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Professor of Science and Engineering Education

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Education

- 1999 – 2005 Ph.D. in Curriculum & Instruction specializing in Science Education, University of Delaware, Newark, DE. *Dissertation: Critical Analysis of Science-related Texts in a Breastfeeding Information, Support, and Advocacy Community of Practice*
- 1996 – 1999 M.Ed. in Curriculum & Instruction specializing in Science Education, University of Delaware, Newark, DE. *Thesis: Situated Learning of Science at W. L. Gore & Associates*
- 1996 – 1998 Teaching Certification in Physics Education, Special Institute for Teacher Certification, University of Delaware, Newark, DE
- 1991 – 1995 Bachelor of Mechanical Engineering, Cum Laude, Degree with Distinction, Tau Beta Pi, University of Delaware, Newark, DE. *Thesis: Analysis of a Mathematical Model of Isometric Force in Slow Skeletal Muscle*

Grants

Date(s)	Amount	Grant Titles, PIs & Co-PIs, and Lottero-Perdue’s Role	Granting Institution
2022-2023	\$5,985	“Using a Simulated Environment to Practice Diagnosing Perceived Social Loafing in Design Teams.” <i>PI: Lottero-Perdue. Co-PI: Malladi (University of Delaware, UD)</i>	TU Faculty Development and Research Committee (FDRC)
	\$15,636	“Design and evaluation of instructional coaching strategies to address social loafing on engineering student teams.” <i>PI: Malladi (UD). Co-PI: Buckley (UD), Lottero-Perdue. Senior Personnel: Headley (UD)</i>	University of Delaware (UD) General University Grant (GUR)
2020-2023	\$291,738	Subaward for: “The Online Practice Suite: Practice Spaces, Simulations and Virtual Reality Environments for Preservice Teachers to Learn to Facilitate Argumentation Discussions in Mathematics and Science.” Total grant award: ~3.1M. <i>PI: Mikeska. Co-PIs: Reich, Lottero-Perdue, Park Rogers, Howell.</i> Amount shown is for Lottero-Perdue/TU.	National Science Foundation (Discovery Research K-12) (NSF DRK12) via Educational Testing Service (ETS)
2018-2020	\$14,000	Subaward for: “Developing Preservice Elementary Teachers’ Ability to Facilitate Goal-Oriented Discussions in Science and Mathematics Via the Use of Simulated Classroom Interactions.” Total grant award: ~\$2.7M. <i>PI: Mikeska. Co-PI: Howell. Lottero-Perdue is a collaborator.</i> Amount shown is for Lottero-Perdue/TU.	NSF DRK12 and ETS
2018-2020	\$20,550	“Expert Elementary Teachers’ Small Group Discussion Strategies in Post-Investigation Science and Post-Testing Engineering Discussions with Avatars.” <i>PI: Lottero-Perdue. Co-PIs: Richman (TU COE) and Mikeska (ETS).</i>	TU School of Emerging Technologies (TU SET)
2018-2019	\$5,925	“A Good Plan: How Kindergarteners Represent and Explain their First Design Ideas and Incorporate Scientific and Mathematical Knowledge as they Engineer.” <i>PI: Lottero-Perdue. Co-PI: Tomayko.</i>	FDRC
2012 - 2018	\$177,800	Subaward for: “Exploring the Efficacy of Engineering is Elementary (EiE)” (E4). Total grant award: ~\$3M. <i>PI, Cunningham (EiE). Co-PIs: Lachapelle (EiE), Lottero-Perdue, & Parry (NC State).</i> Amount shown is for Lottero-Perdue/TU.	NSF DRK12
2011-2012	\$39,999	“Hub, Spoke & Capstone: A TU Integrated Elementary STEM Endorsement for Practicing Teachers.” <i>PI: Lottero-Perdue. Co-PIs: Bamberger (Mathematics, TU), Blake (Elementary Education, TU) & Haines (Biological Sciences, TU).</i>	Maryland State Department of Education (MSDE)

Date(s)	Amount	Grant Titles, PIs & Co-PIs, and Lottero-Perdue's Role	Granting Institution
2010-2011	\$3,240	"Adding Qualitative Depth to Quantitative Findings: Elementary Teachers' Perspectives on Identity and Factors that Support or Challenge Engineering Instruction." <i>PI: Lottero-Perdue</i>	TU FDRC
2009-2010	\$1,879	"The 2009 Summer Engineering and Science (SEAS) Club at the Havre de Grace Unit of the Boys & Girls Clubs of Harford County." <i>PI: Lottero-Perdue</i>	Exelon Corporation
	\$100,000	"Enhancing K-12 Engineering Education: Implementing an Elementary Engineering Program in Harford County Public Schools (HCPS)." <i>PI: Lottero-Perdue with partners in Harford County Public Schools (HCPS).</i>	Department of Labor, Licensing & Regulation (MD Workforce ONE)
	\$1,275	"An Interdisciplinary Experience for Young Children in the Glen." <i>Co-PIs: Lottero-Perdue, Meuller (Music, TU) & Kuthy (Art, TU).</i>	TU 2010 Service Learning
	\$750	"From Glen to Glen: Elementary Science Education Outside the Classroom." <i>Co-PIs: Lottero-Perdue & Ghent (Biological Sciences, TU)</i>	TU 2010 Service Learning
2008-2009	\$3,900	"Implementing Research, Enhancing Engineering and Science Learning, and Exposing Teachers to Elementary Engineering Education at the SEAS Club." <i>PI: Lottero-Perdue</i>	TU FDRC
	\$1,500	Student Organizing & Assistance Resources (SOAR) Grant: "Establishing a ... Mentoring Program." <i>PI: Lottero-Perdue</i>	National Education Association Student Program
	\$1,741	"Establishing a Place of Research, Learning, and Community Outreach: A Science and Engineering Club at the ... Harford County Girls and Boys Club." <i>PI: Lottero-Perdue</i>	TU FDRC

Contracts & Other Funded Activities

Date	Amount	Role/Description	Affiliated Institution(s)/Funder(s)
2023	\$4,250	Funding for the development and study of assessments for science teacher learning and simulation work	<i>Stipend to:</i> Lottero-Perdue as a consultant. <i>Funded by:</i> ETS
2020	\$2,400	Funding to support a graduate student to score engineering argumentation discussions in simulated classrooms	<i>Stipend to:</i> Shae Nester, Psychology graduate student <i>Funded by:</i> TU College of Education (COE) and Department of Physics, Astronomy & Geosciences
2019	\$2,000	Participation as a College of Education Faculty Fellow for Practice-Based Teacher Education and High Leverage Practices	<i>Stipend to:</i> Lottero-Perdue. <i>Funded by:</i> TU COE
	\$7,000	Data collection, analysis, writing, and dissemination work for extension of Expert Project through the Educational Testing Service (ETS)	<i>Stipend to:</i> Lottero-Perdue as consultant <i>Funded by:</i> ETS
2018	\$1,000	Simulation Task Reviewer (Mursion® Simulated Classroom Environment)	<i>Stipend to:</i> Lottero-Perdue as consultant <i>Funded by:</i> ETS
	\$1,000	Panel Member: Advisory Board on Scoring and Reporting (Mursion® Simulated Classroom Environment)	<i>Stipend to:</i> Me as consultant <i>Funded by:</i> ETS
2012-2014	\$2,000	Funding to support teachers in the Hub, Spoke & Capstone Program	<i>Stipends to:</i> Ten Teachers in the Hub, Spoke & Capstone Program (\$200 each) <i>Funded by:</i> Scientific Applications International Corporation (SAIC)

Date	Amount	Role/Description	Affiliated Institution(s)/Funder(s)
2012-2013	\$1,000	Requested funds (through presentation/emails) to support teachers in the Hub, Spoke & Capstone Program	<i>Scholarships to:</i> Two Teachers in the Hub, Spoke & Capstone Program (\$500 each) <i>Funded by:</i> Northeastern Maryland Technology Council (NMTTC)
2011-2012	\$4,000	Engineering Education consultant: STEM Initiative Grant	<i>Major award to:</i> HCPS (\$97,000.00) <i>Funded by:</i> Maryland State Department of Education (MSDE)
2010-2011	\$6,700	Engineering Education consultant: STEM Initiative Grant	<i>Major award to:</i> HCPS (\$100,000.00) <i>Funded by:</i> MSDE
	\$5,860	Winning proposal for a children's camp: Engineering Adventures. Taught in Summer 2011.	<i>Award to:</i> Harford Community College for proposal written by and work performed by Lottero-Perdue <i>Funded by:</i> SAIC
2009-2010	\$6,700	Engineering Education consultant for HCPS "Greengineering" Project with 5 th -8 th grade teachers.	<i>Major award to:</i> HCPS (\$100,000.00) <i>Funded by:</i> Maryland State Department of Education (MSDE)
2009-2010	\$8,600	"Hub Site Partner" for the Engineering is Elementary (EiE) program.	<i>Major award to:</i> EiE National Dissemination through Regional Partners (NDRP) Project: \$466K <i>Subaward to:</i> HCPS/TU (\$26,600.00) (TU contract amount plus professional development expenses) <i>Funded by:</i> Bechtel Corporation.
2008-2009	\$3,500	Faculty Fellow and Mentoring Consultant	NSF-supported STEM Teaching Community Grant; Dr. Cody Sandifer, PI

Honors and Awards

Date	Honor	Awarding Institution
2023	American Society for Engineering Education (ASEE) Fellow	ASEE
2022	Lifetime Achievement Award	Pre-College Engineering Education (PCEE) Division of ASEE
2018	Meritorious Service Award	
2018	Regents Faculty Award for Excellence in Teaching	University System of Maryland Board of Regents
2016	Best Division Paper	Best Paper Committee of the PCEE Division (formerly K-12 and Precollege Division) of ASEE
2015	Outstanding Faculty Award	Fisher College of Science & Mathematics, Towson University, TU
	Best Division Paper	Best Paper Committee of the K-12 and Precollege Division of ASEE
2014	Best Conference, Professional Interest Council and Division Paper	ASEE Best Paper Committee (for the entire 2014 conference), ASEE Professional Interest Council IV, & ASEE K12 and Precollege Division
	2014 Distinguished Career Alumni Award Winner	Department of Mechanical Engineering University of Delaware (UD)
	2014 Visionary Award - Innovator	Northeastern Maryland Technology Council
2013	Regents Faculty Award for Excellence in Public Service	University System of Maryland Board of Regents
2011	Business and Community Outreach Award	Fisher College of Science & Mathematics, TU

Date	Honor	Awarding Institution
2011	Best Division Paper	K-12 Division of ASEE, 2011 Annual Conference
2010	Excellence in Teaching Award	Fisher College of Science & Mathematics, TU
2008	Faculty Fellow	TU College of Graduate Studies and Research
2004-2005	University Dissertation Fellows Award	University of Delaware (UD)
2002	System Teacher of the Year	New Castle Co. Vo-Tech School System
2001	Most Innovative Grant Award	MBNA Corporation
1999	First Class Teacher Award (New Teacher of the Year) Panel of Outstanding Masters' Students	New Castle Co. Vo-Tech School System College of Human Resources, Education, & Public Policy (CHEP) at UD
1998	Robert W. Stegner Award (Excellence in Science Ed.) Outstanding Performance in Student Teaching	CHEP at UD College of Arts & Science, UD

Peer Reviewed Publications († denotes district leader or teacher co-authors; †† denotes TU student co-authors)

