MEGAN WAWRO

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EDUCATION

University of California, San Diego & San Diego State University	2007-2011	Ph.D.	Mathematics and Science Education
Miami University	2003-2005	M.A.	Mathematics
Cedarville University	1996-2000	B.A.	Mathematics

EMPLOYMENT

2023 - present	Professor, Department of Mathematics, Virginia Tech, Blacksburg, VA
2016 - 2023	Associate Professor, Department of Mathematics, Virginia Tech, Blacksburg, VA
2011 - 2016	Assistant Professor, Department of Mathematics, Virginia Tech, Blacksburg, VA
2007 - 2011	Graduate Research Assistant, Department of Mathematics and Statistics, San Diego State University, San Diego, CA
2005 - 2007	Visiting Instructor, Department of Mathematics and Statistics, Miami University, Oxford, OH
2005 - 2007	Summer in Switzerland program Mathematics Teacher and Residential Life Coordinator (‘07), Leysin American School, Leysin, Switzerland
2003 - 2005	Graduate Teaching Assistant, Department of Mathematics and Statistics, Miami University, Oxford, OH
2001 - 2003	Mathematics Teacher, Institut auf dem Rosenberg, St. Gallen, Switzerland
2000 - 2001	Art Teacher and Mathematics Teacher, Portsmouth East High School, Portsmouth, OH

AWARDS AND RECOGNITIONS

Presidential Early Career Award for Scientists and Engineers (PECASE) recipient, 2019

National Science Foundation CAREER Award through Division of Undergraduate Education (DUE), 2015-22

Affiliate Faculty, Virginia Tech School of Education Faculty of Teaching and Learning, 2014-present

Virginia Tech Thank-a-Teacher note recipient, 2022, 2023

Best Paper Award for the Sixteenth Annual Conference on Research in Undergraduate Mathematics Education (RUME) with David Plaxco, 2013

STaR (Service, Teaching, and Research) Fellow, a mentoring program for new math education faculty, 2012

PUBLICATIONS

Refereed journal articles

Wawro, M., Pina, A., Thompson, J. R., Topdemir, Z., & Watson, K. (2024). Student interpretations of eigenequations in linear algebra and quantum mechanics. *International Journal of Research in Undergraduate Mathematics Education.* https://doi.org/10.1007/s40753-024-00241-7

Rasmussen, C., Wawro, M., & Zandieh, M. (2024). Integrated methodological approach for documenting individual and collective mathematical progress: Reinventing the Euler method algorithmic tool. *Education Sciences, 14*(3), 335. https://doi.org/10.3390/educsci14030335

Mauntel, M., Wawro, M., & Plaxco, D. (2024). An inquiry-oriented approach to determinants. *PRIMUS.* https://doi.org/10.1080/10511970.2024.2315134

Serbin, K.S., & Wawro, M. (2022). The inextricability of students' mathematical and physical reasoning in quantum mechanics problems. *International Journal of Research in Undergraduate Mathematics Education, 10*, 57-86. https://doi.org/10.1007/s40753-022-00174-z

Serbin, K.S., Wawro, M., & Storms, R. (2021). Characterizations of student, instructor, and textbook discourse related to basis and change of basis in quantum mechanics. *Physical Review Physics Education Research, 17,* 010140. https://doi.org/10.1103/PhysRevPhysEducRes.17.010140

Robinson, A., Simonetti, J.H., Richardson, K.L., & Wawro, M. (2021). Positive attitudinal shifts and a narrowing gender gap: Do expertlike attitudes correlate to higher learning gains for women in the physics classroom? *Physical Review Physics Education Research, 17,* 010101. https://doi.org/10.1103/PhysRevPhysEducRes.17.010101

Serbin, K.S., Sanchez-Robayo, B.J., Truman, J., Watson, K., & Wawro, M. (2020). Characterizing quantum physics students' conceptual and procedural knowledge of the characteristic equation. *Journal of Mathematical Behavior, 58,* 100777. https://doi.org/10.1016/j.jmathb.2020.100777

Wawro, M., Watson, K., & Christensen, W. (2020). Students' metarepresentational competence with matrix notation and Dirac notation in quantum mechanics. *Physical Review Physics Education Research, 16*, 020112. https://doi.org/10.1103/PhysRevPhysEducRes.16.020112

Wawro, M., Watson, K., & Zandieh, M. (2019). Student understanding of linear combinations of eigenvectors. *ZDM The International Journal on Mathematics Education, 51*(7), 1111-1123. https://doi.org/10.1007/s11858-018-01022-8

Andrews-Larson, C., Wawro, M., & Zandieh, M. (2017). A hypothetical learning trajectory for conceptualizing matrices as linear transformations. *International Journal of Mathematical Education in Science and Technology, 48*(6), 809-829. https://doi.org/10.1080/0020739X.2016.1276225

Zandieh, M., Wawro, M., & Rasmussen, C. (2017). An example of inquiry in linear algebra: The roles of symbolizing and brokering. *PRIMUS, 27*(1), 96-124. https://doi.org/10.1080/10511970.2016.1199618

Wawro, M. (2015). Reasoning about solutions in linear algebra: The case of Abraham and the Invertible Matrix Theorem. *International Journal of Research in Undergraduate Mathematics Education, 1*(3), 315-338. https://doi.org/10.1007/s40753-015-0017-7

Plaxco, D., & Wawro, M. (2015). Analyzing student understanding in linear algebra through mathematical activity. *Journal of Mathematical Behavior, 38,* 87-100. https://doi.org/10.1016/j.jmathb.2015.03.002

Rasmussen, C., Wawro, M., & Zandieh, M**.** (2015). Examining individual and collective level mathematical progress. *Educational Studies in Mathematics, 88*(2), 259-281.

Selinski, N., Rasmussen, C., Wawro, M., & Zandieh, M. (2014). A methodology for using adjacency matrices to analyze the connections students make between concepts: The case of linear algebra. *Journal for Research in Mathematics Education, 45*(5), 550-583. https://doi.org/10.5951/jresematheduc.45.5.0550

Wawro, M. (2014). Student reasoning about the invertible matrix theorem in linear algebra. *ZDM The International Journal on Mathematics Education, 46*(3), 1-18. https://doi.org/10.1007/s11858-014-0579-x

Wawro, M., Rasmussen, C., Zandieh, M, Sweeney, G., & Larson, C. (2012). An inquiry-oriented approach to span and linear independence: The case of the Magic Carpet Ride sequence. *PRIMUS, 22*(8), 577-599. https://doi.org/10.1080/10511970.2012.667516

Becker, N., Rasmussen, C., Sweeney, G., Wawro, M., Towns, M., & Cole, R. (2012). Reasoning using

particulate nature of matter: An example of a sociochemical norm in a university-level physical chemistry class. *Chemistry Education Research and Practice*, *14*, 81-94. https://doi.org/10.1007/s10763-011-9284-1

Cole, R., Becker, N., Towns, M., Sweeney, G., Wawro, M., & Rasmussen, C. (2012). Adapting a methodology from mathematics education research to chemistry education research: Documenting collective activity. *International Journal of Science and Mathematics Education, 10*(1), 193-211. https://doi.org/10.1007/s10763-011-9284-1

Nemirovsky, R., Rasmussen, C., Sweeney, G., & Wawro, M. (2012). When the classroom floor becomes the complex plane: addition and multiplication as ways of bodily navigation. *Journal of the Learning Sciences, 21*(2), 287-323. https://doi.org/10.1080/10508406.2011.611445

Wawro, M., Sweeney, G., & Rabin, J. M. (2011). Subspace in linear algebra: Investigating students' concept images and interactions with the formal definition. *Educational Studies in Mathematics, 78*(1), 1-19. https://doi.org/10.1007/s10649-011-9307-4

Other publications (refereed expository pieces and book reviews)

Boman, E., Axler, S., Beezer, R. A., Catral, M., McDonald, J., Stewart, S., Strong, D., Vega, O., & Wawro, M. (2023). Linear algebra course area report. *Committee on the Undergraduate Program in Mathematics (CUPM) Curriculum Guide.* https://maa.org/programs/faculty-and-departments/curriculum-department-guidelines-recommendations/cupm/2015-cupm-curriculum-guide

Stewart, S., Axler, S., Beezer, R., Boman, E., Catral, M., Harel, G., McDonald, J., Strong, D., & Wawro, M. (2022). The Linear Algebra Curriculum Study Group (LACSG 2.0) recommendations. *Notices of the American Mathematical Society*, 69(5), 813-820. https://www.ams.org/notices/202205

Wawro, M. (2019). Book review: Proceedings of INDRUM 2018, second conference of the international network for didactic research in university mathematics. *International Journal of Research in Undergraduate Mathematics Education, 5*(3), 424-429. https://doi.org/10.1007/s40753-019-00103-7

Trigueros, M., & Wawro, M. (2019). Linear Algebra Teaching and Learning. In S. Lerman (Ed.), *Encyclopedia of Mathematics Education.* Springer. https://doi.org/10.1007/978-3-319-77487-9_100021-1

Wawro, M., Ellis, J., & Soto-Johnson, H. (2014). MPWR: Mentoring and partnerships for women in RUME. *Association for Women in Mathematics Newsletter, 44*(5), 20-23.

Submitted refereed journal articles

Wawro, M., & Serbin, K. S. (2024). *"What makes it eigen-esque-ish?": A form-function analysis of the development of eigentheory concepts in a quantum mechanics course*. Manuscript submitted for publication.

Serbin, K. S., & Wawro, M. (2024). *Pedagogical moves related to analogy that support a unified understanding of eigentheory concepts in a Quantum Mechanics class*. Manuscript submitted for publication.

