Estrella Johnson

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Education

Portland State University, PhD in Mathematics Education, May, 2013

Portland State University, Master's in the Science of Teaching Mathematics, August 2009

New Mexico State University, Bachelor's of Science in Secondary Mathematics Education, May 2007

Professional Positions

2013 – Present, Virginia Tech, Assistant Professor, Department of Mathematics, Blacksburg, VA

2007 – 2013, Graduate Teaching/Research Assistant, Portland State University, Portland, Or

Grants

Current

Principal Investigator for a $129,315 NSF ISUE grant, "Collaborative Research: Evaluating the Uptake of Research-Based Instructional Strategies in Undergraduate Chemistry, Mathematics, and Physics." NSF Award #1726281 (Total award amount $1,178,834; NSF Awards #1726318, #1726379, #1726042, #1726126, #1726281); Sept 2018 – Aug 2021

Principal Investigator at the lead institution for a $297,271 NSF IUSE grant, "*Collaborative Research: Teaching Inquiry-Oriented Mathematics: Establishing Supports.*" NSF Award #143195 (Total award amount: $1,188,984; NFS Awards: #143195, #1431641, #1431393); Aug 2014 – July 2018

Senior Personnel for a $1,341,181 NSF IUSE grant, "*Progressing Through Calculus.*" NSF Award #1430540; Jan 2015 – Dec 2020

Previous

Consultant (and former graduate research assistant) for a $2,367,889 NSF REESE grant, "*Characteristics of Successful Programs in College Calculus.*" NSF Award # 0910240; Aug 2008 - Dec 2014

Graduate Research Assistant on NSF Funded (CCLI) Project: *Teaching Abstract Algebra for Understanding*. I collected classroom video data, analyzed classroom mathematical activity, managed undergraduate research team, supported mathematicians in implementing the TAAFU curriculum, and investigated the challenges and opportunities of mathematicians as they engaged with the TAAFU curriculum.

Team Member of U.S. Department of Education Funded (FIPSE) Project: *Algebraic Thinking Project*. I reviewed the literature on students understanding of algebraic modeling and developed synthesis reports to be used for pre-service courses for teachers.

Publications

Editor (Journal Special Issue)

Larsen, S., Johnson, E., Weber, K. (Eds). (2013*).* The Teaching Abstract Algebra for Understanding Project: Designing and Scaling up a Curriculum Innovation. *Journal of Mathematical Behavior, 32(4)*

Refereed Journal Publications

Rasmussen, C., Apkarian, N., Hagman, J., Johnson, E., Larsen, S., & Bressoud, D. (in press). Characteristics of Precalculus through Calculus 2 programs: Insights from a national census survey. *Journal for Research in Mathematics Education.*

Keller, R., & Johnson, E. (in press). Effects of individual and situational characteristics on the use of student-centered pedagogy in Calculus I. *International Journal for Teaching and Learning in Higher Education.*

Johnson, E., Keller, R. & Fukawa-Connelly, T. (2018). Results from a national survey of abstract algebra instructors: Understanding the choice to (not) lecture. *International Journal for Research in Undergraduate Mathematics Education. 4(2),* 254-285

Kuster, G., Johnson, E., Keene, K., & Andrews-Larson, C. (2018). Inquiry-oriented instruction: A conceptualization of the instructional components and practices. *Problems, Resources, and Issues in Mathematics Undergraduate Studies, 28(1),* 13-30

Keller, R., Johnson, E., & DeShong, S. (2017). A structural equation model looking at student's participatory behavior and their success in Calculus I. *International Journal of STEM Education*. 4(1), 24

Hagman, J., Johnson, E., & Fosdick, B. (2017). Feeling the squeeze: Factors contributing to experiencing a lack of time in college calculus. *International Journal of STEM Education. 4*(1), 12

Johnson, E., Ellis, J., Rasmussen, C. (2016), It's about time: The relationships between coverage and instructional practices in college calculus. *International Journal for Mathematical Education in Science and Technology*, *47(4),* 491-504