- Mikeska, J.N., Lottero-Perdue, P.S., & Kinsey, D. (accepted for publication). Using videos as a tool for self-reflection: The nature of in-service elementary teachers' reflections on their ability to facilitate argumentation-focused discussions in a simulated classroom. *Journal of Science Education and Technology*.
- Lottero-Perdue, P. S., Rillero, P., Liebars, C. S., Goldberg, A., & Reich, J. (in press). Chat-based role play for pre-service teachers to practice eliciting students' arguments. *Innovations in Science Teacher Education*.
- Mikeska, J. N., Steinberg, J., Lottero-Perdue, P. S., Cisterna D., Kinsey, D., & Howell, H. (2023). Using simulated classrooms to examine elementary teachers' perceptions about, attention to, and use of formative feedback to improve their ability to facilitate science discussions. *Contemporary Issues in Technology and Teacher Education*, 23(1). <https://citejournal.org/proofing/using-simulated-classrooms-to-examine-elementary-teachers-perceptions-about-attention-to-and-use-of-formative-feedback-to-improve-their-ability-to-facilitate-science-discussions>
- Thompson, M., Leonard, G., Mikeska, J.N., Lottero-Perdue, P.S., Maltese, A.V., Pereira, G., Hillaire, G., Waldron, R., Slama, R., & Reich, J. (2022). Eliciting Learner Knowledge: Enabling focused practice through an open-source online tool. *Behavioral Science*, 12(9), 324. <https://doi.org/10.3390/bs12090324>
- Mikeska, J.N., Shekell, C., Dix, J. ††, & Lottero-Perdue, P.S. (2022). "Unnatural how natural it was": Using a performance task and simulated classroom for preservice secondary teachers to practice engaging student avatars in scientific argumentation. *Journal of Technology and Teacher Education*, 30(3), 341-376.
- Mikeska, J. N. & Lottero-Perdue, P. S. (2022). How preservice and in-service elementary teachers engage student avatars in scientific argumentation within a simulated classroom environment. *Science Education*, 106, 980– 1009. <https://doi.org/10.1002/scs.21726>
- Lottero-Perdue, P. S., Mikeska, J. N., & Nester, M. S.†† (2022). Using preservice teachers' transcript coding of simulated argumentation discussions to characterize aspects of their noticing about argument construction and critique. *Contemporary Issues in Technology and Teacher Education*, 22(1). <https://citejournal.org/volume-22/issue-1-22/science/using-preservice-teachers-transcript-coding-of-simulated-argumentation-discussions-to-characterize-aspects-of-their-noticing-about-argument-construction-and-critique>
- Lottero-Perdue, P.S., Sandifer, C., & Grabia, K.† (2022, May/June). Kindergarteners sliding into physics: Examining force and motion through sliding and colliding. *Science and Children*, 59(5), 2833.
- Lottero-Perdue, P.S. & Settlege, J. (2021). Equitizing engineering education by valuing children's assets: Including empathy and an ethic of care when considering trade-offs after design failures. *Journal of Pre-College Engineering Education (J-PEER)*, 11(1), Article 4. <https://doi.org/10.7771/2157-9288.1280>
- Lottero-Perdue, P.S. & Lachapelle, C.P. (2020). Engineering mindsets and learning outcomes in elementary school. *Journal of Engineering Education*, 109(4), 640-664. <https://doi.org/10.1002/jee.20350>
- Sandifer, C., Lottero-Perdue, P.S. & Miranda, R. (2020). A 20-year journey in elementary and early childhood science and engineering education: An iterative cycle of reflection, refinement, and redesign. *Innovations in Science Teacher Education*, 5(4).

- Lottero-Perdue, P.S. & Sandifer, C. (2020). Engaging in engineering and enhancing astronomy: Analyzing and designing quadrants that measure angular height. *Science and Children*, 58(2), 72-79.
- Lottero-Perdue P.S., Haines, S., Baranowski, A.† & Kenny, P. † (2020). Designing a model shoreline: Creating habitat for terrapins and reducing erosion into the bay. *Science and Children*, 57(7), 40-45.
- Lottero-Perdue, P.S. & Lachapelle, C. P. (2019). Instruments to measure elementary student mindsets about smartness and failure in general and with respect to engineering. *International Journal of Education in Mathematics, Science and Technology (IJEMST)*, 7(2), 197-214.
- Lottero-Perdue, P.S. & Parry, E. (2019, March). Scaffolding for failure: Upper elementary students navigate engineering design failure. *Science and Children*, 56(7), 86-89.
- Lottero-Perdue, P.S. & Bollinger, L. (2018). Strategies to develop students' ethical habits of mind in science-integrated engineering. *Science and Children*, 56(2). 60-67.
- Lottero-Perdue, P.S., Haines, S., Bamberger, H., & Miranda, R. (2018). An Innovative Integrated STEM Program for PreK-6 Teachers. *Innovations in Science Teacher Education*, 3(2). 1-17.
- Lottero-Perdue, P.S. & Parry, E. A. (2017). Perspectives on failure in the classroom by elementary teachers new to teaching engineering. *Journal of Pre-College Engineering Education*, 7(1), Article 4, 1-21.
- Lottero-Perdue, P.S. & Parry, E. A. (2017). Elementary teachers' reflections on design failures and use of fail words after teaching engineering for two years. *Journal of Pre-College Engineering Education*, 7(1), Article 1, 1-24.
- Lottero-Perdue, P.S., Sandifer, C. & Grabia, K. (2017, December) "Oh No! Henrietta got out! Kindergarteners investigate forces and use engineering to corral an unpredictable robot." *Science and Children*, 55(4), 46-53.
- Lottero-Perdue, P.S., Bowditch, M. Kagan, M. Robinson-Cheek, L., Webb, T., Meller, M. & Nosek, T. (November, 2016) An engineering design process for early childhood: Trying (again) to engineer an egg package. *Science and Children*, 54(3), 70-76.
- Lottero-Perdue, P.S., Bolotin, S.††, Benyameen, R. †, Brock, E.†, and Metzger, E.† (September 2015). The EDP-5E: A rethinking of the 5E replaces exploration with engineering design. *Science and Children* 53(1), 60-66.
- Lottero-Perdue, P.S., De Luigi, M.A. †, and Goetzinger, T. † (March, 2015). Blade structure and wind turbine function: Third and fifth graders co-investigate and co-design wind turbine blades and voltage output." *Science and Children*, 52(7), 45-55.
- Lottero-Perdue, P.S., Roland, C., Turner, K., † & Pettitt, J.† (February, 2013). Lunch trash solar stills: Learning about the engineering design process through Earth science. *Science Scope*, 36(6), 62-70.
- Lottero-Perdue, P.S., Nealy, J.†, Roland, C.†, & Ryan, A.† (December, 2011) Caught on video! Using handheld digital video cameras to support evidence-based reasoning. *Science & Children*, 49(4), 56-60.
- Sandifer, C., & Lottero-Perdue, P. S. (2010). Delving deeper into science teaching: An early childhood magnetism lesson as a context for understanding principles of inquiry. *Connect*, 24(2), 11-14. (Invited paper.)
- Lottero-Perdue, P.S., Lovelidge, S.†, & Bowling, E.†. (March, 2010). Engineering for all: Strategies for helping all students succeed in the engineering design process. *Science and Children*, 47(7), 24-27.
- Lottero-Perdue, P.S., Brickhouse, N.W., & Ford, D.J. (June, 2009). Using literacy and science to challenge a science book. *Practically Primary*, 14(2).
- Ford, D.J., Brickhouse, N.W., Lottero-Perdue, P.S., Kittleson, J.M. (2006). Elementary girls' science reading at home and school. *Science Education*, 90(2), 270-288.
- Lottero-Perdue, P.S., & Brickhouse, N.W. (2002). Learning on the job: The acquisition of scientific competence. *Science Education*, 86(6), 756-782.

Peer-Reviewed Conference Proceedings († denotes district leader or teacher co-authors)

- Malladi, H., Headley, M.G., Lottero-Perdue, P.S., Buckley, J. (accepted for publication). Experienced teaching assistants' perceptions of a simulated environment for facilitating discussions with individual student avatars from a design team in conflict. 2023 American Society for Engineering Education (ASEE) Annual Conference and Exposition, Baltimore, MD, United States. <https://peer.asee.org/37636>
- Mikeska, J.N., Shekell, C., Maltese, A., Reich, J., Thompson, M.M., Howell, H., Lottero-Perdue, P.S., & Park Rogers, M. (2022). Exploring the potential of an online suite of practice-based activities for supporting preservice elementary teachers in learning how to facilitate argumentation-focused discussions in mathematics and science. In E. Langran (Ed.), *Proceedings of Society for Information Technology & Teacher Education International Conference* (pp. 2000-2010). San Diego, CA, United States: Association for the Advancement of Computing in Education (AACE). <https://www.learntechlib.org/noaccess/220984/>

- Lottero-Perdue, P.S. & Mikeska, J.N. (2022, June 26-29). *Simulated Engineering Teaching Experiences: Preservice teachers learning to facilitate discussions to help students become informed designers* [Paper presentation]. 2022 American Society for Engineering Education (ASEE) Annual Conference and Exposition, Minneapolis, MN, United States. <https://peer.asee.org/41003>
- Lottero-Perdue, P.S., Figueroa, M., Mikeska, J., & Taylor, M. (2021, July 26-29). *Preservice teachers noticing about students' written design performance and improvement ideas* [Paper presentation]. 2021 ASEE Annual Conference and Exposition, Online. <https://peer.asee.org/37599>
- Lottero-Perdue, P.S., Figueroa, M., Mikeska, J., & Taylor, M. (2021, July 26-29). *Preservice teachers noticing about discussions to support students in revising their design ideas* [Paper presentation]. 2021 ASEE Annual Conference and Exposition, Online. <https://peer.asee.org/37598>
- Lottero-Perdue, P.S. & Tomayko, M. (2020, June 22-26). *Kindergartners' engagement in an epistemic practice of engineering: Persisting and learning from failure* [Paper presentation]. 2020 ASEE Annual Conference and Exposition, Online. <https://peer.asee.org/34892> and <https://doi.org/10.18260/1-2--34892>
- Lottero-Perdue, P.S., Mikeska, J. & Orlandi, E. (2020, June 22-26). *Development and teacher perceptions of an avatar-based performance task for elementary teachers to practice post-testing argumentation discussions in engineering design* [Paper presentation]. 2020 ASEE Annual Conference and Exposition, Online. <https://peer.asee.org/34444> and <https://doi.org/10.18260/1-2--34444>
- Lottero-Perdue, P.S. & Tomayko, M. C. (2019, June 16-19). *Kindergartners planning in the design process: Drawn plans and how they related to first try design attempts* [Paper presentation]. 2019 ASEE Annual Conference and Exposition, Tampa, FL, United States. <https://peer.asee.org/33037> and <https://doi.org/10.18260/1-2--33037>
- Lottero-Perdue, P.S. (2017, June 25-28). *Elementary student reflections on failure within and outside of the engineering design process* [Paper presentation]. 2017 ASEE Annual Conference and Exposition, Columbus, OH, United States. <https://peer.asee.org/28213> and <https://doi.org/10.18260/1-2--28213>
- Lottero-Perdue, P.S. & Parry, E. (2016, June 26-29). *Elementary teachers' reflections on design failure and use of fail words after teaching engineering for two years* [Paper presentation]. 2016 ASEE Annual Conference and Exposition, New Orleans, LA, United States. <https://peer.asee.org/26923> and <https://doi.org/10.18260/p.26923>
- Note: This paper was awarded the Best Paper honor for the ASEE Pre-College Engineering Education Division (formerly, the ASEE K12 and Precollege Division).*
- Lottero-Perdue, P.S. & Parry, L. (2015, June 14-17). *Elementary teachers' reported responses to student design failures* [Paper presentation]. 2015 ASEE Annual Conference and Exposition, Seattle, WA, United States. <https://peer.asee.org/23930> and <https://doi.org/10.18260/p.23930>
- Note: This paper was awarded the Best Paper honor for the ASEE K12 & Precollege Division.*
- Lottero-Perdue, P.S. & Parry, L. (2014, June 15-18). *Perspectives on failure in the classroom by elementary teachers new to teaching engineering.* 2014 ASEE Annual Conference and Exposition, Indianapolis, IN, United States. <https://peer.asee.org/22913> and <https://doi.org/10.18260/1-2--22913>
- Note: This paper was awarded the Best Paper honor for the ASEE 2014 Conference (across 50+ Divisions), Professional Interest Council IV, and ASEE K12 & Precollege Division.*
- Lottero-Perdue, P.S. (2013, June 23-26). *Elementary teacher as teacher of engineering: Identities in concert and conflict* [Paper presentation]. 2013 ASEE Annual Conference and Exposition, Atlanta, GA, United States. <https://peer.asee.org/22473> and <https://doi.org/10.18260/1-2--22473>
- Lottero-Perdue, P.S. (2013, June 23-26). *Strategies to support (female) STEM faculty as voiced by female STEM faculty at a major research university* [Paper presentation]. 2013 ASEE Annual Conference and Exposition, Atlanta, GA, United States. <https://peer.asee.org/19487> and <https://doi.org/10.18260/1-2--19487>
- Lottero-Perdue, P.S. (2012, June 10-13). *Handheld digital video cameras as a means to support engineering instruction* [Paper presentation]. 2012 ASEE Annual Conference and Exposition, San Antonio, TX, United States. <https://peer.asee.org/21443> and <https://doi.org/10.18260/1-2--21443>
- Lottero-Perdue, P.S. (2011, June 26-29). *Classroom teacher – enrichment teacher pairs: Co-Teaching as a means to implement elementary engineering education* [Paper presentation]. 2011 ASEE Annual Conference and Exposition, Vancouver, BC, Canada. <https://peer.asee.org/17610> and <https://doi.org/10.18260/1-2--17610>
- Note: This paper was awarded the Best Paper honor by the ASEE K12 & Precollege Division.*