Refereed book chapters

Wawro, M., Andrews-Larson, C., Zandieh, M., & Plaxco, D. (2023). Inquiry-Oriented Linear Algebra: Connecting design-based research and instructional change theory in curriculum design. In R. Biehler, M. Liebendörfer, G. Gueudet, C. Rasmussen, & C. Winsløw (Eds.), *Practice-Oriented Research in Tertiary Mathematics Education: New Directions* (pp. 329-348), Springer. https://doi.org/10.1007/978-3-031-14175-1_16

Plaxco, D., & Wawro, M. (2022). Argumentation in the context of tertiary mathematics: A case study of classroom argumentation and the role of instructor moves. In K. Bieda, A.M. Connor, C. Kosko, & M. Staples (Eds.), *Conceptions and Consequences of Argumentation, Justification, and Proof* (pp. 219-237), Springer. https://doi.org/10.1007/978-3-030-80008-6

Winsløw, C., Biehler, R., Jaworski, B., Rønning, F., & Wawro, M. (2021). Education and professional development of university mathematics teachers. In V. Durand-Guerrier, R. Hochmuth, E. Nardi, & C. Winsløw (Eds.), *Research and Development in University Mathematics Education: Overview produced by the International Network for Research on Didactics of University Mathematics* (pp. 59-79), Routledge. https://doi.org/10.4324/9780429346859-6

Plaxco, D., Zandieh, M., & Wawro, M. (2018). Stretch directions and stretch factors: A sequence intended to support guided reinvention of eigenvector and eigenvalue. In S. Stewart, C. Andrews-Larson, A. Berman, & M. Zandieh (Eds.), *Challenges in Teaching Linear Algebra* (pp. 175-192), ICME-13 Monographs. Springer, Cham. https://doi.org/10.1007/978-3-319-66811-6_8

Rasmussen, C., & Wawro, M. (2017). Post-calculus research in undergraduate mathematics education. In J. Cai, (Ed.), *The compendium for research in mathematics education* (pp. 551-579). NCTM.

Wawro, M. (2016). Finding synergy among research, teaching, and service: An example from mathematics education research. In J. Dewar, P. Hsu, & H. Pollatsek (Eds.), *Mathematics Education: A Spectrum of Work in Mathematical Sciences Departments* (pp. 135-145). Springer International Publishing. https://doi.org/10.1007/978-3-319-44950-0_10

Wawro, M., Rasmussen, C., Zandieh, M., & Larson, C. (2013). Design research within undergraduate mathematics education: An example from introductory linear algebra. In T. Plomp, & N. Nieveen (Eds.), *Educational design research – Part B: Illustrative cases* (pp. 905-925). SLO.

Rasmussen, C., Zandieh, M., & Wawro, M. (2009). How do you know which way the arrows go? The emergence and brokering of a classroom mathematics practice. In W.-M. Roth (Ed.), *Mathematical representation at the interface of body and culture* (pp. 171-218). Information Age Publishing.

Refereed conference papers

Wawro, M., Mauntel, M., & Plaxco, D. (2023). Student reasoning about determinants with GeoGebra. In P. Drijvers, C. Csapodi, H. Palmér, K. Gosztonyi, & E. Kónya (Eds.), *Proceedings of the Thirteenth Congress of European Research Society in Mathematics Education* (pp. 2567-2568). Alfréd Rényi Institute of Mathematics; ERME.

Biza, I., Viirman, O., Bašić, M., Florensa, I., Gueudet, G., Hitier, M., Kontorovich, I., Thoma, A., & Wawro, M. (2023). An introduction to TWG14: University mathematics education. In P. Drijvers, C. Csapodi, H. Palmér, C. Gosztonyi, & E. Kónya (Eds.), *Proceedings of the Thirteenth Congress of European Research Society in Mathematics Education* (pp. 2243-2250). Alfréd Rényi Institute of Mathematics; ERME.

Wawro, M., Mauntel, M., & Plaxco, D. (2023). "The shape will have no volume": Relationships students observed about determinants in a dynamic geometric applet. In S. Cook, B. Katz, and D. Moore-Russo (Eds.), *Proceedings of the 25th annual conference on research in undergraduate mathematics education* (p. 403-411). The Special Interest Group of the Mathematical Association of America for Research in Undergraduate Mathematics Education.

Wawro, M., Park, M., Zandieh, M., Bettersworth, Z., & Lee, I. (2023). Student reasoning about the least-squares problem in inquiry-oriented linear algebra. In S. Cook, B. Katz, and D. Moore-Russo (Eds.), *Proceedings of the 25th annual conference on research in undergraduate mathematics education* (p. 643-651). The Special Interest Group of the Mathematical Association of America for Research in Undergraduate Mathematics Education.

Wawro, M., & Serbin, K. (2023). "What makes it eigen-esque-ish?": Eigentheory development in a quantum mechanics course. In S. Cook, B. Katz, and D. Moore-Russo (Eds.), *Proceedings of the 25th annual conference on research in undergraduate mathematics education* (p. 991-998). The Special Interest Group of the Mathematical Association of America for Research in Undergraduate Mathematics Education.

Schermerhorn, B. P., & Wawro, M. (2022). Students' conceptual understanding of normalization of vectors from $\mathbb{R}^2$ and $\mathbb{C}^2$. In S. S. Karunakaran & A. Higgins (Eds.), *Proceedings of the 24th conference on*

research in undergraduate mathematics education (pp. 546-553). The Special Interest Group of the Mathematical Association of America for Research in Undergraduate Mathematics Education.

Serbin, K. S., & Wawro, M. (2022). Ways that student reasoning about linear algebra concepts can support flexibility in solving quantum mechanics problems. In S. S. Karunakaran & A. Higgins (Eds.), *Proceedings of the 24th conference on research in undergraduate mathematics education* (pp. 554-562). The Special Interest Group of the Mathematical Association of America for Research in Undergraduate Mathematics Education.

Lee., I., Bettersworth, Z., Zandieh, M., Wawro, M., & Quinlan, I. (2022). Student thinking in an inquiry-oriented approach to teaching least squares. In S. S. Karunakaran & A. Higgins (Eds.), *Proceedings of the 24th conference on research in undergraduate mathematics education* (pp. 349-356). The Special Interest Group of the Mathematical Association of America for Research in Undergraduate Mathematics Education.

Rasmussen, C., Wawro, M., & Zandieh, M. (2022). Student reinvention of Euler's method: An integrated analysis of one small group's individual and collective mathematical progress. In J. Hodgen, E. Geraniou, G. Bolondi & F. Ferretti (Eds.), *Proceedings of the Twelfth Congress of European Research Society in Mathematics Education (CERME12)* (pp.1-9). Free University of Bozen-Bolzano and ERME.

Serbin, K. S. & Wawro, M. (2021). Students' understanding of linear algebra concepts underlying a procedure in a quantum mechanics task. In A.I. Sacristán, J.C. Cortés-Zavala, & P.M. Ruiz-Arias (Eds.), *Mathematics education across cultures: Proceedings of the 42nd meeting of the North American chapter of the international group for the psychology of mathematics education* (pp. 1218-1222). Cinvestav / AMIUTEM / PME-NA. https:/doi.org/10.51272/pmena.42.2020

Wawro, M., Thompson, J., & Watson, K. (2020). Student meanings for eigenequations in mathematics and in quantum mechanics. In S.S. Karunakaran, Z. Reed, & A. Higgins (Eds.), *Proceedings of the 23rd annual conference on research in undergraduate mathematics education* (pp. 629-636). The Special Interest Group of the MAA for Research in Undergraduate Mathematics Education.

Serbin, K.S., Storms, R., & Wawro, M. (2020). Students' language about basis and change of basis in a quantum mechanics problem. In S.S. Karunakaran, Z. Reed, & A. Higgins (Eds.), *Proceedings of the 23rd annual conference on research in undergraduate mathematics education* (pp. 520-528). The Special Interest Group of the MAA for Research in Undergraduate Mathematics Education.

Wawro, M., Watson, K., & Christensen, W. (2019). Student reasoning about eigenvectors and eigenvalues from a Resources perspective. In A. Weinberg, D. Moore-Russo, H. Soto, & M. Wawro (Eds.), *Proceedings of the 22nd annual conference on research in undergraduate mathematics education* (pp. 654-662). The Special Interest Group of the Mathematical Association of America for Research in Undergraduate Mathematics Education.

Serbin, K., Sanchez-Robayo, B., Watson, K., Truman, J., Jiang, S., & Wawro, M. (2019). Characterizing conceptual and procedural knowledge of the characteristic equation. In A. Weinberg, D. Moore-Russo, H. Soto, & M. Wawro (Eds.), *Proceedings of the 22nd annual conference on research in undergraduate mathematics education* (pp. 541-548). The Special Interest Group of the Mathematical Association of America for Research in Undergraduate Mathematics Education.

Wawro, M., Zandieh, M., & Watson, K. (2018). Delineating aspects of understanding eigentheory through assessment development. In V. Durand-Guerrier, R. Hochmuth, S. Goodchild, & N.M. Hogstad (Eds.), *Proceedings of the 2nd conference of the international network for didactic research in university mathematics (INDRUM, 5-7 April 2018)* (pp. 275-284). University of Agder and INDRUM.

Wawro, M., Watson, K., & Christensen, W. (2017). Meta-representational competence with linear algebra in quantum mechanics. In A. Weinberg, C. Rasmussen, J. Rabin, M. Wawro, & S. Brown (Eds.), *Proceedings of the 20th annual conference on research in undergraduate mathematics education* (pp. 326-337). The Special Interest Group of the Mathematical Association of America for Research in Undergraduate Mathematics Education.

Watson, K., Wawro, M., Zandieh, M., & Kerrigan, S. (2017). Knowledge about student understanding of eigentheory: Information gained from multiple choice extended assessment. In A. Weinberg, C. Rasmussen, J. Rabin, M. Wawro, & S. Brown (Eds.), *Proceedings of the 20th annual conference on research in undergraduate mathematics education* (pp. 311-325). The Special Interest Group of the Mathematical Association of America for Research in Undergraduate Mathematics Education.