Johnson, E. (2013). Teacher's mathematical activity in inquiry-oriented instruction. *Journal of Mathematical Behavior. 32(4),* 761-775

Johnson, E., Caughman, J., Fredericks, J., & Gibson, L. (2013). Implementing inquiry-oriented curriculum: From the mathematicians' perspective. *Journal of Mathematical Behavior. 32(4),* 743-760

Larsen, S., Johnson, E., & Bartlo, J. (2013). Designing and scaling up an innovation in abstract algebra. *Journal of Mathematical Behavior. 32(4),* 693-711

Lockwood E., Johnson, E., & Larsen S. (2013). Developing instructor support materials for an inquiry-oriented curriculum. *Journal of Mathematical Behavior. 32(4),* 776-790

Johnson, E. M. S., & Larsen, S. (2012). Teacher listening: The role of knowledge of content and students. *Journal of Mathematical Behavior, 31(1)*, 117-129

Edited Chapters and Publications

Johnson, E. (2018) Undergraduate mathematics instruction: Not as bad as you'd think? *A white paper commissioned by the American Association for the Advancement of Science to inform the Levers for Change working meeting (May 7-8 2018; Bethesda, MD)*

Fukawa-Connelly, T., Johnson, E., & Keller, R. (2016). Can math education research improve the teaching of abstract algebra? *Notices of the AMS 63(3).*

Johnson, E. (2016). What is in Calculus I? *MAA FOCUS, 36(2). 17-20.*

Johnson, E. & Hanson, K. (2015). Chapter 6: Academic and Social Supports. D. Bressoud, C. Rasmussen, & V. Mesa (Eds.), *Insights and Recommendations from the MAA National Study of Calculus,* Mathematical Association of America. Washington, DC.

Articles Under Review

Johnson, E., Keller, R., Peterson, V., & Fukawa-Connelly, T. (under review). Individual and situational factors influencing pedagogical practice. *Submitted to Journal for Research in Mathematics Education: Oct 2017.*

Johnson, E., Andrews-Larson, C., Keene, K., Keller, R., Fortune, N., & Melhuish, K. (under review). Inquiry and inequity in the undergraduate mathematics classroom. *Submitted to Journal for Research in Mathematics Education: Dec 2017.*

Kuster, G., Johnson, E., Rupnow, R., & Wilhelm, A. (under review) The Inquiry-Oriented Instructional Measure. *Submitted to International Journal for Research in Undergraduate Mathematics Education: Aug, 2018.*

Articles in Preparation

Andrews-Larson, C., Johnson, E., Peterson, V., & Keller, R. (n.d.). Mathematicians' Pedagogical Reasoning. *Target Journal: Journal of Mathematical Behavior: Nov 2018.*

Refereed Conference Proceedings

Johnson, E., Andrews-Larson, C., Keene, K., Keller, R., Fortune, N., & Melhuish, K. (in press). Inquiry and inequity in the undergraduate mathematics classroom. *Proceedings of the 40th Annual Conference of the North American Chapter of the International Group for the Psychology of Mathematics Education.* Greenville, SC.

Johnson, E., Keller, R., Fukawa-Connelly, T., Peterson, V. (in press). Individual and situational factors related to lecturing in abstract algebra. *Proceedings of the Twenty-first Special Interest Group of the Mathematical Association of America on Research in Undergraduate Mathematics Education Conference on Research in Undergraduate Mathematics Education*. San Diego, CA.

Kuster, G., Rupnow, R., Johnson, E., Garrison-Wilhelm, A. (in press). The development of the inquiry-oriented instructional measure. *Proceedings of the Twenty-first Special Interest Group of the Mathematical Association of America on Research in Undergraduate Mathematics Education Conference on Research in Undergraduate Mathematics Education*. San Diego, CA.