Lottero-Perdue, P.S. (2011, June 26-29). *Making elementary engineering work: Lessons from partnerships and practice—The SySTEMic Project, Maryland* [Paper presentation]. 2011 ASEE Annual Conference and Expo, Vancouver, BC, Canada. <https://peer.asee.org/18316> and <https://doi.org/10.18260/1-2--18316>

Lottero-Perdue, P.S. (2009, June 14-17). *Children's conceptions and critical analysis of technology before and after participating in an informal engineering club* [Paper presentation]. 2009 ASEE Annual Conference and Exposition, Austin, TX, United States. <https://peer.asee.org/4946> and <https://doi.org/10.18260/1-2--4946>

Book Chapters

Benedict-Chambers, A., & Madden, L., Lottero-Perdue, P.S., Mikeska, J.N., & Park Rogers, M. (in press). Preservice Teachers Noticing and Positioning Students as “Knowers” in Equitable Scientific Argumentation-based Discussions. In: Finley, S.L., Correll, P., Pearman, C., & Huffman, S. (Eds) *Empowering and Engaging Students Through Academic Discourse*. IGI Global.

Carberry, A. R., Klein-Gardner, S. S., Lottero-Perdue, P. S., & Shirey, K. L. (2023). Pre-college engineering education teacher preparation. In A. Johri (Ed.), *International Handbook of Engineering Education Research* (pp. 241-262). Routledge, London, UK. <https://www.taylorfrancis.com/chapters/oa-edit/10.4324/9781003287483-15/professional-learning-pre-college-engineering-teachers-adam-carberry-stacy-klein-gardner-pamela-lottero-perdue-katherine-shirey>

Howell, H., Mikeska, J. N., Tyson, K., Lottero-Perdue, P. S., Liebars, C. S. (2022). Practicing Practice: Investigating the Potential of Simulated Teaching in STEM Teacher Preparation. In Jenlink, P. (Ed.), *STEM Teacher Preparation and Practice for the 21st Century: Research-based Insights*. (pp. 201-226). Information Age Publishing.

Lottero-Perdue, P.S. (2020). Engaging young children in engineering design: Encouraging them to think, create, try and try again. In L. E. Cohen and S. W. Stupianski (Eds.), *STEM in early childhood education: How science, technology, engineering, and mathematics strengthen learning* (pp. 99-117). New York: Taylor & Francis Group, Routledge.

Lottero-Perdue, P.S. (2017). Engineering design into science classrooms. In Settlage, J., Southerland, S., Smetana, L., & Lottero-Perdue, P.S. *Teaching Science to Every Child: Using Culture as a Starting Point. (Third Edition)*. (pp. 207-266). New York, NY: Routledge.

Lottero-Perdue, P.S. (2017). Pre-service elementary teachers learning to teach science-integrated engineering design PBL. In Saye, J. & Brush, T. (Eds.), *Developing and supporting PBL practice: Research in K-12 and teacher education settings*. (pp. 105-131). West Lafayette, IN: Purdue University Press.

Parry, E., Lottero-Perdue, P.S., & Klein-Gardner, S. (2016). Engineering professional societies and pre-university engineering education. In de Vries, M.J., Gumaelius, L. & Skogh, I.-B. (Eds.), *Pre-university engineering education*. (pp. 189-204). Rotterdam: Sense Publishers.

Lee, Y-J, Brown, B., Brickhouse, N.W., Lottero-Perdue, P. S., Tobin, K., & Roth, W-M. (2007). Metalogue on the discursive construction of identity. In W.-M. Roth & K. Tobin (Eds.), *Science, learning, and identity: Sociocultural and cultural-historical perspectives* (pp. 325-337). Rotterdam, The Netherlands: Sense Publishers.

Lottero-Perdue, P.S., Bolotin, S.††, Benyameen, R. †, Brock, E.†, and Metzger, E.† (2016). The EDP-5E: A rethinking of the 5E replaces exploration with engineering design. In Froschauer, L. (Ed.) *Bringing STEM to the Elementary Classroom*. (pp. 53-60). Arlington, VA: National Science Teachers Association (NSTA) Press. *Note: This is a reprinted article from NSTA's Science and Children journal.*

Lottero-Perdue, P.S., De Luigi, M.A. †, and Goetzing, T. † (2016). Blade structure and wind turbine function: Third and fifth graders co-investigate and co-design wind turbine blades and voltage output." In Froschauer, L. (Ed.) *Bringing STEM to the Elementary Classroom*. (pp. 199-210). Arlington, VA: NSTA Press. *Note: This is a reprinted article from NSTA's Science and Children journal.*

Lottero-Perdue, P.S. & Lev, S. (2010). Activity 8: Constructing a topographic map outside the classroom [Book contribution]. In R. W. Blake, J. A. Frederick, S. Haines, & S. C. Lee, *Inside out: Environmental science in the classroom and the field: Grades 3-8*. (pp. 15-21). Arlington, VA: National Science Teachers Association Press.

Lottero-Perdue, P.S. & Lev, S. (2010). A science educator and a geologist work together to make topography elementary. In R. W. Blake, J. A. Frederick, S. Haines, & S. C. Lee, *Inside out: Environmental science in the classroom and the field: Grades 3-8*. (pp. 147-148). Arlington, VA: National Science Teachers Association Press.

Lottero-Perdue, P.S. & Fifield, S. (2010). A conceptual framework for higher education faculty mentoring. In L. Nilson & J. Miller (Eds.), *To Improve the Academy: Resources for Faculty, Instructional and Organizational Development*. v28, 37-62.

Brickhouse, N.W., & Lottero-Perdue, P.S. (2007). Constructing critical science and social identities in a girls' and a boys' summer science book club. In W.-M. Roth & K. Tobin (Eds.), *Science, learning, and identity: Sociocultural and cultural-historical perspectives* (pp. 301-323). Rotterdam, The Netherlands: Sense Publishers.

Other Scholarly Publications

- Settlage, J., Southerland, S., Smetana, L., & Lottero-Perdue, P.S. (2017). *Teaching Science to Every Child: Using Culture as a Starting Point. (Third Edition)*. Routledge.
- Lottero-Perdue, P.S. (October 2016). Engineering education for every child: The Pre-college Engineering Education Division sets forth a bold new path. *Prism*, 43.
- Lottero-Perdue, P.S. (Producer & Co-Director) & Field, J. (Co-Director). (2014). *Towson University Integrated STEM Leadership Program for Practicing Teachers* [Film]. Towson University.
http://www.towson.edu/fcsm/community_engagement/istem/index.asp
- Lottero-Perdue, P.S. (Producer) & Reiss, D. (Director). (2009) *The SySTEMic Elementary Engineering Project* [Film]. Harford County Public Schools.
- Brickhouse, N.W., & Lottero-Perdue, P.S. (2003). [Review of the books: *Athena Unbound: The Advancement of Women in Science and Technology*; *Women, Science, and Society: The Crucial Union*; and *Women Becoming Mathematicians: Creating a Professional Identity in the Post-World War II America*]. *Signs: Journal of Women in Culture and Society*, 28(3), 987-991.

National and International Presentations († denotes district leader or teacher co-presenters; presenter(s) underlined)

Note: Peer-reviewed papers presented at American Association for Engineering Education (ASEE) annual conferences are included in the "Peer Reviewed Conference Proceedings" section of the CV but not duplicated here.

- Masters, H.L. & Lottero-Perdue, P. (2023, April 18-21). Elementary preservice teachers' use of prompts that encourage and discourage student- to-student talk during scientific argumentation discussions [Conference presentation]. 2023 NARST Annual International Conference, Chicago, IL, United States.
- Mikeska, J.N., Lottero-Perdue, P.S., & Kinsey, D. (2023, April). Examining elementary teachers' reflections on their ability to facilitate argumentation-focused discussions in a simulated classroom [Conference presentation]. 2023 NARST Annual International Conference, Chicago, IL, United States.
- Mikeska, J.N., Howell, H., Lottero-Perdue, P.S. & Shekell, C. (2023, January 11-15). *Using online simulations within secondary science method courses to support preservice teachers in learning how to facilitate argumentation-focused discussions* [Poster presentation]. 2023 Association for Science Teacher Education (ASTE) International Conference, Salt Lake City, UT, United States.
- Hanuscin, D., Wilcox, J., Mikeska, J.N., Lottero-Perdue, P.S., Kruse, J., Voss, S., et al. (2023, January 11-15). *Reimagining possibilities for elementary science field experiences and practica* [Poster presentation]. 2023 Association for Science Teacher Education (ASTE) International Conference, Salt Lake City, UT, United States.
- Mikeska, J.N., Lottero-Perdue, P.S., & Kinsey, D. (2023, January 11-15). *Examining elementary science teachers' attention to and use of formative feedback within online simulated teaching experiences* [Conference presentation]. 2023 Association for Science Teacher Education (ASTE) International Conference, Salt Lake City, UT, United States.
- Mikeska, J.N., Shekell, C., Maltese, A., Reich, J., Thompson, M.M., Howell, H., Lottero-Perdue, P.S., & Park Rogers, M. (2022, April 11-15). *Exploring the potential of an online suite of practice-based activities for supporting preservice elementary teachers in learning how to facilitate argumentation-focused discussions in mathematics and science* [Paper presentation]. 2022 Society for Information Technology and Teacher Education Annual Meeting, San Diego, CA, United States.
- Mikeska, J. N., Steinberg, J., Lottero-Perdue, P.S., & Cisterna, D. (2022, March 27-30). *Using simulated classrooms to examine how formative feedback impacts elementary teachers' ability to facilitate discussions* [Paper presentation]. 2022 NARST Annual International Conference, Vancouver, BC, Canada and Online.
- Lottero-Perdue, P.S. & Settlage, J. (2022, March 27-30). *Planning in science-integrated engineering: Kindergartners' incorporation of ideas about inertia in their design plans* [Roundtable session]. 2022 NARST Annual International Conference, Vancouver, BC, Canada and Online.
- Lottero-Perdue, P.S., Masters, H.L., Mikeska, J. N., Thompson, M.M., Park Rogers, M., & Cross Francis, D. (2022, March 27-30). *Elementary preservice teachers' noticing of scientific argumentation within two online practice spaces* [Paper presentation]. 2022 NARST Annual International Conference, Vancouver, BC, Canada and Online.
- Lottero-Perdue, P.S. (2022, January 5-8). *Troubling the cube: Removing gender binarism from a cube activity used to help learners engage in inquiry-based science and scientific argumentation* [Poster session]. 2022 ASTE Annual International Conference, Greenville, South Carolina, United States and Online.