Wawro, M., Watson, K., & Christensen, W. (2017). Meta-representational competence with linear algebra in quantum mechanics. Paper presented at the 10th Congress of European Research in Mathematics Education, Dublin, Ireland. In T. Dooley & G. Gueudet (Eds.), *Proceedings of the 10th congress of the European society for research in mathematics education* (pp. 2282-2289). DCU Institute of Education and ERME.

Zandieh, M., Wawro, M., & Rasmussen, C. (2016). Symbolizing and brokering in an inquiry-oriented linear algebra classroom. In T. Fukawa-Connelly, N. Infante, M. Wawro, & S. Brown (Eds.), *Proceedings of the 19th annual conference on research in undergraduate mathematics education* (1475-1483). The Special Interest Group of the Mathematical Association of America for Research in Undergraduate Mathematics Education.

Jaworski, B., Potari, D., Rasmussen, C., Oates, G., Kwon, O.N., Ellis, J., … Zachariades, T. (2016). Mathematics learning and teaching at university level. In C. Csíkos, A. Rausch, & J. Szitányi (Eds.), *Proceedings of the 40th Conference of the International Group for the Psychology of Mathematics Education, Vol. 1*, pp. 375–404. PME.

Rasmussen, C., Wawro, M., & Zandieh, M. (2015). Examining individual and collective level mathematical progress. In T. Fukawa-Connelly, N. Infante, K. Keene, & M. Zandieh (Eds.), *Proceedings of the 18th annual conference on research in undergraduate mathematics education* (896-903). The Special Interest Group of the Mathematical Association of America for Research in Undergraduate Mathematics Education.

Zandieh, M., Plaxco, D., Wawro, M., Rasmussen, C., Milbourne, H., & Czeranko, K. (2015). Extending multiple choice format to document student thinking. In T. Fukawa-Connelly, N. Infante, K. Keene, & M. Zandieh (Eds.), *Proceedings of the 18th annual conference on research in undergraduate mathematics education* (pp. 1079-1085). The Special Interest Group of the Mathematical Association of America for Research in Undergraduate Mathematics Education.

Wawro, M., & Plaxco, D. (2015). Student understanding of linear independence of functions. *Proceedings of the 9th Congress of European Research on Mathematics Education*, Prague, Czech Republic. In K. Krainer & N. Vondrová (Eds.), *Proceedings of the 9th congress of the European society for research in mathematics education (CERME9, 4-8 February 2015)* (pp. 2297-2298). Charles University in Prague, Faculty of Education and ERME.

Plaxco, D., Wawro, M., & Zietsman, L. (2014). Student understanding of linear independence of functions. In T. Fukawa-Connelly, G. Karakok, K. Keene, & M. Zandieh (Eds.), *Proceedings of the 17th annual conference on research in undergraduate mathematics education* (pp. 992-998). The Special Interest Group of the Mathematical Association of America for Research in Undergraduate Mathematics Education.

Larson, C., Wawro, M., Zandieh, M., Rasmussen, C., Plaxco, D., & Czeranko, K. (2014). *Implementing inquiry-oriented instructional materials in undergraduate mathematics.* In T. Fukawa-Connelly, G. Karakok, K. Keene, & M. Zandieh (Eds.), *Proceedings of the 17th annual conference on research in undergraduate mathematics education* (pp. 797-802). The Special Interest Group of the Mathematical Association of America for Research in Undergraduate Mathematics Education.

Wawro, M., & Plaxco, P. (2013). Utilizing types of mathematical activities to facilitate characterizing student understanding of span and linear independence. In S. Brown, G. Karakok, K. H. Roh, & M. Oehrtman (Eds.), *Proceedings of the 16th annual conference on research in undergraduate mathematics education* (pp. 1-15). The Special Interest Group of the Mathematical Association of America for Research in

Undergraduate Mathematics Education.

Wawro, M. (2012). Expanding Toulmin's Model: The development of four expanded argumentation schemes from analysis in linear algebra. In S. Brown, S. Larsen, K. Marrongelle, & M. Oehrtman (Eds.), *Proceedings of the 15th annual conference on research in undergraduate mathematics education* (pp. 2-242 – 2-250). The Special Interest Group of the Mathematical Association of America for Research in Undergraduate Mathematics Education.

Wawro, M., Larson, C., Zandieh, M., & Rasmussen, C. (2012). A hypothetical collective progression for conceptualizing matrices as linear transformations. In S. Brown, S. Larsen, K. Marrongelle, & M. Oehrtman (Eds.), *Proceedings of the 15th annual conference on research in undergraduate mathematics education* (pp. 1-465 – 1-479). The Special Interest Group of the Mathematical Association of America for Research in Undergraduate Mathematics Education.

Wawro, M. (2011). Individual and collective analysis of the genesis of student reasoning regarding the Invertible Matrix Theorem in linear algebra. In S. Brown, S. Larsen, K. Marrongelle, & M. Oehrtman (Eds.), *Proceedings of the 14th annual conference on research in undergraduate mathematics education* (pp. 3-179 – 3-184). The Special Interest Group of the Mathematical Association of America for Research in Undergraduate Mathematics Education.

Wawro, M., Zandieh, M., Sweeney, G., Larson, C., & Rasmussen, C. (2011). Using the emergent model heuristic to describe the evolution of student reasoning regarding span and linear independence. In S. Brown, S. Larsen, K. Marrongelle, & M. Oehrtman (Eds.), *Proceedings of the 14th annual conference on research in undergraduate mathematics education* (pp. 3-185 –3-189). The Special Interest Group of the Mathematical Association of America for Research in Undergraduate Mathematics Education.

Rasmussen, C., Trigueros, M., Zandieh, M., Possani Espinosa, E., Wawro, M, Sweeney, G., et al. (2010). Building on students' current ways of reasoning to develop more formal or conventional ways of reasoning: The case of linear algebra. In P. Brosnan, D. B. Erchick, & L. Flevares (Eds.), *Proceedings of the 32nd annual meeting of the North American chapter of the international group for the psychology of mathematics education* (pp. 1577-1587). The Ohio State University.

Rasmussen, C., Zandieh, M., & Wawro, M. (2010). Brokering as a mechanism for the social production of meaning. In P. Brosnan, D. B. Erchick, & L. Flevares (Eds.), *Proceedings of the 32nd annual meeting of the North American chapter of the international group for the psychology of mathematics education* (pp. 427-434). Ohio State University.

Schwarz, B., Hershkowitz, R., Atzmon, S., Rasmussen, C., Stahl, G., Wawro, M., et al. (2010). Symposium: Social construction of mathematical meaning through collaboration and argumentation. In K. Gomez, L. Lyons, & J. Radinsky (Eds.), *Learning in the disciplines: Proceedings of the 9th international conference of the learning sciences (ICLS 2010): Volume 2, short papers, symposia, and selected abstracts* (pp. 29-36). International Society of the Learning Sciences.

Cole, R., Towns, M., Rasmussen, C., Becker, N., Wawro, M., & Sweeney, G. (2010). Adapting a methodology for documenting collective growth to an undergraduate physical chemistry class. *Proceedings of the 13th annual conference on research in undergraduate mathematics education*. The Special Interest Group of the Mathematical Association of America for Research in Undergraduate Mathematics Education. Retrieved from: http://sigmaa.maa.org/rume/crume2010/Abstracts2010.htm

Henderson, F., Rasmussen, C., Sweeney, G., Wawro, M, & Zandieh, M. (2010). Symbol sense in linear algebra. *Proceedings of the 13th annual conference on research in undergraduate mathematics education*. The Special Interest Group of the Mathematical Association of America for Research in Undergraduate Mathematics Education. Retrieved from: http://sigmaa.maa.org/rume/crume2010/Abstracts2010.htm

Wawro, M., Sweeney, G., & Rabin, J. M. (2010). Subspace in linear algebra: Investigating students' concept images and interactions with the formal definition. *Proceedings of the 13th annual conference on research in undergraduate mathematics education.* The Special Interest Group of the Mathematical Association of America for Research in Undergraduate Mathematics Education. Retrieved from:

http://sigmaa.maa.org/rume/crume2010/Abstracts2010.htm

Wawro, M. (2009). Task design: Towards promoting a geometric conceptualization of linear transformation and change of basis. *Proceedings of the 12th annual conference on research in undergraduate mathematics education*. The Special Interest Group of the Mathematical Association of America for Research in Undergraduate Mathematics Education. Retrieved from: http://sigmaa.maa.org/rume/crume2009/proceedings.html

Editor for Conference Proceedings

Weinberg, A., Moore-Russo, D., Soto, H., Wawro, M. (Eds.). (2019). Proceedings of the 22nd *annual conference on research in undergraduate mathematics education.* The Special Interest Group of the Mathematical Association of America for Research in Undergraduate Mathematics Education.

Weinberg, A., Rasmussen, C., Rabin, J., Wawro, M., & Brown, S. (Eds.). (2018). Proceedings of the 21st *annual conference on research in undergraduate mathematics education.* The Special Interest Group of the Mathematical Association of America for Research in Undergraduate Mathematics Education.

Weinberg, A., Rasmussen, C., Rabin, J., Wawro, M., & Brown, S. (Eds.). (2017). Proceedings of the 20th *annual conference on research in undergraduate mathematics education.* The Special Interest Group of the Mathematical Association of America for Research in Undergraduate Mathematics Education.

Fukawa-Connelly, T., Engelke Infante, N., Wawro, M., & Brown, S. (Eds.). (2016). Proceedings of the 19th *annual conference on research in undergraduate mathematics education.* The Special Interest Group of the Mathematical Association of America for Research in Undergraduate Mathematics Education.

Dissertation

Wawro, M. J. (2011). *Individual and collective analyses of the genesis of student reasoning regarding the Invertible Matrix Theorem in linear algebra* (Doctoral dissertation, UC San Diego).

GRANTS

National Science Foundation Improving Undergraduate STEM Education, *Collaborative Research: Extending Inquiry-Oriented Linear Algebra* (DUE- 1915156, 1914841, 1914793), M. Wawro (lead PI), M. Zandieh and C. Andrews-Larson (PIs), D. Plaxco (co-PI), 2019-2023, Total award $618,430.

