming courses
 - *Introduction to Python* – learned the basics of data analysis in Python
 - *Introduction to R* – learned the basics of data analysis in R

- *Intermediate Python* – created visualizations using Booleans, flow, and loops
- *Pandas Foundations* – learned to use pandas data frames with Python
- *Introduction to Data Visualization in Python* – extended Python skills to customize graphics, plotting two-dimensional arrays, statistical graphics, and working with time series and image data
- DataCamp computer programming projects
 - *A New Era of Data Analysis in Baseball* – applied knowledge used in Python courses to a complex problem in comparing baseball statistics among two players

2013

- Teacher Educator Institute, *Engineering is Elementary*, Museum of Science, Boston

2012-2016

- Graduate school, Doctoral program in Curriculum and Instruction (Science Education)

HONORS, AWARDS, AND RECOGNITION

2018	Public Education Partners and Promoters (PEPP) Award, South Western School District, Hanover, PA
2008-2011	NSF Research Experience for Teachers Participant, Penn State University, University Park, PA
2003	Outstanding Student Teacher, Clarion University of Pennsylvania, Clarion, PA
1999-2000	Nellie H. and Oscar L. Roberts Fellowship, Department of Biochemistry, Microbiology, and Molecular Biology, Penn State University, University Park, PA
1999	President's Award for Excellence, Natural Sciences and Mathematics, Mercyhurst College, Erie, PA
1998	NSF Research for Undergraduates Participant, Center for Metalloenzymes Studies, Department of Biochemistry. University of Georgia, Athens, GA

TECHNOLOGY SKILLS

Educational Technology in Research

- SPSS – quantitative analysis software
- Transana – qualitative analysis software
- V-Note – qualitative analysis software
- NVivo – qualitative analysis software

Educational Technology in Teaching

- Collaboration – Google Classroom, Google Drive, Dropbox, Box, Slack
- Online course management – Blackboard, Angel, Canvas
- Promethean Board technology
- Geospatial software: ArcGIS, Google Earth

- Data analysis and representation: R studio, Jupyter, Excel
- Small, mobile instruments for laboratory enhancement (SMILE) program – developed and used low-cost fluorimeter, Karl-Fischer titrator, and conductivity meter in classrooms

REFERENCES

Dr. Kathleen Hill

Director, Center for Science and the Schools & Associate Professor of Education
Penn State University, kmm173@psu.edu
(814) 644-1199

Dr. Gregory Kelly,

Senior Associate Dean of Research, Outreach, and Technology; Distinguished Professor,
Science Education
Penn State University, gkelly@psu.edu
(814) 863-1489

Dr. Christine Cunningham

Professor of Practice, Colleges of Engineering and Education
Penn State University, ccunningham@psu.edu
(814) 865-0861