- Mikeska, J.N., Shekell, C., Dix, J. †, & Lottero-Perdue, P.S. (2022, January 5-8). “Unnatural how natural it was”: Using a performance task and simulated classroom for preservice teachers to practice engaging student avatars in scientific argumentation [Conference presentation.]. 2022 ASTE Annual International Conference, Greenville, South Carolina, United States and Online.
- Park Rogers, M., Mikeska, J., Lottero-Perdue, P.S., Masters, H., Hermann, R.; Zangori, L.; & Cross Francis, D. (2022, January 5-8). *Exploring pedagogies of practice that support preservice teachers in learning how to facilitate argumentation-focused discussions* [Conference workshop session]. 2022 ASTE Annual International Conference, Greenville, South Carolina, United States and Online.
- Lottero-Perdue, P.S. & Mikeska, J. (2021, June 23-24). *Argumentation in engineering to empower, improve, and prepare* [Conference workshop session]. 2021 Pre-College Engineering Education Conference for P-12 Educators, Online.
- Mikeska, J.N., Lottero-Perdue, P., Park Rogers, M., Thompson, M., Cross Francis, D., & Shekell, C. (2021, April 7-10). *Pushing the boundaries: Exploring the potential of an online practice suite to support elementary science teachers in learning how to engage students in argumentation.* [Conference workshop session]. 2021 NARST Annual International Conference, Online.
- Mikeska, J.N., Lottero-Perdue, P., Brockway, D., Cisterna, D., Sackietey, S., & Steinberg, J. (2021, April 7-10). *Teacher perceptions about an engineering argumentation discussion within a simulated classroom after feedback and practice* [Poster presentation]. 2021 NARST Annual International Conference, Online.
- Lottero-Perdue, P.S., Mikeska, J.N., & Finkelstein, C. (2021, January 14-15). *Using discussion frames and focused transcript coding to support pre-service teachers’ facilitation of argumentation discussions in science* [Conference workshop session]. 2021 ASTE Annual International Conference, Online.
- Mikeska, J.N. & Lottero-Perdue, P.S. (2021, January 14-15). *How pre-service and in-service elementary teachers engage student avatars in scientific argumentation within a simulated classroom environment* [Conference presentation]. 2021 ASTE Annual International Conference, Online.
- Lottero-Perdue, P.S. & Tomayko, M. C. (2020, March 16). *Kindergartners’ engagement in two epistemic practices of engineering: Making trade-offs and applying science* [Paper presentation]. 2020 NARST Annual International Conference, Cancelled. *Note: Lottero-Perdue presented with other session presenters via Zoom on March 16, 2020 from 1:30 to 3:00 pm; about 10 colleagues were on the call.*
- Mikeska, J.N., Lottero-Perdue, P.S., Brockway, D., Finnegan, A., Steinberg, J., & Howell, H. (2020). Using digital simulated classrooms to examine elementary teachers’ ability to engage students in scientific argumentation [Conference session]. 2020 NARST Annual International Conference, Cancelled. *Note: The presentation was prepared but not delivered.*
- Lottero-Perdue, P.S., Haines, S., Cimino, K., Miranda, R. (2020, January 9-11) *Design and implementation of an integrated STEM program for preK-6 teachers: Skilled graduates and recruitment dilemmas.* 2020 ASTE Annual International Conference, San Antonio, TX, United States.
- Lottero-Perdue, P.S. & Mikeska, J. (2020, January 9-11) *After design testing and failure, then what? Using elementary student avatars to practice teaching a post-testing engineering argumentation discussion* [Conference workshop session]. 2020 ASTE Annual International Conference, San Antonio, TX, United States.
- Lottero-Perdue, P.S. (2019, June 15). *A four-lesson STEM unit for kindergarten: Sliding discs, pushing blocks, and designing a fence and maze for an unpredictable robot* [Conference workshop session]. 2019 Pre-College Engineering Education Conference for P-12 Educators, Tampa, FL, United States.
- Sandifer, C., Lottero-Perdue, P., & Miranda, R. (2019, September). *A 20-year journey in elementary and early childhood science/engineering education: An iterative cycle of reflection, refinement, and redesign* [Conference session]. 2019 Mid-Atlantic ASTE Conference, Pipestem, WV, United States.
- Mikeska, J. & Lottero-Perdue, P.S. (2019, January 3-5). *Exploring the potential of simulated classrooms to support practice-based learning opportunities for elementary science teachers* [Conference workshop session]. 2019 ASTE Annual International Conference, Savannah, GA, United States.
- Lottero-Perdue, P.S. & Sandifer, C. (2018, July 11-13). *Elementary STEM Showcase: “Oh No! Henrietta got out!”* [Roundtable workshop session]. 7th Annual National Science Teachers Association (NSTA) STEM Forum and Expo, Philadelphia, PA, United States.
- Lottero-Perdue, P.S., Parry, E., Sokol, K. (2018, June 6-7). *Opening doors through engineering education* [Invited panelist]. 2018 Dell-EiE Symposium: Opening Doors through Engineering Education, Boston, MA, United States.

- Lottero-Perdue, P.S. & Sandifer, C. (2018, March 15-18). *Sliders, blocks, fences, and mazes: Kindergarten physics and engineering* [Conference presentation]. 2018 NSTA National Conference, Atlanta, GA, United States.
- Lottero-Perdue, P.S. & Sandifer, C. (2018, March 15-18). *Elementary Extravaganza - "Oh No! Henrietta got out!"* [Invited roundtable workshop session]. 2018 NSTA National Conference, Atlanta, GA, United States.
- Lottero-Perdue, P.S. & Zarske, M.S. (2018, January 3-6). *Using biography to support pre-service science and engineering teachers learning about engineering practices and habits of mind* [Conference paper]. 2018 ASTE Annual International Conference, Baltimore, MD, United States.
- Lottero-Perdue, P.S. (2017, July 12-14). *Another engineering habit of mind for students to develop and teachers to encourage: Persistence and productive responses to failure* [Keynote presentation]. 2017 Annual STEM Think Tank and Conference, Nashville, TN, United States.
- Lottero-Perdue, P.S. (2017, June 24). *The 2017 Best STEM Books for K-12 students* [Conference workshop session]. 2017 ASEE PreK-12 Annual Teacher Workshop, Columbus, OH, United States.
- Lottero-Perdue, P.S. (2017, June 25-28). *The 2017 Best STEM Books for K-12 students* [Roundtable session]. 2017 ASEE Annual Conference and Exposition, Columbus, OH, United States.
- Lottero-Perdue, P.S. (2017, April 19). *What works in educator professional development and what are common practices that don't?* [Invited panelist]. Educator Capacity Building in PreK-12 Engineering Education – A Project of the National Academy of Engineering and Board on Science Education, Washington, D.C., United States.
- Lottero-Perdue, P.S. (2017, April 19). *Methods courses for science and engineering pre-service teachers: Similarities, differences and implications.* [Invited panelist]. Educator Capacity Building in PreK-12 Engineering Education – A Project of the National Academy of Engineering and Board on Science Education, Washington, D.C., United States.
- Lottero-Perdue, P.S. (2016, November 9). *Integrating engineering within P12 science and mathematics education* [Keynote presentation] Bridging UTeach and Engineering Workshop, Philadelphia, PA, United States.
- Parry, E. & Lottero-Perdue, P.S. (2016, July 27-29). *Infusing engineering throughout the elementary day* [Conference presentation]. NSTA 5th Annual STEM Forum and Expo, Denver, CO, United States.
- Lottero-Perdue, P.S. (2016, July 27-29). *Elementary STEM Showcase: The EDP-5E: A rethinking of the 5E replaces exploration with engineering design* [Invited roundtable workshop session]. NSTA 5th Annual STEM Forum and Expo, Denver, CO, United States.
- Lottero-Perdue, P.S. & Parry, E. (2016, July 27-29). *Engineering design failures in elementary classrooms: What can you expect and how can you respond* [Conference presentation]. NSTA 5th Annual STEM Forum and Expo, Denver, CO, United States.
- Lottero-Perdue, P.S. (2016, June 26-29). *Next steps in PK-12 transformation: Urgent issues and actions* [Invited panelist]. 2016 ASEE Annual Conference and Exposition, New Orleans, LA, United States.
- Lottero-Perdue, P.S. (2016, May 25). *Lessons from elementary classrooms: How students and teachers navigate design failure* [Invited presentation]. Engineering is Elementary (EiE) Online Share Out Series for the EiE Professional Development Network, Online.
- Lottero-Perdue, P.S. (2016, April 14-17). *Fifth graders' perceptions about failure and mindsets before and after learning to engineer* [Paper presentation]. 2016 NARST Annual International Conference, Baltimore, MD, United States.
- Lottero-Perdue, P.S. (2015, September 16). *Failure research within the Exploring the Efficacy of Elementary Engineering project* [Invited presentation]. Engineering is Elementary Invited Symposium, Museum of Science, Boston, MA, United States.
- Lottero-Perdue, P.S. (2015, June 14-17). *Plenary II Talk: Failure in Engineering Education* [Invited talk]. 2015 ASEE Annual Conference and Exposition, Seattle, WA, United States.
- Lottero-Perdue, P.S. (2015, April 11-14). *The Engineering Design Process as a safe place to try again: Responses to failure by elementary teachers and students* [Paper presentation]. 2015 NARST Annual International Conference, Chicago, IL, United States.
- Lottero-Perdue, P.S., Cyr, M., Tank, K., & Yang, S. (2014, June 14). *Engineering habits of mind* [Lunchtime session presentation]. 2014 ASEE Annual K-12 Teacher Workshop, Indianapolis, IN, United States.
- Sandifer, C.S. & Lottero-Perdue, P.S. (2014, April). *When practice doesn't make perfect: Common misunderstandings of the NGSS scientific practices* [Conference presentation]. NSTA National Conference, Boston, MA, United States.