National Science Foundation, *MPWR 2016 and Beyond: Fostering Sustainable Networks for Women in RUME* (DUE-1553278); J. Ellis (PI), S. Musgrave (co-PI), M. Wawro and E. Thanheiser (senior personnel), 2016-2020, $199,992. Serving as PI (DUE-1938495) for 2019-2022, $77,437.

National Science Foundation Innovations in Undergraduate STEM Education, *MATH: EAGER Building a mathematical toolkit and motivation for success in the physical and quantitative sciences* (#1544225), J. Sible (PI); K. Drezek, S. Lewis, M. Pleimling, A. Robinson (co-PIs), J. Simonetti, M. Wawro (senior personnel), 2015-2017, $296,996.

National Science Foundation Faculty Early Career Development Program through the Division of Undergraduate Education, *CAREER: An Interdisciplinary Study of Learning: Student Understanding of Linear Algebra in Physics* (DUE-1452889), Megan Wawro (PI), 2015-2022, $779,686.

National Science Foundation Transforming Undergraduate Education in STEM, *MPWR II: Mentoring and Partnerships for Women in RUME* (DUE-1457785), Jessica Ellis (PI); M. Wawro, E. Thanheiser, and S. Musgrave (senior personnel), 2014-2015, $49,986.

National Science Foundation Transforming Undergraduate Education in STEM, *MPWR: Mentoring and Partnerships for Women in RUME* (DUE-1352990), M. Wawro (PI), J. Ellis and H. Soto-Johnson (senior personnel), 2013-2014, $44,148.

National Science Foundation Robert Noyce Teach Scholarship, *Virginia Teach, Phase II: A Community-Based*

Approach to Serving Mathematics Students in Need (DUE-1339947), C. Ulrich (PI), J. Wilkins, B. Kreye, A. Norton, and M. Wawro (co-PIs), 2013-2019, $800,000.

National Science Foundation Transforming Undergraduate Education in STEM, *Collaborative Research: Developing Inquiry-Oriented Instructional Materials for Linear Algebra* (DUE-1245673, 1245796, and 1246083), M. Wawro (lead PI), M. Zandieh and C. Rasmussen (PIs), 2013-2017, Total award $179,949.

National Science Foundation Robert Noyce Teach Scholarship, *Virginia Teach: Serving Mathematics Students in Need* (DUE-0832992), A. Norton (PI), J. Wilkins, B. Kreye, M. Wawro, C. Ulrich (co-PIs), 2008-2015, $890,307

Virginia Tech Office of the Provost, Faculty Writing Group Grant: *WRITE* (*Writers Researching, Innovating, and Teaching Each other*), A. Reed (convener), K. Carmichael, T. Drape, E. Johnson, C. Labuski, S. Ovink, C. Robbins, S. Tomer, & M. Wawro, 2022-2023, $2000.

Virginia Tech Office of the Provost, Faculty Writing Group Grant: *WRITE* (*Writers Researching, Innovating, and Teaching Each other*), E. Meitner (convener), S. Adams, K. Carmichael, C. Catalano, T. Drape, E. Johnson, C. Labuski, T. Lane, S. Ovink, A. Reed, C. Robbins, S. Tomer, & M. Wawro, 2020-2022, $2000.

Virginia Tech Office of the Provost, Faculty Writing Group Grant: *WRITE* (*Women Researching, Innovating, and Teaching Each other*), M. Wawro (convener), Carmichael, K., Drape, T., Johnson, E. Labuski, C., Meitner, E., Ovink, S., Reed, A., Robbins, C. K., & Tomer, S., 2019-2020, $2000.

Virginia Tech Office of the Provost, Faculty Writing Group Grant: *WRITE (Women Researching, Innovating, and Teaching Each other*), S. Ovink (convener), Carmichael, K., Drape, T., Johnson, E. Labuski, C., Meitner, E., Reed, A., Robbins, C. K., Tomer, S., & Wawro, M., 2018-2019, $2000.

Virginia Tech Center for Innovation in Learning, *Innovation in Undergraduate Mathematics Education: Supporting Student-Centered Instruction*, M. Wawro (PI) and D. Plaxco (co-PI), 2013-2014, $10,000.

Virginia Tech International Travel Supplement Grant: $1,700: 2018 (Norway), 2017 (Ireland), 2016 (France).

Virginia Tech International Travel Supplement Grant: $2,000, 2015 (Czech Republic), 2012 (South Korea).

Association for Women in Mathematics (AWM), AWM-NSF Travel Grant, 2013, $1500.

Virginia Tech Mentoring Grant, 2011, $1,500.

INVITED TALKS

Wawro, M. (2024, August). *Research on the learning and teaching of linear algebra.* Invited colloquium given in the Virginia Tech Mathematics Department, Blacksburg, VA.

Wawro. M. (2023, October). *The Inquiry-Oriented Linear Algebra Project.* Invited colloquium given in the Colorado School of Mines Department of Applied Mathematics & Statistics. [virtual]

Wawro, M. (2023, January). *Student reasoning about linear algebra in quantum mechanics.* Invited talk for the Workshop on Quantum Education for Quantum Workforce Development, Arlington, VA.

Wawro, M. (2022, September). *The Inquiry-Oriented Linear Algebra Project.* Invited speaker for the Online Seminar on Undergraduate Mathematics Education (OLSUME). [virtual]

Wawro, M. (2022, April). *Student understanding of linear combinations of eigenvectors.* Invited colloquium given at Colorado State University, Fort Collins, CO.

Axler, S., Boman, E., Catral., M., Harel, G., McDonald, J., Stewart, S., Strong, D., & Wawro, M. (2021, May). *Linear Algebra Curriculum Study Group (LACSG 2.0) recommendations*. Invited panelist for "Transforming Learning and Teaching: Precalculus, Calculus, and Linear Algebra," MAA Virtual Programs. [virtual]

Wawro, M. (2021, April). *Inquiry-Oriented Linear.* Invited speaker in the Seoul National University Center for Research in Mathematics Education Webinar Series, Seoul, South Korea. [virtual]

Wawro, M. (2021, April). *Student understanding of linear combinations of eigenvectors.* Invited speaker in the Seoul National University Center for Research in Mathematics Education Webinar Series, Seoul, South Korea. [virtual]

Wawro, M. (2021, April). *Inquiry-Oriented Linear Algebra*. Invited presentation given at the Cornell University Department of Mathematics Teaching Seminar, Ithaca, NY. [virtual]

Wawro, M. (2019, September). *Student reasoning about linear algebra in quantum physics*. Invited colloquium given at Montana State University, Bozeman, MT.

Wawro, M. (2019, March). *Exploring teaching and learning through Inquiry-Oriented Linear Algebra*. Invited colloquium given at the University of Oslo, Oslo, Norway.

Wawro, M. (2019, January). *Student reasoning about linear algebra in quantum physics*. Invited colloquium given at the University of Auckland, Auckland, New Zealand.

Wawro, M. (2018, November). *Exploring teaching and learning through Inquiry-Oriented Linear Algebra*. Invited colloquium given at Northern Illinois University, DeKalb, IL.

Wawro, M. (2018, November). *Student reasoning about linear algebra in quantum physics*. Invited colloquium given at Northern Illinois University, DeKalb, IL.

Wawro, M. (2018, October). *Inquiry-Oriented Linear Algebra.* Invited workshop leader for the NSF-sponsored (DUE 1822247) Linear Algebra Workshop on National Pedagogical Initiatives in Linear Algebra, University of Oklahoma, Norman, OK.

Wawro, M. (2018, May). *Discovering definitions in Inquiry-Oriented Linear Algebra*. Invited Facilitator for a Live Classroom Session for the Inquiry-Based Learning and Teaching Conference, Austin, TX.

Wawro, M. (2018, April). *Education and professional development of university mathematics teachers.* Plenary panelist for the International Network for Didactic Research in University Mathematics (INDRUM), Kristiansand, Norway.

Wawro, M. (2018, March). *Student reasoning about linear algebra in quantum physics*. Invited colloquium given at Yale University as part of the Yale STEM Center for Teaching and Learning Seminar Series, New Haven, CT.

Wawro, M. (2018, March). *Exploring teaching and learning through Inquiry-Oriented Linear Algebra*. Invited workshop given at the University of Bridgeport as part of the Yale STEM Center for Teaching and Learning Seminar Series, Bridgeport, CT.

Wawro, M. (2018, February). *Student reasoning about eigenvectors and eigenvalues.* Invited colloquium given at James Madison University, Harrisonburg, VA.

Wawro, M. (2017, November). *An inquiry-oriented approach to the teaching and learning of linear algebra*. Invited keynote speaker for the *Wisconsin Section NExT Meeting*. Baraboo, WI.

Wawro, M. (2017, July). *Student understanding and symbolization of eigentheory*. Plenary speaker for the Physics Education Research Conference, Cincinnati, OH.

Wawro, M. (2017, July). *Student understanding at the intersection of linear algebra and quantum physics.* Plenary speaker for the Transforming Research in Undergraduate STEM Education (TRUSE) Conference, St. Paul, MN.

Wawro, M. (2017, February). *How to support each other in being successful.* Plenary panelist for the 2017 Mentoring and Partnerships for Women in RUME (MPWR) Conference, San Diego, CA.

Borum, V., Lovin, L., Wawro, M., & White, N. (2017, January). *Highlighting contributions to mathematics education from members of departments of mathematics sciences.* Panel discussion sponsored by the MAA COMET and the AWM presented at the Joint Mathematics Meetings of the Mathematical Association of America and the American Mathematical Society, Atlanta, GA.

Wawro, M. (2016, September). *Research on the learning and teaching of diagonalization and eigentheory.* Invited colloquium given at the Maine Center for Research in STEM Education (RiSE Center)**,** University of Maine, Orono, ME.