Keller, R,. Johnson, E., Peterson, V., & Fukawa-Connelly, T. (2017) Undergraduate Abstract Algebra: Is teaching different at 'teaching' universities?. *Proceedings of the Twentieth Special Interest Group of the Mathematical Association of America on Research in Undergraduate Mathematics Education Conference on Research in Undergraduate Mathematics Education*. San Diego, CA.

Ellis, E., Johnson, E., & Fosdick, B. (2016). Feeling the squeeze: Factors contributing to experiencing a lack of time in college calculus. *Proceedings of the 38th Annual Conference of the North American Chapter of the International Group for the Psychology of Mathematics Education.* Tucson, AZ.

Fukawa-Connelly, T., Johnson, E., & Keller, R. (2016). Results from a national survey of abstract algebra instructors: Math ed is solving problems they don't have. *Proceedings of the Nineteenth Special Interest Group of the Mathematical Association of America on Research in Undergraduate Mathematics Education Conference on Research in Undergraduate Mathematics Education*. Pittsburgh, PA.

Rasmussen, C., Apkarian, N., Bressoud, D., Ellis, J., Johnson, E., & Larsen, S. (2016). A national investigation of precalculus through calculus 2. *Proceedings of the Nineteenth Special Interest Group of the Mathematical Association of America on Research in Undergraduate Mathematics Education Conference on Research in Undergraduate Mathematics Education*. Pittsburgh, PA.

Kuster, G. & Johnson, E. (2016). Inquiry-oriented instruction: A conceptualization of the instructional the components and practices. *Proceedings of the Nineteenth Special Interest Group of the Mathematical Association of America on Research in Undergraduate Mathematics Education Conference on Research in Undergraduate Mathematics Education.* Pittsburgh, PA.

Hanson, K. & Johnson, E. (2015). Building student communities through academic supports. *Proceedings of the Eighteenth Special Interest Group of the Mathematical Association of America on Research in Undergraduate Mathematics Education Conference on Research in Undergraduate Mathematics Education*. Pittsburg, PA.

Johnson, E. (2015). Towards a measure of inquiry-oriented teaching. *Proceedings of the Eighteenth Special Interest Group of the Mathematical Association of America on Research in Undergraduate Mathematics Education Conference on Research in Undergraduate Mathematics Education*. Pittsburg, PA.

Ellis, J., Johnson, E., & Rasmussen, C. (2015). It's about time: How instructors and students experience time constraints in Calculus I. *Proceedings of the Eighteenth Special Interest Group of the Mathematical Association of America on Research in Undergraduate Mathematics Education Conference on Research in Undergraduate Mathematics Education*. Pittsburg, PA.

Johnson, E., Ellis, J., & Rasmussen, C. (2014). It's about time: How instructors and students experience time constraints in Calculus I. *Proceedings of the 38th Conference of the International Group for the Psychology of Mathematics Education and the 36th Conference of the North American Chapter of the Psychology of Mathematics Education.* Vancouver, British Columbia.

Johnson, E. (2014). Two metaphors for realistic mathematics education design heuristics: implications for documenting student learning. *Proceedings of the Seventeenth Special Interest Group of the Mathematical Association of America on Research in Undergraduate Mathematics Education Conference on Research in Undergraduate Mathematics Education*. Denver, CO.

Johnson, E., Ellis, J. & Rasmussen, C. (2014). How to make time: The relationships between concerns about coverage, material covered, instructional practices, and student success in college calculus. *Proceedings of the Seventeenth Special Interest Group of the Mathematical Association of America on Research in Undergraduate Mathematics Education Conference on Research in Undergraduate Mathematics Education*. Denver, CO.

Larsen, S., Johnson, E., & Zazkis, D. (2014), Characteristics of successful programs in college calculus: How calculus instructors talk about their students. *Proceedings of the Seventeenth Special Interest Group of the Mathematical Association of America on Research in Undergraduate Mathematics Education Conference on Research in Undergraduate Mathematics Education*. Denver, CO.