- Lottero-Perdue, P.S. (2013, June 24). *Engineering within the Next Generation Science Standards* [Invited lunchtime session presentation]. 2014 ASEE Annual K-12 Teacher Workshop, Atlanta, GA, June 24, United States.
- Lottero-Perdue, P.S. (2012, March 29-April 1). *Elementary Extravaganza: "Engineering for All" and "Caught on Video!"* [Invited roundtable workshop session]. 2012 NSTA National Conference, Indianapolis, IN, United States.
- Lottero-Perdue, P.S. (2012, March 29-April 1). *From Seed to Fruit: Exploring the Garden and Pollination (and agricultural engineering)* [Paper presentation]. 2012 NSTA National Conference, Indianapolis, IN, United States.
- Lottero-Perdue, P.S. (2011, June 27). *Best practices in K-12 Engineering: Assessments of participant outcomes* [Invited panelist]. 2011 ASEE Annual Conference, Vancouver, BC, Canada.
- Lottero-Perdue, P.S., Nealy, J.†, & Ryan, A.†. (2011, March 10-13). *STEM on Camera: Using handheld digital video cameras to enhance teaching and learning* [Conference presentation]. 2011 NSTA National Conference, San Francisco, CA, United States.
- Lottero-Perdue, P.S. (2010, October 21). *Fostering elementary engineering through partnerships* [Invited panelist]. First Annual Project Lead the Way Innovation Summit, Washington, D.C., United States.
- Lottero-Perdue, P.S., Herzog, M.†, Ryan, A.†, Baranowski, A.†, Cole, M.† (2010, August 11-13). *The SySTEmic Elementary Engineering Project: Reflections on growing an engineering education community of practice* [Paper presentation]. P-12 Engineering Education Summit hosted by Purdue University, Seaside, OR, United States.
- Lottero-Perdue, P.S. (2010, June 2-3). *The SySTEmic Project: Reflections on Year 1 and thoughts about next steps* [Poster presentation]. Engineering is Elementary Invited Symposium, Boston, MA, United States.
- Brickhouse, N.W. & Lottero-Perdue, P.S. (2008, November). What children do with science texts in a summer science book club. *Centres for Research on Youth, Science Teaching and Learning (CRYSTAL) and the Canadian Centre for Research on Literacy (CCRL)*, University of Alberta, Canada.
- Fifield, S. & Lottero-Perdue, P.S. (2007, October 11-13) *Perspectives on mentoring among institutional and individual actors in an interdisciplinary research initiative* [Conference presentation]. Society for the Social Studies of Science (4S) Annual Meeting, Montreal, QC, Canada.
- Lottero-Perdue, P. S. & Brickhouse, N.W. (2007, April 9-13). *A critical look at informal contexts for critically engaging with science-related texts* [Paper presentation]. 2007 American Educational Research Association (AERA) Annual Meeting, Chicago, IL, United States.
- Lottero-Perdue, P. S. & Brickhouse, N. W. (2007, March 28-April 1). *Lessons from science book clubs on the utility of imperfect books.* 2007 NSTA Annual Conference, St. Louis, MO, United States.
- Lottero-Perdue, P.S. (2006, November 1-5). Critical engagement with science-related texts in a breastfeeding information, support, and advocacy community of practice [Paper presentation]. 4S Annual Meeting, Vancouver, BC, Canada.
- Lottero-Perdue, P.S., & Brickhouse, N.W. (2005, April). Critical talk about science texts in a book club for young girls [Paper presentation]. 2005 NARST Annual International Conference, Dallas, TX, United States.
- Brickhouse, N.W., Ford, D.J., Wier, B., Kittleson, J.M., Lottero-Perdue, P.S., Antes, C., Deshon, J., Fredricks, K., & Mairs, A. (2003, March). *Do young girls read about science?* [Conference presentation]. 2003 NSTA Annual Conference, Philadelphia, PA, United States.
- Ford, D.J., Brickhouse, N.W., Lottero-Perdue, P.S., & Kittleson, J. M. (2003, March). *Identity construction in the elementary school: Gender, inquiry, and text* [Paper presentation]. 2003 NARST Annual International Conference, Philadelphia, PA, United States.

Regional, State, and Local Presentations

- Finkelstein, C., Hoppin, K.M., and Lottero-Perdue, P.S. (2022, March 28). *Practice-based teacher education* [Roundtable session]. 2022 Towson University College of Education FDRC Research Forum, Towson University, Towson, MD, United States.
- Lottero-Perdue, P.S., Bowditch, M. †, Kagan, M. † & Webb, T. † (2017, October 5-7). *Kindergarteners trying and trying again to engineer solutions to problems* [Conference presentation]. NSTA Area Conference on Science Education, Baltimore, MD, United States.
- Launius, J.C., Brady, E., & Lottero-Perdue, P. (2017, October 5-7). *STEM and tradebooks: Strange bedfellows* [NSTA sponsored talk]. NSTA Area Conference on Science Education, Baltimore, MD, United States.

- Lottero-Perdue, P.S. (2017, October 5-7). *ASEE's K-12 outreach* [Invited presentation]. NSTA Area Conference on Science Education, Baltimore, MD, United States.
- Lottero-Perdue, P.S. (2017, March 21). *Scaffolding for failure: Research on design failure in elementary engineering education and suggestions for classroom practice* [Invited talk]. Center for the Advancement of STEM Teaching and Learning Excellence (CASTLE), Philadelphia, PA, United States.
- Lottero-Perdue, P.S. (2016, January 22) *Engineering engineering education* [Invited keynote]. University of Delaware Engineering Education Conference, University of Delaware, Newark, DE, United States.
- Lottero-Perdue, P.S. (2015, July 13) *Re-engineering the Mobile Lab* [Invited presentation]. *Accelerating Science Education Conference*, Towson University Center for STEM Excellence, Baltimore, MD, United States.
- Lottero-Perdue, P.S. (2015, February 25) *Engineering standards for teacher professional learning experiences* [Invited presentation]. Maryland State Department of Education (MSDE) STEM Coordinator Meeting, Wye Mills, MD, United States.
- Lottero-Perdue, P.S. (2015, February 25) *Integration: A model, reconsidering the M, and practicing a habit* [Invited presentation]. MSDE STEM Coordinator Meeting, Wye Mills, MD, United States.
- Lottero-Perdue, P.S., De Luigi, A., † & Goetzinger, T. † (2014, October 17-18). *Being scientists and engineers: Third and fifth graders co-investigating and co-designing wind turbines* [Conference presentation]. 2014 Maryland Association for Science Teaching (MAST) Fall Conference, Ellicott City, MD, United States.
- Lottero-Perdue, P.S. (2014, October 3). *Failure in Elementary Engineering Education: Teacher and Student Perspectives on and Responses to Failure* [Sabbatical presentation]. Towson University, Towson, MD, United States.
- Haines, S. & Lottero-Perdue, P. (2013, September). *Environmental literacy & engineering education within an integrated STEM program for elementary teachers* [Conference presentation]. Mid-Atlantic Association for Science Teacher Education annual conference, Davis, WV, United States.
- Lottero-Perdue, P.S. (2013, January 24) *Handheld digital video cameras as a means to support engineering instruction* [Invited Talk]. Towson University College of Education Professional Development Day, Towson, MD, United States.
- Lottero-Perdue, P.S. (2012, Dec 8) *Handheld digital video cameras as a means to support engineering instruction* [Invited talk]. Baltimore Excellence in STEM Project Teachers, Towson University, Towson, MD, United States.
- Lottero-Perdue, P.S. (2012, March 3). *Developing engineering education for elementary teachers and students: A non-traditional STEM career pathway* [Invited talk]. Towson University Women in Science Forum, Towson University, Towson, MD, United States.
- Lottero-Perdue, P.S. (2012, February 17). Participant and observer: Mixed-methods research by a SySTEMic Project leader [Invited talk]. *Towson University STEM Educator Seminar*, Towson University, Towson, MD, United States.
- Lottero-Perdue, P.S. (2011, June 4). *Strategies for successful careers built on an engineering degree: A non-traditional pathway* [Invited talk]. University of Delaware Alumni Weekend Women in Engineering Panel, Newark, DE, United States.
- Lottero-Perdue, P.S. (2011, February 24-25). *Integrating Engineering is Elementary (EiE) into the science curriculum* [Conference presentation]. 2011 Children's Engineering Convention, Richmond, VA, United States.
- Lottero-Perdue, P.S. (2010, October 18). *Elementary Engineering in formal and informal settings* [Invited talk]. Harford County Senior Science Society Meeting, Harford Community College, Bel Air, MD, United States.
- Lottero-Perdue, P.S. (2008, November). *Promoting elementary engineering education in Harford County* [Conference presentation]. Towson University STEM Celebration and Exposition, Towson, MD, United States.
- Lottero-Perdue, P.S. (2008, January 22). Critical scientific literacy: Examples from a Breastfeeding Information, Support, & Advocacy Group [Invited talk]. *Brown Bag Lunch series of the Chemical Heritage Foundation*, Philadelphia, PA, United States.
- Lottero-Perdue, P.S. (2007, March). *A problem of sunlight exposure, dark(er) skin, and other: An intersectional critique of some breastfeeding advocates' critical responses about vitamin D supplementation for breastfed infants* [Conference presentation]. ITROW conference, Intersectional Models of Women's Health: Uniting Theory and Practice, Towson University, Towson, MD, United States.
- Lottero-Perdue, P.S. (2006, October 26). *An NMI (Nursing Mothers, Incorporated) herstory* [Paper presentation]. NMI Annual Meeting, Newark, DE, United States.

Simulated Classroom Certifications as a Simulation Specialist

Each of the following certifications required about 30 hours of synchronous training and over 20 hours of asynchronous training through Mursion® to be able to operate and voice avatars within the classroom.

- Certified Simulation Specialist for the Mursion® Middle School Classroom and Adult Avatars, September 2021
- Certified Simulation Specialist for the Mursion® Upper Elementary Classroom (see image), November 2021
- Certified Simulation Specialist for the Mursion® High School Classroom, March 2022



Simulated Classroom Scenario Writing

Lottero-Perdue, P.S. (2022). *Diagnosing perceived social loafing in a design team: Ciara and logistical challenges* [Scenario]. Towson University and University of Delaware.

Lottero-Perdue, P.S. (2022). *Diagnosing perceived social loafing in a design team: Stephanie and marginalization* [Scenario]. Towson University and University of Delaware.

Lottero-Perdue, P.S. (2022). *Diagnosing perceived social loafing in a design team: Jordan and disinterest* [Scenario]. Towson University and University of Delaware.

Lottero-Perdue, P.S. & Cimino, K. (2022). *Connecting ideas about survival, growth, behavior, and reproduction in a nonfiction text and a life science unit* [Scenario]. Towson University SIMTeach@TU Repository.

Lottero-Perdue, P.S. (2021). *Simulated Engineering Teaching Experience: Addressing idea fixation during brainstorming*. Towson University.

Lottero-Perdue, P.S. (2021). *Simulated Engineering Teaching Experience: Encouraging diagnostic troubleshooting and improvement*. Towson University.

Mikeska, J.M., Lottero-Perdue, P.S., Orlandi, E.W., King, K., and Shekell, C. (2021). *The Keep it Cold middle school science task* [Scenario]. Educational Testing Service and Towson University.

Lottero-Perdue, P.S., Mikeska, J.N., & Orlandi, E.W. (2019). *The Design a Shoreline engineering design challenge discussion task* [Scenario]. Towson University and Educational Testing Service.

Guidi, T. & Lottero-Perdue, P.S. (2019). *Including children who are English Language Learners in a discussions about sun and shade / Emphasizing High Leverage Practice 3 Eliciting and Interpreting Individual Student Thinking* [Scenario]. Towson University SIMTeach@TU Repository for the EMPOWER Project.

Lottero-Perdue, P.S., & Guidi, T. (2018). *Traditions: Including children with special needs in discussions about cultural difference / Emphasizing High Leverage Practice 1 Leading a Group Discussion* [Scenario]. Towson University SIMTeach@TU Repository.

Professional Development

Format: Project, Dates, Duration, Attendees (Additional notes where applicable). Preparation time not included in this list.

- Harford County Public Schools (HCPS) Curriculum Writing Workshop. July 23, 2019, 3 hours. I worked with the kindergarten, fourth-grade, and fifth-grade teams (about 8 teachers each), offering resources and guidance.
- Maryland State Department of Education Professional Learning Summer Workshop Series at Marriott's Ridge High School: "Let's Make Sense of Implementing NGSS in the Classroom." July 22, 2019, 2 hours, 9 attendees. Presenters: Mikeska, J. M., Llort, K., & Lottero-Perdue, P.S. Topic: Argumentation/talk moves in elementary science.
- HCPS Early Childhood Professional Development Day, Edgewood, MD: "Kindergarten Physics and Engineering." March 29, 2018, 1 hour. With three K teacher co-presenters (Bowditch, Grabia, and Kagan), led professional development (PD) for 5 teachers. Utilized lessons that I had developed with Cody Sandifer.
- Hall's Cross Roads Elementary School (in HCPS) Professional Development Hosted by the Science and Social Studies Goal Team, Aberdeen, MD: "STEM Book Review Session." March 19, 2018, 1.5 hours. Included a donation of 230

books to the school and a presentation and discussion of Best STEM book award winners for 2017 and 2018 (and how to integrate them into instruction). Led PD for 6 teachers.