Wawro, M. (2016, April). *Research on the teaching and learning of linear algebra.* Invited colloquium given at West Virginia University, Morgantown, WV

Wawro, M. (2016, March). *Research on the teaching and learning of linear algebra.* Invited colloquium given at the University of Delaware, Newark, DE.

Wawro, M. (2015, August). *Research on the teaching and learning of linear algebra.* Invited colloquium given at the Virginia Tech Mathematics Department, Blacksburg, VA.

Rasmussen, C., & Wawro, M. (2015, May). *Representing and modeling with vectors.* Invited workshop for the San Diego Mathematics Project "Getting Ready for College Mathematics: Conversations with Math Professors" series for high school teachers, San Diego, CA.

Wawro, M. (2014, December). *An inquiry-oriented approach to the teaching and learning of linear algebra.* Invited colloquium given at the Colorado State University Mathematics Department, Ft. Collins, CO.

Wawro, M. (2014, April). *Transitioning from doctoral student to faculty member.* Invited talk given at the Graduate Student, Junior Faculty, and Researcher Mentoring Session at the 2014 NCTM Research Conference, New Orleans, LA.

Wawro, M., & Plaxco, D. (2014, January). *Utilizing types of mathematical activities to facilitate characterizing student understanding of span and linear independence.* Invited talk given at the Joint Mathematics Meetings [SIGMAA on RUME Session on Research on the Teaching and Learning of Undergraduate Mathematics], Baltimore, MD.

Wawro, M. (2013, July). *Analyzing student understanding in linear algebra through mathematical activity*. Invited talk given at the 2013 Summer Meeting of the American Association of Physics Teachers [Research in Undergraduate Mathematics Education session], Portland, OR.

Wawro, M. (2013, April). *Analyzing student understanding in linear algebra through mathematical activity*. Invited colloquium given at the University of North Carolina Charlotte.

Wawro, M., Sweeney, G., Zandieh, M., & Larson, C. (2011, August). *Designing instruction that builds on students' ways of reasoning in linear algebra*. SIGMAA on RUME invited workshop at MathFest, Lexington, KY.

Rasmussen, C., & Wawro, M. (2009). *The role of brokers in the reinvention process*. Invited workshop at the Second Realistic Mathematics Education Conference, Boulder, CO.

PRESENTATIONS AT PROFESSIONAL MEETINGS

Speakers are noted in bold.

Wawro, M., & **Serbin, K. S**. (2024, June). *Form-function relations for eigentheory in quantum mechanics*. Paper presented at the 5th Conference of the International Network for Didactic Research in University Mathematics (INDRUM), Barcelona, Spain.

Wawro, M., Mauntel, M., & Plaxco, D. (2023, July). *Student reasoning about determinants with GeoGebra.* Poster presented at the Congress for European Research in Mathematics Education, Budapest, Hungary.

Plaxco, D., Wawro, M., & Mauntel, M. (2023, May). *An Inquiry-Oriented Task Sequence for Teaching Determinants.* Presentation at the Third International Conference on Applications of Mathematics to Nonlinear Sciences (AMNS-2023), Pokhara, Nepal.

Wawro, M., Mauntel, M., & **Plaxco, D**. (2023, February). *"The shape will have no volume": Relationships students observed about determinants in a dynamic geometric applet.* Paper presented at the 25th

Conference on Research in Undergraduate Mathematics Education, SIGMAA on RUME, Omaha, NE.

Wawro, M., Park, M., Zandieh, M., Bettersworth, Z., & **Lee, I**. (2023, February). *Student reasoning about the least-squares problem in inquiry-oriented linear algebra.* Paper presented at the 25th Conference on Research in Undergraduate Mathematics Education, SIGMAA on RUME, Omaha, NE.

Wawro, M., & **Serbin, K**. (2023, February). *"What makes it eigen-esque-ish?": Eigentheory development in a quantum mechanics course.* Paper presented at the 25th Conference on Research in Undergraduate Mathematics Education, SIGMAA on RUME, Omaha, NE.

Mauntel, M., **Wawro, M.**, & Plaxco, D. (2023, January). *Inquiry Oriented Linear Algebra: Exploring determinants.* Workshop presented as part of the Joint Mathematics Meetings, Boston, MA.

Wawro, M., & Thompson, J. (2022, October). *Recognizing matrix equations as eigenequations or not: Examples of student reasoning in quantum mechanics*. Poster presented at 4th Conference of the International Network for Didactic Research in University Mathematics. Hannover, Germany.

Mauntel, M., Wawro, M., Zandieh, M., Andrews-Larson, C., & Plaxco, D. (2022, August). *Collaborative Research: Extending Inquiry-Oriented Linear Algebra (IOLA-X)*. Poster presented at the MAA MathFest. Philadelphia, PA.

Wawro, M., Zandieh, M., Andrews-Larson, C., & **Plaxco, D.** (2022, August). *Collaborative Research: Extending Inquiry-Oriented Linear Algebra (IOLA-X)*. Poster presented at the 2022 Improving Undergraduate Education (IUSE) Summit, National Science Foundation and American Association for the Advancement of Science, Washington, DC.

Wawro, M. (2022, June). *Student Reasoning about Linear Algebra in Quantum Mechanics*. Presentation given at the 24th Conference of the International Linear Algebra Society, Galway, Ireland.

Wawro, M. (2022, April). *Selected outcomes and reflections from the project: An Interdisciplinary Study of Learning: Student Understanding of Linear Algebra in Physics.* Presentation given at the Joint Mathematics Meetings, NSF Special Session on Outcomes and Innovations from NSF Undergraduate Education Programs in the Mathematical Sciences. [virtual conference because of COVID-19]

Mauntel, M., Plaxco, D., & Wawro, M. (2022, April). *Determining the Determinant: Using GeoGebra to visualize and measure spatial distortion.* Presentation given at the Joint Mathematics Meetings of the Mathematical Association of America and the American Mathematical Society, AMS Session on Innovative and Effective Ways to Teach Linear Algebra. [virtual conference because of COVID-19]

Schermerhorn, B., & Wawro, M. (2022, February). *Students' conceptual understanding of normalization of vectors from* $\mathbb{R}^2$ and $\mathbb{C}^2$. Paper presented at the 24th Conference on Research in Undergraduate Mathematics Education, SIGMAA on RUME, Boston, MA.

Serbin, K. S., & **Wawro, M.** (2022, February). *Ways that student reasoning about linear algebra concepts can support flexibility in solving quantum mechanics problems.* Paper presented at the 24th Conference on Research in Undergraduate Mathematics Education, SIGMAA on RUME, Boston, MA.

Bergman, A. M., Bresock, K., & **Wawro, M.** (2022, February). *Education research at the interface of mathematics and science: Graphical reasoning across and within the disciplines*. Working group organized at the 24th Conference on Research in Undergraduate Mathematics Education, SIGMAA on RUME, Boston, MA.

Lee., I., **Bettersworth, Z.**, Zandieh, M., Wawro, M., & Quinlan, I. (2022, February). *Student thinking in an inquiry-oriented approach to teaching least squares*. Paper presented at the 24th Conference on Research in Undergraduate Mathematics Education, SIGMAA on RUME, Boston, MA.

Kerrigan, S., Wawro, M., Plaxco, D., Mauntel, M., & Quinlan, I. (2022, February). *Exploring student generalizations about 2x2 determinants from using a GeoGebra applet*. Poster presented at the 24th Conference on Research in Undergraduate Mathematics Education, SIGMAA on RUME, Boston, MA.

Rasmussen, C., Wawro, M., & Zandieh, M. (2022, February). *Student reinvention of Euler's method: An integrated analysis of one small group's individual and collective mathematical progress*. Paper presented at the 12th Congress of European Research in Mathematics Education, Bolzano, Italy. [virtual conference because of COVID-19]

Wawro, M., Thompson, J., & Watson, K. (2021, July). *Student reasoning about eigenequations in mathematics and quantum mechanics*. Paper presented at the 14th International Congress on Mathematical Education, Shanghai, China. [presented virtually because of COVID-19]

Serbin, K. S., & Wawro, M. (2021, June). *Students' understanding of linear algebra concepts underlying a procedure in a quantum mechanics task.* Paper presented at the 42nd annual meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education. Mazatlán, Mexico. [presented virtually because of COVID-19]

Wawro, M. (2021, May). *Inquiry-Oriented Linear Algebra*. Invited presentation given in the "Linear Algebra Education for the Modern World" mini-symposium, SIAM Conference on Applied Linear Algebra. [virtual conference because of COVID-19]

Plaxco, D., Wawro, M., Zandieh, M., & Andrews-Larson, C. (2020, August). *An Inquiry-Oriented Approach to Determinants: New Materials from the IOLA Project*. Workshop accepted to be part of MathFest, Philadelphia, PA. [Conference canceled due to COVID-19]

Wawro, M., **Thompson, J.**, & Watson, K. (2020, February). *Student Meanings for Eigenequations in Mathematics and in Quantum Mechanics*. Paper presented at the 23rd Annual Conference on Research in Undergraduate Mathematics Education, Boston, MA.

Serbin, K. S., Storms, R., & **Wawro, M.** (2020, February). *Students' Language about Basis and Change of Basis in a Quantum Mechanics Problem*. Paper presented at the 23rd Annual Conference on Research in Undergraduate Mathematics Education, Boston, MA.

Wawro, M., Zandieh, M., Andrews-Larson, C. & Plaxco, D. (2020, January). *Promoting Inquiry in Linear Algebra with Student Videos, Reflections, and Portfolios.* Presentation given at the Joint Mathematics Meetings of the Mathematical Association of America and the American Mathematical Society [MAA Session on Inquiry-Based Learning and Teaching], Denver, CO.

Hagman, J., & Wawro, M. (2020, January). *MPWR 2016 and Beyond: Fostering Sustainable Networks for Women in RUME.* Poster presented at the Joint Mathematics Meetings of the Mathematical Association of America and the American Mathematical Society [MAA Poster Session: Projects Supported by the NSF Division of Undergraduate Education], Denver, CO.

Wawro, M. (2019, August). *Using Videos, Reflections, and Portfolios to Promote Inquiry*. Talk given at MathFest, Cincinnati, OH.

Wawro, M., Hagman, J.E., & Musgrave, S. (2019, August). *The MPWR Seminar: Mentoring and Partnerships for Women in RUME.* Poster presented at MathFest, Cincinnati, OH.

Wawro, M., **Thompson, J.**, & Watson, K. (2019, July). *Student Meanings for Eigenequations in Mathematics and in Quantum Mechanics.* Invited talk given at the Annual Physics Education Research Conference (Parallel Session on Representing student reasoning about math in physics), Provo, UT.

Wawro, M., **Christensen, W.**, & Watson, K. (2019, July). *Student Reasoning about Eigenvectors and Eigenvalues from a Resources Perspective.* Juried Talk given at the Annual Physics Education Research Conference, Provo, UT.

Wawro, M., Thompson, J., & Watson, K. (2019, July). *Student Interpretation of Eigenequations in Mathematics and in Quantum Mechanics.* Talk given at the Summer Meeting of the American Association of Physics (PER Session: Student Content Understanding, Problem-solving and Reasoning), Provo, UT.

Wawro, M., **Watson, K.**, & **Christensen, W.** (2019, February). *Student reasoning about eigenvectors and eigenvalues from a resources perspective*. Paper presented at the 22nd Annual Conference on Research in

Undergraduate Mathematics Education, Oklahoma City, OK.

Serbin, K. S., **Sanchez-Robayo, B.**, **Watson, K.**, **Truman, J.**, Jiang, S., & Wawro, M. (2019, February). Characterizing conceptual and procedural knowledge of the characteristic equation. Paper presented at the 22nd Annual Conference on Research in Undergraduate Mathematics Education, Oklahoma City, OK.

Serbin, K.S., Storms, R., & Wawro, M. (2019, February). Student reasoning about basis and change of basis in a quantum mechanics problem. Poster presented at the 22nd Annual Conference on Research in Undergraduate Mathematics Education, Oklahoma City, OK.

Wawro, M., Watson, K., & Christensen, W. (2018, August). *Student reasoning about eigenvectors and eigenvalues from a resources perspective*. Poster presented at the Annual Physics Education Research Conference, Washington, DC.

Christensen, W., Watson, K., & Wawro, M., (2018, August). *Student reasoning about eigenvectors and eigenvalues from a resources perspective*. Contributed talk given at the American Association of Physics Teachers Summer Meeting, Washington, DC.

Robinson, A., Simonetti, J. H., Richardson, K. L., Esmaeili, S., Grimes, M., Lewis, S. N., McConnell, K. D., Pleimling, M. J., Sible, J., Sorenson, K. J., Vengrin, C., & Wawro, M. (2018, August). *Positive attitudinal gains and reduced gender gap in a first year physics experience*. Poster presented at the Annual Physics Education Research Conference, Washington, DC.

Simonetti, J., Robinson, A., Richardson, K. L., Esmaeili, S., Grimes, M., Lewis, S. N., McConnell, K. D., Pleimling, M. J., Sible, J., Sorenson, K. J., Vengrin, C. & Wawro, M. (2018, August). *A first-year experience program in physics.* Poster presented at the 2018 Summer Meeting of the American Association of Physics Teachers, Washington, DC.

Wawro, M., **Zandieh, M.**, & Watson, K. (2018, April). *Delineating aspects of understanding eigentheory through assessment development.* Paper presented at the International Network for Didactic Research in University Mathematics (INDRUM), Kristiansand, Norway.

Esmaeili, S., Richardson, K. L., Lewis, S. N., Vengrin, C., Sible, J. C., Robinson, A., Pleimling, M., Simonetti, J., Sorenson, K., & Wawro, M. (2018, April.) *The effectiveness of a summer bridge program in integrating math into science instruction*. Poster presented at the 102nd meeting of the American Educational Research Association, New York, NY.

Esmaeili, S., Richardson, K. L., Simonetti, J. H., Robinson, A., Sorenson, K., Vengrin, C., Wawro, M., Pleimling, M., & Sible, J. C. (2018, February). *Math, problem solving, and SCALE-UP in an integrated science curriculum and a physics first-year experience program*. Paper presented at the 41st meeting of the Eastern Educational Research Association, Clearwater, FL.

Wawro, M., Watson, K., & Zandieh, M. (2018, February). *Student Understanding of Linear Combinations of Eigenvectors.* Paper presented at the 21st Conference on Research in Undergraduate Mathematics Education, San Diego, CA.

Wawro, M., Watson, K., & Christensen, W. (2018, February). *Quantum Physics Students' Reasoning about Eigenvectors and Eigenvalues.* Poster presented at the 21st Conference on Research in Undergraduate Mathematics Education, San Diego, CA.

Musgrave, S., Hagman, J.E., Melhuish, K., Thanheiser, E., & Wawro, M. (2018, February). *MPWR-ing Women in RUME: Continuing Support*. Poster presented at the 21st Conference on Research in Undergraduate Mathematics Education, San Diego, CA.

Robinson, A., Simonetti, J. H., Richardson, K. L., Esmaeili, S., Grimes, M., Lewis, S. N., McConnell, K. D., Pleimling, M., Sible, J. C., Sorenson, K., Vengrin, C., & Wawro, M. (2018, January). *A study of learning and attitudinal gains in a first-year physics experience.* Poster presented at the 2018 meeting of the American Association of Physics Teachers, San Diego, CA.

Wawro, M., Zandieh, M., & Plaxco, D. (2017, November). *An Inquiry-Oriented Approach to the Guided*

Reinvention of Eigentheory. Paper presented at the 11th Southern Hemisphere Conference on the Teaching and Learning of Undergraduate Mathematics and Statistics (DELTA), Gramado, Brazil.

Wawro, M., Watson, K., & **Christensen, W.** (2017, July). *Investigating Students' Meta-Representational Competence with Matrix Notation and Dirac Notation.* Paper presented at the Physics Education Research Conference, Cincinnati, OH.

Wawro, M. (2017, July). *Inquiry-Oriented Linear Algebra (IOLA): An Overview and an Example.* Presentation given at the Meeting of the International Linear Algebra Society, Ames, IA.

Wawro, M., **Watson, K.**, & **Christensen, W.** (2017, February). *Meta-representational competence with linear algebra in quantum mechanics.* Paper presented at the 20th Conference on Research in Undergraduate Mathematics Education, San Diego, CA.

Watson, K., Wawro, M., Zandieh, M., & **Kerrigan, S.** (2017, February). *Knowledge about student understanding of eigentheory: Information gained from multiple choice extended assessment.* Paper presented at the 20th Conference on Research in Undergraduate Mathematics Education, San Diego, CA.

Ellis, J., Musgrave, S., Melhuish, K., Thanheiser, E., & Wawro, M. (2017, February). *Empowered women in RUME: We have we been up to?* Poster presented at the 20th Conference on Research in Undergraduate Mathematics Education, San Diego, CA.

Wawro, M., Watson, K., & Christensen, W. (2017, February). *Meta-representational competence with linear algebra in quantum mechanics.* Paper presented at the 10th Congress of European Research in Mathematics Education, Dublin, Ireland.

Ellis, J., Musgrave, S., Wawro, M., Thanheiser, E., & Melhuish, K. (2017, January). *MPWR 2016 and Beyond: Fostering sustainable networks for women in RUME.* Poster presented at the Joint Mathematics Meetings of the Mathematical Association of America & American Mathematical Society, Atlanta, GA.

Wawro, M., & Watson, K. (2017, January). *An interdisciplinary study of learning: Student understanding of linear algebra in physics.* Poster presented at the Joint Mathematics Meetings of the Mathematical Association of America and the American Mathematical Society, Atlanta, GA.

Wawro, M., & **Zandieh, M.**, & Rasmussen, C. (2016, July). *Symbolizing and brokering in fostering inquiry.* Paper presented at the 13th International Congress on Mathematical Education, Hamburg, Germany.

Rasmussen, C., & **Wawro, M.** (2016, August). *Coordinating analyses of individual and collective mathematical progress.* Paper presented in the "Mathematics Learning and Teaching at University Level" Research Forum at the Psychology of Mathematics Education 40th Annual Conference, Szeged, Hungary.

Wawro, M., & Zandieh, M. (2016, April). *An inquiry-oriented task sequence for eigentheory and diagonalization in linear algebra.* Poster presented at the First Conference of the International Network for Didactic Research in University Mathematics (INDRUM), Montpellier, France.

Zandieh, M., Wawro, M., & Rasmussen, C. (2016, February). *Symbolizing and brokering in an inquiry-oriented linear algebra classroom.* Paper presented at the Nineteenth Conference on Research in Undergraduate Mathematics Education, Pittsburgh, PA.

Watson, K., Wawro, M., & Zandieh, M (2016, February). *Assessing students' understanding of eigenvectors and eigenvalues in linear algebra.* Poster presented at the Nineteenth Conference on Research in Undergraduate Mathematics Education, Pittsburgh, PA.

Wawro, M., Ellis, J., & Soto-Johnson, H. (2015, April). *Lessons learned from mentioning and partnerships for women in research in undergraduate mathematics education.* Poster presented at the American Educational Research Association (AERA) Annual Meeting, Chicago, IL.

Wawro, M., Zandieh, M., Rasmussen, C., & Andrews-Larson, C. (2015, February). *An RME-based instructional sequence for change of basis and eigentheory.* Poster presented at the Eighteenth Conference on Research in Undergraduate Mathematics Education, Pittsburgh, PA.

Christensen, W., & **Wawro, M.** (2015, February). *Education research at the interface of mathematics and physics.* Working group organized at the Sixteenth Conference on Research in Undergraduate Mathematics Education, Denver, CO.