- STEM Think Tank and Conference, Nashville, TN, Science-Integrated Engineering in Early Elementary (Grades K-2), July 14, 2017, 3 hours, 30 minutes: Led professional development to 16 educators and leaders. Primarily utilized lessons and NGSS interpretation resources that I had developed.
- Calvert County Public Schools EiE Professional Development, January 25, 2017, 6 hours / one day: Led 6-hour professional development to 24 3rd grade teachers. Engaged teachers in learning the EiE unit, *Water, Water Everywhere: Designing Filters*.
- Calvert County Public Schools EiE Professional Development, December 6, 2016, 6 hours / one day: Led 6-hour professional development to 24 4th grade teachers. Engaged teachers in learning the EiE unit, *A Stick in the Mud: Evaluating a Landscape*.
- Smithsonian Science Education Forum, Alexandria, VA, July 25, 2015. 5.5 hours / one day. Co-developed and co-lead a PD session with Glenn Bradbury, a Montana high school teacher about P12 engineering education to 26 educators and educational leaders.
- E4 Project Professional Development, June 23, 2015, 6 hours / one day. Attendees included 4 teachers who had taught the “control” curriculum for the project, and on this day, received PD for the “experimental”/EiE curriculum. Participation was optional for the roughly 25 control curriculum teachers in the project.
- Calvert County Public Schools (CCPS) EiE Professional Development, June 2, 2015, 6 hours / one day: With Dr. Cindy Ghent, who led the environmental science aspects of the PD, provided a 6-hour professional development to 26 5th grade teachers from CCPS. Engaged teachers in learning the EiE unit, *A Slick Solution: Cleaning an Oil Spill*.
- HCPS EiE Professional Development, October 15, 2014, 6 hours. Attendees included 24 teachers (8 3rd grade, 8 4th grade, 8 fifth grade) from HCPS. This professional learning experience deepened teachers learning about teaching engineering habits of mind and the design process, and engaged the teachers in learning three new Engineering is Elementary (EiE) units of instruction. Introduction provided by Amy Ryan, Elementary Science Teacher Specialist for HCPS.
- Follow-up E4 Project Professional Development, May 21 & 22, 2014, 6 hours per day; Attendees included 12 (May 21) and 15 (May 22) 3rd-5th grade teachers on the E4 Project who taught one or two of 10 engineering units of instruction; professional learning focused on reflecting on units and instructional strategies and on questioning and troubleshooting strategies.
- Maryland Elementary STEM Network Summer Institute, July 18 & 19, 2013, 6 hours; Attendees included approximately 50 professors and teachers from Institutions of Higher Education and schools from across Maryland (co-taught with Dr. Jennifer Rankin, Frostburg State University; 6 hours represents my instructional time)
- CCPS EiE Professional Development, Grade 4, Feb 28, 2013, 6 hours; Attendees were approximately 37 4th grade teachers learning the EiE unit, “An Alarming Idea: Designing Alarm Systems”
- CCPS EiE Professional Development, Grade 3, Jan 31, 2013, 6 hours; Attendees were approximately 30 3rd grade teachers learning the EiE unit, “Lighten Up: Designing Lighting Systems”
- TU Faculty Professional Development on Scientific & Engineering Practices and the Engineering Design Process, Jan 10, 2013, 2 hours (all participants) and 3 hours (for 6 participants); Attendees were 13 TU faculty and staff
- Tunbridge Public Charter School (TPCS), Baltimore City, 1st Grade Science & STEM Reform, Jan 22, 2013, 6 hours; Attendees were 2 1st grade teachers learning the EiE unit, Thinking inside the Box: Designing a Plant Package
- TPCS, Baltimore City, 5th Grade Science & STEM Reform, Nov 29, 2012, 2 hours, Attendees were 2 5th grade teachers learning about plate tectonics with engineering extensions (utilized a notebooking format)
- TPCS, Baltimore City, 4th Grade Science & STEM Reform, Oct 25, 2012, 2 hours; Attendees were 2 4th grade teachers learning about weathering and erosion, with engineering extensions (utilized a notebooking format)
- TPCS, Baltimore City, 3rd Grade Science & STEM Reform, Sept 20, 2012, 2 hours; Attendees were 2 3rd grade teachers, learning about light and color, with engineering extensions (utilized a notebooking format)
- TPCS, Baltimore City, Whole School Science & STEM Reform, Aug 21, 2012, 3 hours; Attendees were 23 teachers from TPCS including pre-K through 5th grade classroom teachers, special educators, instructional aids, being introduced to best practices in engineering and science education
- HCPS Title I STEM Integration, July 23, 2012, 3 hours; Attendees were 15 elementary teachers, 5 artists, and one Science Teacher Specialist learning the Engineering Adventures unit, “Bubble Bonanza: Designing Bubble Wands”

- Environmental Literacy Academy, Engineering Applications, June 22, 2012, 6 hours; attendees were 38 teachers (20 from Baltimore City, and 18 from HCPS) in grades 3 - 8 learning how to integrate engineering into environmental science education
- CCPS EiE Professional Development, Grade 4, April 23 & 26, 2012, 6 hours each day; Attendees were approximately 30 4th grade teachers (~15 each day) learning the EiE unit, “An Alarming Idea: Designing Alarm Systems”
- CCPS EiE Professional Development, Grade 3, April 16 & 19, 2012, 6 hours each day; Attendees were approximately 30 3rd grade teachers (~15 each day) learning the EiE unit, “Lighten Up: Designing Lighting Systems”
- Engineering Education Consultation for Baltimore County Public Schools (BCPS), January 27, 2012, 3 hours; Attendees were the Coordinator of Elementary Science, 2 elementary science leaders, 2 elementary mathematics leaders, 1 supervisor of technology education
- Engineering Education Professional Development for HCPS Middle School Science Teachers, January 24, 2012, 2 hours; Attendees were all middle school science teachers in HCPS
- Engineering Education Professional Development for HCPS High School Science Teachers, January 24, 2012, 2 hours; Attendees were all high school science teachers in HCPS
- SCIE 376 New Mentor Teacher Training at Abingdon Elementary School, September 1, 2012 (45 min, 1 teacher), September 4, 2009 (45 min, 1 teacher), September 10, 2008 (1.5 hours, 3 teachers).
- SCIE 376 New Mentor Teacher Training at Woodholme Elementary/Middle School in Baltimore City, January 27, 2010 (1 hour, 3 teachers)
- Lead Professional Development (PD) Provider & Curriculum Writer/Integrator for the SySTEmic Elementary Engineering Project. A Partnership between Harford County Public Schools (HCPS), Engineering is Elementary (EiE) and TU. (2009-2012). I was the lead/sole professional developer for pilot year teachers in each grade to prepare to teach science-technology-engineering units of instruction. Units include: Grade 1: States of Matter & Chemical Engineering (SMCE); Grade 2: Pollination Partners & Agricultural Engineering (PPAE); Grade 3: Motion, Energy & Mechanical Engineering (MEME); Grade 4: Rocks, Minerals & Materials Engineering (RMME); and Grade 5: Electricity, Electrical Engineering & Electromagnetism (4E).
 - Pilot Year Professional Development (PD) Teaching (Lottero is lead/sole PD provider): 13.5 days between March 2009 and August 2011 to ~140 teachers for all five units.
 - Full Implementation Year PD for Systemic Project (Includes co-teaching with classroom teachers and project management during PD days): 4 days between October 2010 and April 2012 impacting a total of ~630 teachers for all five units.
- Shorter Presentations Related to the SySTEmic Elementary Engineering Project with HCPS:
 - January 11, 2012, 0.5 days, 15 teachers; Attendees were 1st grade teachers and enrichment teachers who volunteered to be Master Teachers for the Project; Focus - Master teacher training to prepare teachers to lead SMCE PD workshops for all 1st grade teachers in the system
 - January 9, 2012 & January 13, 2012, 0.5 days, 17 teachers; Attendees were 5th grade teachers and enrichment teachers who volunteered to be Master Teachers for the Project; Focus - Master teacher training to prepare teachers to lead 4E PD workshops for all 5th grade teachers in the system
 - October 25, 2011, 0.5 days, 10 teachers, 4th grade teachers; Attendees were 4th grade teachers new to the grade level; Focus – RMME unit PD.
 - October 19, 2012, 0.5 days, 7 teachers; Attendees were 2nd grade teachers and enrichment teachers who volunteered to be Master Teachers for the Project; Focus - Master teacher training to prepare teachers to lead PPAE PD workshops for all 2nd grade teachers in the system
 - October 12, 2011, 1 hour introduction (my part)*, 7 teachers; Attendees were 1st grade teachers and enrichment teachers who volunteered to be Master Teachers for the Project; Focus - Master teacher training to prepare teachers to lead SMCE PD workshops for all 1st grade teachers in the system
 - October 11, 2011 (2 hours) & August 19, 2011 (1 day); 10 teachers (Oct 11) and 7 teachers (Aug 19); Attendees were 2nd grade teachers and enrichment teachers who volunteered to be Master Teachers for the Project; Focus - Master teacher training to prepare teachers to lead PPAE PD workshops for all 2nd grade teachers in the system
 - August 18, 2011, 1 day, 9 teachers; Attendees were 1st grade teachers and enrichment teachers who volunteered to be Master Teachers for the Project; Focus - Master teacher training to prepare teachers to lead SMCE PD workshops for all 1st grade teachers in the system

- Dec 5, 2011, 45 min presentation and 45 min support, 60 teachers; Attendees were middle school and high school science department chairs, elementary science facilitators and science leaders in HCPS; Focus - Teaching engineering in the context of science education
- August 23, 2010, 0.5 day, 16 teachers; Attendees were 3rd & 4th grade teachers and enrichment teachers who volunteered to be Master Teachers for the SySTEmic Project; Focus - Master teacher training to prepare teachers to lead MEME & RMME PD workshops for all 3rd/4th grade teachers in the system
- August 18, 2010, 15 min presentation and 6 hours support*, ~130 teachers; Attendees were all 5th grade teachers in HCPS; Focus - 5th Grade Professional Development (Full Dissemination) for Environmental Issues & Environmental Engineering Unit (Greengineering Project)
- August 17, 2010, 15 min presentation and 6 hours support*, ~25 teachers; Attendees were a subset of HCPS 6th and 7th grade teachers; Focus - 6th & 7th Grade Professional Development for engineering-blended units (I focused on providing support to 6th grade).
- January 12, 2010, 30 min, 15 teachers; Attendees were Maryland State Department of Education Advisory Council for Gifted and Talented Education, HCPS Superintendent and other HCPS administrators; Focus - The SySTEmic Elementary Engineering Project - 4th Grade (RMME Unit)
- October 7, 2009, 1 hour, 40 teachers; Attendees were Elementary Science Facilitators; Focus - The SySTEmic Elementary Engineering Project - 4th Grade (RMME Unit)
- September 14, 2009, 30 min, 20 teachers; Attendees were the faculty and administration of Hall's Cross Roads Elementary School; Focus - the SySTEmic Elementary Engineering Project
- May 13, 2009, 1 hour, 40 teachers; Attendees were Elementary Science Facilitators; Focus - The SySTEmic Elementary Engineering Project - 3rd Grade (MEME Unit)
- Apr 6, 2009, 80 minutes, 40 teachers; Attendees were 3rd grade teachers; Focus - The SySTEmic Elementary Engineering Project - 3rd Grade (MEME Unit)
- March 27, 2009, 1 hour, 50 teachers; Attendees were Mentor Teachers and Instructional Facilitators; Focus - The SySTEmic Elementary Engineering Project - 3rd Grade (MEME Unit) focus
- April 14, 2008, 1 hour, 40 teachers; Attendees were Elementary Science Facilitators; Focus - Introduction to Engineering is Elementary with science & engineering tradebooks
- Constructing Physics Understanding (CPU) Project, Summers of 2003 & 1997, 5 weeks; Attendees were primarily Elementary & 9th-grade Delaware Teachers (roughly 20 in each session)
- Project Lead the Way (PLTW) Principles of Engineering 2-Week Courses, Summers of 2000, 2001, & 2002, 6 weeks total; Attendees were High School Science, Math, & Technology Teachers (I was a Master Teacher for PLTW)