Rasmussen, C., Wawro, M., & Zandieh, M. (2015, February). *Examining individual and collective level mathematical progress.* Paper presented at the Eighteenth Conference on Research in Undergraduate Mathematics Education, Pittsburgh, PA.

Zandieh, M., Plaxco, D., Wawro, M., Rasmussen, C., **Milbourne, H.**, & Czeranko, K. (2015, February). *Extending multiple choice format to document student thinking.* Paper presented at the Eighteenth Conference on Research in Undergraduate Mathematics Education, Pittsburgh, PA.

Wawro, M., & Plaxco, D. (2015, February). *Student understanding of linear independence of functions.* Poster presented at the 9th Congress of European Research on Mathematics Education, Prague, Czech Republic.

Wawro, M., Zandieh, M., & Plaxco, D. (2015, January). *An instructional sequence for change of basis and eigentheory.* Paper presented at the Joint Mathematics Meetings of the Mathematical Association of America and the American Mathematical Society [MAA Session on Innovative and Effective Teaching of Linear Algebra], San Antonio, TX.

Zandieh, M., Wawro, M., & Plaxco, D. (2015, January). *Inquiry-Oriented Linear Algebra (IOLA): An RME-based instructional sequence for change of basis and eigentheory.* Paper presented at the Joint Mathematics Meetings of the Mathematical Association of America and the American Mathematical Society [SIGMAA on RUME Session on Research on the Teaching and Learning of Undergraduate Mathematics], San Antonio, TX.

Wawro, M., Zandieh, M., Rasmussen, C., Larson, C., Plaxco, D., & Czeranko, K. (2014, February). *Developing inquiry oriented instructional materials for linear algebra (DIOIMLA): Overview of the research project.* Poster presented at the Seventeenth Conference on Research in Undergraduate Mathematics Education, Denver, CO.

Plaxco, D., Wawro, M., & Zietsman, L. (2014, February). *Student understanding of linear independence of functions.* Paper presented at the Seventeenth Conference on Research in Undergraduate Mathematics Education, Denver, CO.

Larson, C., Wawro, M., Zandieh, M., Rasmussen, C., Plaxco, D., & Czeranko, K. (2014, February). *Implementing inquiry-oriented instructional materials in undergraduate mathematics.* Paper presented at the Seventeenth Conference on Research in Undergraduate Mathematics Education, Denver, CO.

Plaxco, D., & **Wawro, M**. (2013, November). *Characterizing student conceptions of span and linear independence through mathematical activity: The case of Joe*. Poster presented at the Thirty-fifth Annual Conference of the North American Chapter of the International Group for the Psychology of Mathematics Education (PME-NA), Chicago, IL.

Wawro, M. (2013, June). *Designing instruction that builds on students' ways of reasoning in linear algebra: an example from span and linear independence*. Paper presented at the 2013 Meeting of the International Linear Algebra Society, Providence, RI.

Wawro, M., & **Christensen, W.** (2013, February). *Investigating student understanding of cross-cutting concepts within undergraduate mathematics and physics.* Working group organized at the Sixteenth Conference on Research in Undergraduate Mathematics Education, Denver, CO.

Wawro, M., & **Plaxco, D**. (2013, February). *Utilizing types of mathematical activities to facilitate characterizing student understanding of span and linear independence*. Paper presented at the Sixteenth Conference on Research in Undergraduate Mathematics Education, Denver, CO.

Wawro, M. (2013a, January). *Reasoning about solutions in linear algebra: The case of Abraham and the Invertible Matrix Theorem*. Paper presented at the Joint Mathematics Meetings of the Mathematical Association of America and the American Mathematical Society [SIGMAA on RUME Session on

Research on the Teaching and Learning of Undergraduate Mathematics], Boston, MA.

Wawro, M. (2013b, January). *Transitioning from graduate student to faculty member: Learning to lead a research project team.* Poster presented at the Project STaR Session at the 17th Annual Association of Mathematics Teacher Educators Conference, Orlando, FL.

Wawro, M. (2012, November). *Student reasoning about the Invertible Matrix Theorem in linear algebra*. Poster presented at the Thirty-fourth Annual Conference of the North American Chapter of the International Group for the Psychology of Mathematics Education (PME-NA), Kalamazoo, MI.

Wawro, M. (2012, July). *Student thinking about the Invertible Matrix Theorem in linear algebra*. Paper presented at the 12th International Congress on Mathematics Education [roundtable discussion within the Learning and Cognition in Mathematics Topic Study Group], Seoul, South Korea.

Rasmussen, C., & Wawro, M. (2012, July). *Documenting the collective activity of the mathematics classroom*. Paper presented at the 12th International Congress on Mathematics Education [Learning and Cognition in Mathematics Topic Study Group], Seoul, South Korea.

Wawro, M. (2012, June). *Reasoning about existence and uniqueness of solutions to Ax=0 and Ax=b in linear algebra: Abraham and the IMT*. Poster presented at the Second Conference on Transforming Research on Undergraduate STEM Education, St. Paul, MN.

Rasmussen, C., Wawro, M., & Zandieh, M. (2012, April). *Four lenses for examining individual and collective level mathematical progress*. Paper presented at the American Educational Research Association (AERA) Annual Meeting [symposium on Connecting the Moving Dots: Comparing Approaches to Coordinating Temporal Analyses of Groups and Individuals], Vancouver, BC.

Wawro, M. (2012, February). *Expanding Toulmin's Model: The development of four expanded argumentation schemes from analysis in linear algebra*. Paper presented at the Fifteenth Conference on Research in Undergraduate Mathematics Education, Portland, OR.

Wawro, M., Larson, C., Zandieh, M., & Rasmussen, C. (2012, February). *A hypothetical learning trajectory for conceptualizing matrices as linear transformations*. Paper presented at the Fifteenth Conference on Research in Undergraduate Mathematics Education, Portland, OR.

Wawro, M., & Larson, C. (2012, January). *A hypothetical learning trajectory for conceptualizing matrices as linear transformations.* Paper presented at the Joint Mathematics Meetings of the Mathematical Association of America and the American Mathematical Society [MAA Session on Innovative and Effective Teaching of Linear Algebra], Boston, MA.

Wawro, M. (2011, February). *Individual and collective analysis of the genesis of student reasoning regarding the Invertible Matrix Theorem in linear algebra*. Paper presented at the Fourteenth Conference on Research in Undergraduate Mathematics Education, Portland, OR.

Wawro, M., Zandieh, M., Sweeney, G., Larson, C., & Rasmussen, C. (2011, February). *Using the emergent model heuristic to describe the evolution of student reasoning regarding span and linear independence*. Paper presented at the Fourteenth Conference on Research in Undergraduate Mathematics Education, Portland, OR.

Sweeney, G., & **Wawro, M.** (2011, January). *Revoicing as a tool for promoting effective student discourse*. Roundtable paper presented at the Fifteenth Annual Association of Mathematics Teacher Educators Conference, Irvine, CA.

Wawro, M. (2011a, January). *A student-centered approach to span and linear independence: The case of the magic carpet ride problem*. Paper presented at the Joint Mathematics Meetings of the Mathematical Association of America and the American Mathematical Society [MAA Session on Innovative and Effective Teaching of Linear Algebra], New Orleans, LA.

Wawro, M. (2011b, January). *Development of student reasoning regarding the Invertible Matrix Theorem in linear algebra*. Paper presented at Joint Mathematics Meetings of the Mathematical Association of

America and the American Mathematical Society [SIGMAA on RUME Session on Research on the Teaching and Learning of Undergraduate Mathematics], New Orleans, LA.

Wawro, M. (2010, October). *Individual and collective analyses of the genesis of student reasoning regarding the Invertible Matrix Theorem*. Poster presented at the Thirty-second Annual Conference of the North American Chapter of the International Group for the Psychology of Mathematics Education (PME-NA), Columbus, OH.

Rasmussen, C., Zandieh, M., & Wawro, M. (2010, October). *Brokering as a mechanism for the social production of meaning*. Brief research report presented at the Thirty-second Annual Conference of the North American Chapter of the International Group for the Psychology of Mathematics Education (PME-NA), Columbus, OH.

Rasmussen, C., Zandieh, M., & Wawro, M. (2010, June). *Brokering as a mechanism for the social production of meaning*. Symposium on social construction of mathematical meaning through collaboration and argumentation. Paper presented at the 9th International Conference of the Learning Sciences, Chicago, IL.

Cole, R., Towns, M., Rasmussen, C., Becker, N., Wawro, M., & Sweeney, G. (2010, February). *Adapting a methodology for documenting collective growth to an undergraduate physical chemistry class*. Paper presented at the 13th Conference on Research in Undergraduate Mathematics Education, Raleigh, NC.

Henderson, F., Rasmussen, C., Sweeney, G., Wawro, M, & Zandieh, M. (2010, February). *Symbol sense in linear algebra*. Paper presented at the Thirteenth Conference on Research in Undergraduate Mathematics Education, Raleigh, NC.

Wawro, M., Sweeney, G., & Rabin, J. M. (2010, February). *Subspace in linear algebra: Investigating students' concept images and interactions with the formal definition*. Paper presented at the Thirteenth Conference on Research in Undergraduate Mathematics Education, Raleigh, NC.

Wawro, M. (2009, February). *Task design: Towards promoting a geometric conceptualization of linear transformation and change of basis*. Paper presented at the Twelfth Conference on Research in Undergraduate Mathematics Education, Raleigh, NC.

Rasmussen, C., Zandieh, M., & Wawro, M. (2009, February). *The social production of meaning*. Paper presented at the Twelfth Conference on Research in Undergraduate Mathematics Education, Raleigh, NC.

GRADUATE STUDENT SUPERVISION

- Kevin Watson (advisor), PhD, Virginia Tech, 2020 (awarded posthumously)
  Dissertation Title: *Students' Conceptions of Normalization*
- George Kuster (advisor), PhD, Virginia Tech, 2016
  Dissertation Title: *On the Role of Student Understanding of Function and Rate of Change in Learning Differential Equations*
  Current position: Associate Professor, Christopher Newport University
- David Plaxco (advisor), PhD, Virginia Tech, 2015
  Dissertation Title: *Relating Understanding of Inverse and Identity to Engagement in Proof in Abstract Algebra*
  Current position: Lecturer: University of Georgia
- Kyle Flanigan (committee member), PhD, Virginia Tech, 2023
  Current position: Instructor, Virginia Tech
- Sarah Kerrigan (committee member), PhD, Virginia Tech, 2022
  Current position: Assistant Professor, George Fox University
- Kaitlyn Serbin (committee member), PhD, Virginia Tech, 2021
  Current position: Assistant Professor, University of Texas Rio Grande Valley
- Ahsan Chowdhury (committee member), PhD, Virginia Tech, 2021
  Current position: Term Assistant Professor, George Mason University

- Rachel Rupnow (committee member), PhD, Virginia Tech, 2019
  Current position: Assistant Professor, Northern Illinois University
- Steven Boyce (committee member), PhD, Virginia Tech, 2014
  Current position: Associate Professor, Portland State University
- Co-advisor for current doctoral student: Matthew Park
- Academic advisor for current doctoral student: Jacob Lineberry
- Doctoral committee member: Andi Pina, University of Maine, Physics, 2024
- External Reviewer: Inyoung Lee, Arizona State University, Mathematics, 2024
- External Examiner for PhD Thesis: Vera Baumgartner, ETH Zurich, Learning Sciences, 2023
- External Evaluator for PhD Thesis: Odd Petter Sand, University of Oslo, 2021
- Doctoral committee member: Janet Sipes, Arizona State University, Mathematics, 2019
- Master's thesis committee member: Marilin Kelley, Virginia Tech, 2020; Corinne Mitchell, Virginia Tech, 2023
- Master's presentation committee member: Adam Bradie, Virginia Tech, 2024; Lindy Hearne, Virginia Tech, current
- Master's presentation advisor for Neal Aronson, 2012
- Committee member for many students, MAEd, Curriculum and Instruction, Virginia Tech, since 2012

REVIEWER FOR PROFESSIONAL JOURNALS

- *Journal for Research in Mathematics Education*
- *International Journal of Research in Undergraduate Mathematics Education*
- *Physical Review Physics Education Research*
- *Educational Studies in Mathematics*
- *ZDM- Mathematics Education*
- *Cognition and Instruction*
- *Journal of Mathematical Behavior*
- *Mathematics Education Research Journal*
- *Canadian Journal for Science, Mathematics, and Technology Education*
- *Problems, Resources, and Issues in Mathematics Undergraduate Studies (PRIMUS)*
- *La Matematica*

REVIEWER FOR PROFESSIONAL CONFERENCES

- Special Interest Group of the Mathematical Association of America on Research in Undergraduate Mathematics Education (RUME)
- Congress for European Research in Mathematics Education (CERME)
- International Congress of Mathematics Education (ICME)
- Joint Mathematics Meetings and MathFest
- International Network for Didactic Research in University Mathematics (INDRUM)
- International Group for the Psychology of Mathematics Education, North American Chapter Annual Conference (PME-NA)

MEMBERSHIPS IN PROFESSIONAL SOCIETIES

- Mathematical Association of America (MAA) and Special Interest Group of the MAA on Research in Undergraduate Mathematics Education (SIGMAA on RUME)
- Associate for Women in Mathematics (AWM)
- American Association of Physics Teachers (AAPT)
- International Linear Algebra Society (ILAS)
- European Society for Research in Mathematics Education (ERME)

SERVICE TO THE RESEARCH COMMUNITY

- Editorial Board, *International Journal for Research in Undergraduate Mathematics Education*, 2016-present
- Program Chair (elected position) of the Executive Committee, SIGMAA on RUME, 2016-2020
- MAA MathFest Invited Address Committee, 2020
- Planning Committee for the *Annual Conference on Research in Undergraduate Mathematics Education*, 2012-2024
- Scientific Committee for conferences for the *International Network for Didactic Research in University Mathematics* (INDRUM)
- Program Committee for the 2026 *International Network for Didactic Research in University Mathematics* (INDRUM) Conference, Dubrovnik, Croatia
- Math Alliance mentor, 2021-present
- Association for Women in Mathematics (AWM) Hay Award Selection Committee, 2021-2023
- Lead developer for the NSF-funded Inquiry-Oriented Linear Algebra (IOLA) curriculum materials. Materials maintained and available to interested university instructors at http://iola.math.vt.edu
- Advisory Board member and consultant, NSF EDU DUE, *Collaborative Research: Collaborating with Mathematicians to Enhance Teaching (COMET)* (#2315058, 2315056, 2315057), K. Weber (Rutgers, lead PI), E. Johnson (Virginia Tech, PI), T. Fukawa-Connelly (Temple, PI), L. Carbone (Rutgers, co-PI), $399,324, 2023-2026.
- Advisory Board, NSF ECR DBER DCL, *Investigating Undergraduate Chemistry Students' Reasoning and Conceptual Change Related to Graphs of Particulate-Level Variability* (# 1954861), N. Becker (University of Iowa, PI), $496,573, 2021-2024.
- Advisory Board, NSF *Collaborative Research: Beyond Procedures: A research-based approach to teaching mathematical methods in physic*s (PHY #1912152, 1912660, 1912087), W. Christensen (North Dakota State University, lead PI), M. Loverude (Cal State Fullerton, PI), J. Thompson (University of Maine, PI), $938,387, 2019-2024.
- Consultant, NSF Innovations in Undergraduate STEM Education, *Simulation-Based Inquiry-Oriented Linear Algebra* (#1712524); M. Zandieh (PI), A. Amresh, D. Plaxco (co-PIs), $299,999, 2017-20.
- Curriculum Advisory Board, NSF Innovations in Undergraduate STEM Education, *Collaborative Research: Teaching Inquiry-Oriented Mathematics: Establishing Supports* (#143195, 1431641, 1431393), E. Johnson (PI); K. Keene, C. Andrews-Larson (co-PIs), $999,773, 2014-2017.
- Executive Committee, NSF Innovations in Undergraduate STEM Education *Pedagogical Initiatives in Linear Algebra* project (#1822247); S. Stewart (University of Oklahoma, PI), $49,286, 2018-2020.
- Executive Committee, NSF Transforming Research in Undergraduate STEM Education (DUE #151038); W. Christensen (PI), C. Rasmussen, J. Thompson, M. Towns, (co-PIs), $49,994, 2015.
- Co-organizer (with David Strong, Pepperdine University; Sepideh Stewart, University of Oklahoma; Gil Strang, MIT) of the *Innovative and Effective Ways to Teach Linear Algebra* session at the Joint Mathematics Meetings (sponsored by ILAS in 2023, AMS in 2022, and MAA in 2014-2020)
- Co-organizer (with Rachel Quinlan, National University of Ireland, Galway) of the Mathematics Education mini-symposium at the Annual Meeting of the International Linear Algebra Society, 2017
- Co-organizer of the *Mentoring and Partnerships for Women in RUME (MPWR)* Seminar, a one-day seminar that occurred before the Annual RUME Conference in February, 2013-2020
- Co-organizer of the Math-Science Working Group, Annual Conference on Research in Undergraduate Mathematics Education, 2013, 2015, 2022
- Panel reviewer for EHR Directorate at the National Science Foundation, including CAREER
- Reviewer for the Israeli National Science Foundation
- External reviewer for various tenure and/or promotion applications in mathematics education
- Graduate Student Panelist for the Southern California Undergraduate Mathematics Conference, organized by University of California San Diego's chapter of the Association for Women in Mathematics (AWM), 2010

- Local organizing committee member for the Fifth Biennial National Conference of Cognitively Guided Instruction (CGI), San Diego, CA, 2009
- Local organizing committee member for the Eleventh Annual Conference of the Special Interest Group of the Mathematical Association of America on Research in Undergraduate Mathematics Education, San Diego, CA, 2008

COURSES TAUGHT AT VIRGINIA TECH

- MATH 1114H Elementary Linear Algebra for Honors
- MATH 2114 Introduction to Linear Algebra
- MATH 3144 Linear Algebra I
- MATH 4625 Mathematics for Secondary Teachers
- MATH 4626 Mathematics for Secondary Teachers
- MATH 4664 Senior Mathematics Education Seminar
- MATH 5634 Research in Undergraduate Mathematics Education

SERVICE TO THE UNIVERSITY

- University Council, College of Science representative, 2020-2022
- College of Science Collegiate Faculty and Professor of Practice Promotion Committee, 2018–present
- Mathematics Department Chair Review Committee, 2022
- Mathematics Department Postdoctoral Researcher Search Committee, 2022
- Mathematics Department Executive Committee, 2019-2021, 2023-2025
- Mathematics Department Mathematics Education Program Committee, 2011-present
- Mathematics Department Travel Fund Committee, 2018-2022
- Mathematics Department Computational Resource Committee, 2019-2022
- Mathematics Department Undergraduate Program Committee, 2013-2016, 2017-2018, 2022-2024
- Mathematics Department Scholarship Committee, 2012-2014
- Mathematics Department Chair Position Search Committee, 2022-2023
- Mathematics Department Mathematics Education tenure-track position Search Committee, 2012-2013
- Mathematics Department Patricia A. Caldwell Postdoctoral Researcher Search Committee, 2016-2017
- College of Science Integrated Science tenure-track position Search Committee, 2012-2013
- Panelist in the New Faculty Mentoring Program, sponsored by the Office of the Provost, 2012 & 2014
- Led the development of the course, *MATH 5634 Research in Undergraduate Mathematics Education,* first offered Spring 2012 and made permanent in 2013
- Worked with department colleagues to develop *MATH 2114 Introduction to Linear Algebra,* first offered and made permanent in Fall 2014
- MATH 2114 Course Co-Coordinator, 2014