Curriculum Writing for School Systems & States

HCPS System Curricular Units for the SySTEmic Project: Lottero-Perdue wrote science activities for these units, revised HCPS science activities, and integrated an EiE unit with the science activities to create a single coherent integrated unit. This is done with input from Amy Ryan, Elementary Science Teacher Specialist for HCPS. Teachers provide input after the pilot year to edit the units prior to full implementation. These units are part of the regular, required 'science' curriculum in HCPS that all students learn:

- 1st Grade States of Matter & Chemical Engineering (SMCE), piloted in spring 2010
- 2nd Grade Pollination Partners & Agricultural Engineering (PPAE), piloted in spring 2010
- 3rd Grade Motion, Energy & Mechanical Engineering Unit (MEME), piloted in spring 2009
- 4th Grade Rocks, Minerals & Materials Engineering Unit (RMME), piloted in spring 2009
- 5th Grade Electricity, Electrical Engineering & Electromagnetism (4E), piloted in winter, 2012

HCPS Physics and Literacy (PAL) Unit: Lottero-Perdue wrote this science-only (i.e., not engineering-integrated), literacy-based, 5-lesson unit, doing some editing of existing lessons and using a lesson from Dr. Cody Sandifer. Piloted January 2012 as an optional unit.

Dissemination of these Units to School Systems and States: The following units have been shared and disseminated:

- The 4E Unit has been shared with the state of Delaware.
- The PPAE Unit (which fits especially well with Next Generation Science Standards) has been shared with:

- Baltimore County Public Schools – BCPS has partially revised the unit and has begun to implement the unit in 2nd grades in the county
- Tunbridge Public Charter School – TPCS has taught this within the 2nd grade curriculum (based on my PD work and teaching SCIE 376 there)
- The PPAE Unit was shared with the Elementary STEM Network in MD as part of the 2013 Summer Institute

Development of iSTEM Unit on Butterfly Migration and Tracking: Co-developed an integrated STEM unit (and presented it at the 2013 Elementary STEM Network meeting in June 2013) on butterfly migration with a colleague from Frostburg State University, Dr. Jennifer Rankin. The unit was intended as an exemplar of integrated STEM for early childhood, and integrated concepts of butterfly migration (science) and reverse engineering of butterfly tags (engineering/technology) and butterfly tracking (technology) with mathematical understandings of sets. Dr. Rankin focused on the mathematics piece, while I wrote the science, engineering, and technology pieces. This unit has not yet been disseminated beyond the Elementary STEM Network, but our intention is to publish in the future.

University Course Texts and Courses Developed

University Course Texts (most recent version)

- Lottero-Perdue, P.S., and Sandifer, C. PHSC 303 *Earth & Space Science and Integrated Engineering* (Gizmo Version v2)
- Sandifer, C. & Lottero-Perdue, P.S., PHSC 303 *Earth & Space Science and Integrated Engineering* (v2.1)
- Lottero-Perdue, P.S. & Sandifer, C., SCIE 371 *Teaching Science and Engineering in Early Childhood* (v6)
- Lottero-Perdue, P.S. *SCIE 376 Teaching Science in Elementary School*, 2011 (v3)

Courses (Authored or co-authored by Lottero-Perdue and approved at TU)

- Lottero-Perdue, P.S. SCIE 650 *Engineering in Integrated STEM Education* (approved S2014)
- Lottero-Perdue, P.S. SCIE 652 *Earth-Space & Physical Science in Integrated STEM Education* (S2014)
- Roland, C. & Lottero-Perdue, P.S. SCIE 685 *Practicum in Integrated STEM Education* (S2014)
- Lottero-Perdue, P.S. *SCIE 355 Teaching Engineering Design in Elementary & Middle School Science* (F2011)

STEM Outreach (My teaching of K-12 Students Directly)

- Created and led the “Read a Book, Solve a Problem” online camp for kindergartners and first graders. One hour of Zoom instruction per day in a four-day week. I developed the activities for the camp, communicated with parents/caregivers, mentored an engineering undergraduate student each summer to be my assistant. (one week in June/July 2021; one week in June/July 2020).
- Social-Distancing-Friendly Electronic Engineering and Science Lessons for Parents/Caregivers: I developed/shared one engineering lesson for the ASEE P12 Facebook Page and shared another that was done by a student in my course (related to the “@Home Project” that I supervised within my SCIE 371 Teaching Science in Early Childhood course). I shared these two engineering lessons as well as 12 other science/engineering lessons from the @Home Project with a Harford County Public Schools elementary science leader and early childhood teachers for dissemination to parents/caregivers. Credit for student work was given to students. (March – May 2020)
- Henrietta’s Fence Engineering Design Challenge at Churchville Elementary School. *Participants*: ~ 60 kindergartners (3 classrooms of about 20 each). *Co-teachers*: Classroom teachers (assisted with management). *Curriculum/Focus*: Taught team-based Henrietta’s maze design challenge, which reinforced ideas about inertia. 3 hours instructional time. (June 11, 2018).
- Physics & Engineering Unit at Darlington Elementary School (DES). *Participants*: 12 kindergartners. *Co-teachers*: Classroom teacher (shared teaching roles). *Curriculum/Focus*: Taught physics and engineering integrated mini-unit. 2.5 hours instructional time. (Feb 14, 15, & 16, 2017).
- Family Creativity Night at DES. *Participants*: 80 elementary-aged children and their parents, grandparents and siblings. *Assistants*: The DES PTA, 7 teachers/staff from the school, 10 current TU students, 2 National Junior Honor Society Students from Havre de Grace Middle; 5 students from the Science & Mathematics Academy. *Curriculum/Focus*: Families engaged in multiple engineering design challenges and other creative learning experiences throughout the night. I led and organized the event. 3 hours. (March 4, 2016).
- Rocks, Minerals & Materials Engineering Unit (RMME) Instruction at DES. *Participants*: 16 4th graders. *Co-teachers*: Some assistance from classroom teacher (minimal). *Curriculum/Focus*: Taught science and engineering content/lessons within the RMME unit. 8 hours of instructional time. (May 26, May 27, June 1, 3, 4, 5, 8, & 10, 2015).

- May Day STEM Activity for Elementary Students at DES. *Participants*: Darlington Elementary School students (perhaps 40). *Assistant*: Kevin Perdue (husband/engineer). *Curriculum/Focus*: This was the only STEM station for the May Day event; children are free to choose what stations to visit. 2 hours of instructional time. (May 29, 2015).
- Wind Turbine Science & Engineering with 3rd and 5th Graders at DES. *Participants*: 14 3rd graders and 22 5th graders. *Co-Teachers*: 3rd grade and 5th grade teacher. *Curriculum/Focus*: Investigation of variables that affect voltage output of a model wind turbine, followed by an entire cycle (one or more improvements) of the engineering design process. 9 hours of instructional time (over 5 days). (May 14, 15, 27, 29, & June 3, 2014).
- Family Creativity Night at DES. *Participants*: 90 elementary-aged children and their parents, grandparents and siblings. *Assistants*: The DES PTA, 9 teachers/staff from the school, 3 current TU EESE Harford County cohort students, 2 teachers in the TU iSTEM Program for Practicing Teachers; 1 student from the Science & Mathematics Academy. *Curriculum/Focus*: Same as above with slightly different activities. 3 hours of instructional time. (March 21, 2014).
- Family Engineering Night at DES. *Participants*: 90 elementary-aged children and their parents, grandparents and siblings. *Assistants*: The DES PTA, 12 teachers/staff from the school, 9 former TU students, 3 students from the Science & Mathematics Academy. *Curriculum/Focus*: Families engaged in multiple engineering design challenges and learning experiences throughout the night. I led and organized the event. 3 hours of instructional time. (January 24, 2013).
- States of Matter & Chemical Engineering (SMCE) Unit in 1st Grade at DES. *Participants*: 17 1st graders. *Assistants*: 1 parent volunteer, 1 substitute teacher. *Curriculum/focus*: Taught the engineering portion of the SMCE unit (part of the 1st grade curriculum, which the long-term substitute had not taught). 4 hours of instructional time. (June 4, 2012).
- Engineering Adventures @ Harford Community College (HCC). *Bubble Camp*. *Participants*: 15 3rd, 4th, and 5th graders. *Assistants*: 1 TU ELED graduate and 2 TU EESE seniors. *Curriculum/focus*: Materials and mechanical engineering of bubble solutions/wands. 12.5 hours of instructional time. (August 8 - 12, 2011).
- Engineering Adventures @ HCC: *Invasive Species Camp*. *Participants*: 22 1st and 2nd graders. *Assistants*: 2 TU EESE graduates and 1 TU EESE seniors. *Curriculum/focus*: Invasive species, mechanical engineering (designing Rube Goldberg devices and safe animal traps). 12.5 hours of instructional time. (Aug 1 - 5, 2011).
- Engineering Lesson & Talk at Pleasant Plains Elementary School. *Participants*: 3 classrooms of 3rd graders. *Curriculum/focus*: Tower building activity (led by me and five students in Ms. Karen Cimino's SCIE 370 class) and presentation about engineering to students (by me). 1 hour of instructional time. (March 8, 2011).
- Summer Engineering & Science (SEAS) Club at the Boys & Girls Clubs (BGC) of Harford County Havre de Grace Unit. *Participants*: 12 children. *Curriculum/focus*: 1 Engineering is Elementary (EiE) unit of Instruction. 12 hours of instructional time. (July – Aug 2009).
- SEAS Club (at BGC in HdG). *Participants*: 23 elementary-aged children. *Curriculum/focus*: 3 EiE units of Instruction. 38 hours of instructional time. (June 30 – August 7, 2008).
- Roland Park Science Club. *Participants*: ~20 elementary-aged children. *Curriculum/focus*: Part of EiE unit. 1 hour of instructional time. (May 14, 2008).
- Sally Ride Science Festival @ TU. *Participants*: 24 middle school aged girls. *Curriculum/focus*: Surface tension and Bernoulli's law. 1.5 hours of instructional time. (June 2, 2007).

Significant Professional Services

- Served on an NSF Review Panel (spring 2021).
- Invited reviewer for the book, *Framework for P-12 Engineering Learning*, a major national-level effort supported by the American Society for Engineering Education (April 2020).
- Editorial Board Member for the journal, *Innovations in Science Teacher Education* (2019 – 2025).
- Member of the 9-member 2018 Best STEM Books committee of the Children's Book Council (CBC) and National Science Teachers Association (NSTA). As such, I reviewed 314 K-12 books sent by publishers to be considered for the 2018 Best STEM Book award. I will meet with the committee on November 3-5 to come to consensus on a final list of awardees. (July – November 2017).
- Member of the 8-member 2017 Best STEM Books committee of the CBC and NSTA. As such, I reviewed 267 K-12 books sent by publishers to be considered for the 2017 Best STEM Book award. I also met with the committee on November 5 and 6 to come to consensus on a final list of awardees. (July – November 2016)

- National Assessment for Educational Progress (NAEP) Panelist. I was one 31 panelists selected to serve on the NAEP Technology & Engineering Literacy (TEL) Assessment Achievement Levels Setting panel. (September 28 – October 2, 2015).
- External reviewer for a proposed Master's in Education in Integrative-STEM Education program within The College of New Jersey's School of Engineering (August – September 2014)
- Invited consultant/expert for:
 - Oregon State University Nature of Engineering Study (expert panelist; online survey format): I participated as an expert panelist to contribute to a Nature of Engineering study. (December 2015 – May 2016)
 - National work group to develop the “Standards for the Preparation and Professional Development for Teachers of Engineering” and associated matrices. (June 2013 – October 2013).
 - MSDE Elementary STEM Certification Work Group. (May 2013 – September 2013).
 - HCPS Title I Schools Summer STEM Programming (June 2012 – July 2012; April 2013).
 - STEM Work Group committee for Harford County Public Schools. (Fall 2010 – May 2012).
- Baltimore Area KidWind Liaison: KidWind PD (Columbus Center, February 25, 2012 and February 9, 2013) and Competition (University Union, May 19, 2012; West Village Commons, April 23, 2013).
- Attended STEM Summit I and STEM Summit II, hosted by the Northeastern Maryland Technology Council representing TU and contributing to discussions about K-16 STEM education in Northeastern Maryland. (Feb 11, 2011 8:00 to 2:00 & April 28, 2011 8:00 to 11:00)

University, College, or Department Committee and Service Work

- Department-level committees/service:
 - Chair, Diversity, Equity, & Inclusion Committee (May 2021 – May 2023)
 - Chair, Department Promotion, Tenure, and Reappointment Committee (June 2018 – May 2020)
 - Chair, Science Education Search Committee (June 2017 – January 2018)
 - Member, Department Promotion, Tenure, and Reappointment Committee (Fall 2014 – May 2020)
 - Member, Department Merit Committee (Fall 2015 – Spring 2017; Fall 2021 - ongoing)
 - Science Education Group Coordinator (June 2014 – May 2016; June 2012 – August 2013; Fall 2012 – May 2013; Spring 2010)
 - Department Rank Committee member (Fall 2010 – May 2013)
 - Co-chair, Middle School Science Education Search (Spring 2011)
 - Science Education Coordinator for the Harford County Elementary Education / Special Education program (Fall 2008 - ongoing) and Early Childhood /Special Education program (Fall 2012 – ongoing)
 - Physics, Astronomy & Geosciences (PAGs) Seminar Committee member (Fall 2008 to Spring 2011)
- College-level committees/service (FCSM = Fisher College of Science and Mathematics at Towson University):
 - FCSM College Council Chair and at At-Large Representative (Fall 2021 – ongoing)
 - FCSM Diversity Committee (Fall 2021 – Spring 2022)
 - FCSM College Council Representative (Sept 2019 – May 2020; Sept 2011 – May 2013)
 - Program Director and Student Advisor, TU Integrated STEM Instructional Leadership (PreK-6) Post-Baccalaureate Certificate Program for Practicing Teachers (Spring 2013 – ongoing)
 - Member of the Daihl Scholarship Committee (June 2013 – September 2015)
 - Engineering Education representative for the STEM Educators Executive Board (Spring 2011 – May 2013)
 - Chair of the Daihl Scholarship Committee (Spring 2008 – May 2013)
- University-level committees/service:
 - Member, Office of Inclusion and Institutional Equity Data Collection Committee (February – May 2021)
 - Secretary of the TU-AAUP/Faculty Association (Fall 2011 – May 2013)
 - Chair of the Junior Faculty Committee of the TU-AAUP/Faculty Association (Fall 2009 – Spring 2010)
 - Physics, Astronomy & Geosciences Representative for the Teacher Education Executive Board (Fall 2009 – Spring 2011)
 - Faculty Advisor, Student Education Association at Towson University (sea@tu): Sept 2007 – May 2009

Note: On sabbatical 2013-2014 academic year and fall 2020.

Memberships in Professional Associations

<i>Year(s)</i>	<i>Organization</i>
2008 - present	American Society for Engineering Education (ASEE)
2003, 2006 - present	National Science Teachers Association
2017 - present	Association for Science Teacher Education
2002 – 2005, 2007, 2014 - present	NARST (was National Association for Research in Science Teaching)
2010 - 2013	AAUP (National)
2007 - 2014	TU-AAUP/Faculty Association
2008 - 2009	National Education Association & Maryland State Teachers Association
2006 - 2007	Society for the Social Studies of Science
2003 – 2008	American Educational Research Association

Contributions to Professional Organizations and the Profession

- Leadership in the Pre-College Engineering Education (PCEE) Division (formerly, the K12 & Precollege Division) of the American Society for Engineering Education (ASEE):
 - Immediate Past Chair, PCEE Division of ASEE (June 2017 – June 2019)
 - Chair of the PCEE Division of ASEE (June 2015 – June 2017)
 - Chair-Elect of the K12 & Precollege Division of ASEE (June 2013 – June 2015)
 - ASEE K-12 Workshop Co-Organizer and Committee Chair (June 2013 – June 2015)
- Service to the ASEE Commission (formerly Board of Directors Committee) on P12 Engineering Education
 - As a former member, contributing ideas about the path forward (December 2022 – ongoing)
 - Member of the P12 Engineering Standards Subcommittee (October 2019 – January 2020)
 - Committee Member (September 2014 – June 2018)
- Member of the University of Delaware Dept of Mechanical Engineering Advisory Council (May 2016 – May 2019).
- Member of the Baltimore County Public Schools Project Lead the Way Program Advisory Committee and Program Review Subcommittee (March 2017 – March 2018).
- Manuscript reviewer for the journals: (Number is number of articles)
 - *Innovations in Science Teacher Education*: 1 (2023), 3 (2021/2022), 1 (2020), 2 (2019)
 - *Journal of Pre-College Engineering Education*: 1 (2023), 1 (2021), 1 (2020), 1 (2019), 1 (2017); 1 (2015)
 - *Journal of STEM Education Research*: 1 (2020)
 - *Journal of Engineering Education*: 1 (2022), 1 (2020), 1 (2019)
 - *Science Education*: 2 (2023), 3 (2022), 1 (2020); 1 (2018)
 - *Science Activities*: 1 (2022), 1 (2020), 1 (2019), 1 (2015), 1 (2013)
 - *The High School Journal*: 1 (2022)
 - *International Journal of Teaching and Learning*: 1 (2021)
 - *Advances in Engineering Education*: 1 (2011)
- Book chapter reviewer:
 - *Empowering and Engaging Students through Academic Discourse*: 1 chapter (2023)
 - *International Handbook of Engineering Education Research*: 1 chapter (2022)
- Abstract/proposal reviewer for conferences:
 - ASEE full conference papers: 4 (2023), 3 (2022), 6 (2019), 3 (2018), 4 (2017), 1 (2016), 2 (2015), 4 (2014), 4 (2011).
 - NARST proposals: 5 (2022), 5 (2023)
 - ASTE Annual Conference proposals: 3 (2021), 4 (2020), 4 (2019), 3 (2017).
 - ASEE K-12 Workshop Proposals: 6 (2016), 8 (2015), 5 (2014), 7 (2013)

- P-12 Engineering Education Summit papers: 3 (2010)
- Moderator:
 - ASEE Annual Meeting Session Moderator: 2023, 2022, 2021, 2020, 2019, 2017, 2016, 2015, 2014, 2013, 2012, 2011, 2009
 - P-12 Engineering Education Summit session, 2010.
- Textbook reviewer:
 - Editorial consultant and reviewer for *Principles of Engineering* workbook for Project Lead the Way (December 2010– December 2011). (20 hours of work)
 - Reviewer for *Principles of Engineering* textbook for Project Lead the Way (Fall 2009). (40 hours of work.)
- Book proposal reviewer: Routledge (2022) Corwin Press (2013) and NSTA Press (2012).
- Book chapter reviewer: Engineering Education Handbook (2022)
- Invited panelist/contributor:
 - Invited panelist for University of Delaware’s Undergraduate STEM Fellows—STEM majors who in the summer are doing outreach with K12 students. Newark, DE. (1 hour, June 25, 2021).
 - Invited participant for the 3rd Annual Advancing Excellence in Engineering Education meeting in Baltimore, MD. (June 5 and 6, 2019).
 - Invited participant on the National Science and Technology Council Committee on STEM Education focus group discussion on science teacher education, co-sponsored by the National Science Foundation and the US Department of Education. (March 24, 2015)
 - Engineering is Elementary (EiE) Digital Brainstorming Meeting. (Contributor) (March 12, 2012)
 - Delaware Science Coalition, providing insight into EiE implementation (March 1, 2012)
 - HCPS technology and science leaders regarding middle school engineering curricula (Nov 9, 2010)
- Judge:
 - University of Delaware Mechanical Engineering senior design presentations (Oct 2021, Oct and Dec 2020)
 - Edible Book Fair at Towson University in Northeastern Maryland (April 9, 2019).
 - Engineering Design & Development design presentations by teachers for Project Lead the Way, University of Maryland at Baltimore County campus. (July 13, 2011, July 15, 2010, and July 16, 2015).
 - The Baltimore Area KidWind Competition (April 23, 2013).
 - Homestead-Wakefield Elementary School (Bel Air, MD) science fair. (April 29, 2011)
- Dissertation Committee Member:
 - Jessica Cellitti, Drexel University, for her dissertation, *“When Failures are Left Unspoken”: A Case Study of how Engineering Design Failure was Situated in an Elementary Science Classroom.* (August 2017 – April 2019)
 - Theresa Hegedus, University of North Carolina, Greensboro, for her dissertation, *The Cultural Production of Engineering in Elementary School.* (January 2014 – October 2014)
- External Reviewer for Promotion/Tenure for Other Institutions: 1 (2021), 2 (2020), 1 (2018)

Professional Teaching and Work Experience

Professor, Department of Physics, Astronomy & Geosciences, Towson University, Towson, MD, United States

Students: Elementary and Early Childhood Education Majors; Middle School Majors; Practicing Teachers.

Courses Taught: PHSC 303 Earth Space Science; SCIE 376 Teaching Science in Elementary School; SCIE 371 Teaching Science in Early Childhood; PHSC 101 Physical Science; SCIE 355 Teaching Engineering Design in Science Education; and SCIE 650 Engineering in Integrated STEM Education.

Assistant Professor starting in 2006, Associate in 2012, Full in 2017

Educational Researcher, DE Education Research & Development Center at the University of Delaware (UD), Newark, DE, United States

Role: Conducted qualitative research on science faculty mentoring within the Delaware Biotechnology Institute

Duration: 20 hours per week; Sept 2005 to May 2006

Adjunct Faculty, UD, School of Education, Newark, DE, United States

Students: Pre-service Master’s Teachers.

Course: EDUC 696: Methods of Teaching Secondary Science

Term: Fall 2005

High School Physics & Engineering Teacher, Hodgson Vocational-Technical High School, Newark, DE, United States

Students: 9th, 11th, & 12th Graders

Courses taught: Physics, Junior & Senior level Pre-Engineering courses, Engineering and Manufacturing Freshman Exploratory

Other roles: Project FIRST Robotics Team Leader (2000 to 2002); curriculum writer (Aug 1998 to June 2002)

Process Engineer, W. L. Gore & Associates, Elkton, MD, United States

Role: Designed experiments to ensure product quality; evaluated and solved manufacturing problems.

Duration: June 1995 to August 1996