Melhuish, K. & Johnson, E. (2014), Instructors' beliefs on the role of calculus. *Proceedings of the Seventeenth Special Interest Group of the Mathematical Association of America on Research in Undergraduate Mathematics Education Conference on Research in Undergraduate Mathematics Education,* Denver, CO.

Melhuish, K., Larsen, S. Glover, E., & Johnson, E. (2014), Characteristics of successful programs in college calculus at bachelor's granting universities. *Proceedings of the Seventeenth*

Special Interest Group of the Mathematical Association of America on Research in Undergraduate Mathematics Education Conference on Research in Undergraduate Mathematics Education. Denver, CO

Johnson, E. (2013). Implications of Realistic Mathematics Education for Analyzing Student Learning. *Proceedings of the Sixteenth Special Interest Group of the Mathematical Association of America on Research in Undergraduate Mathematics Education Conference on Research in Undergraduate Mathematics Education*. Denver, CO.

Johnson, E. (2012) Mathematical Activity for Teaching. *Proceedings of the Fifteenth Special Interest Group of the Mathematical Association of America on Research in Undergraduate Mathematics Education Conference on Research in Undergraduate Mathematics Education*. Portland, OR.

Johnson, E. & McCaffery, C. (2011). Navigating the Implementation of an Inquiry-Oriented Task in a Community College. *Proceedings of the Fourteenth Special Interest Group of the Mathematical Association of America on Research in Undergraduate Mathematics Education Conference on Research in Undergraduate Mathematics Education*. Portland, OR.

Larsen, S., Johnson, E., & Scholl, T. (2011). Putting Research to Work: Web-Based Instructor Support Materials for an Inquiry Oriented Abstract Algebra Curriculum. *Proceedings of the Fourteenth Special Interest Group of the Mathematical Association of America on Research in Undergraduate Mathematics Education Conference on Research in Undergraduate Mathematics Education*. Portland, OR.

Invited Presentations

Johnson, E., (2018). Characterizing, Supporting, and Evaluating Inquiry-Oriented Instruction, *Virginia Tech Engineering Education Seminar, Aug 31, 2018.*

Johnson, E., (2018). Characterizing, Supporting, and Evaluating Inquiry-Oriented Instruction, *University of Arizona Mathematics Department Colloquium, March 29, 2018.*

Johnson, E. (2017). MAA's national studies on college calculus: Eye towards Bachelor's granting institutions, Christopher Newport University Mathematics Department Colloquium, Oct 26th, 2017.

Johnson, E., Andrews-Larson, C., Keene, K. (2017). Teaching Inquiry-oriented Mathematics: Establishing Supports. *MAA Invited Paper Session on Research in Improving Undergraduate Mathematical Sciences Education: Examples Supported by the National Science Foundation's IUSE: EHR Program*. Presented at the Joint Mathematical Meetings, Jan. 2017, Atlanta, GA.

Johnson, E. (2015) Characterizing, Investigating, and Supporting Inquiry-Oriented Teaching, *Colorado State University Mathematics Department Colloquium, May, 6th, 2015*

Johnson, E. (February, 2012). Mathematical Activity for Teaching. *Poster Session at the Fifteenth Special Interest Group of the Mathematical Association of America on Research in Undergraduate Mathematics Education Conference on Research in Undergraduate Mathematics Education*. Portland, OR.

Johnson, E., Larsen, S. (January, 2012). Teaching Abstract Algebra for Understanding. *NSF-MAA Joint Poster Session, AMS-MAA Joint Mathematics Meetings*. Boston, MA.

Johnson, E., Larsen, S. (January, 2011). Teaching Abstract Algebra for Understanding. *NSF-MAA Joint Poster Session, AMS-MAA Joint Mathematics Meetings.* New Orleans, LA.

Johnson, E., Larsen, S., (September, 2011). Teacher listening: The role of knowledge of content and students. *Seminar, San Diego State University*.

Teaching Experience

Virginia Tech (2013 – present)

- MATH 4626, Mathematics for Secondary Teachers I, Spring 2016
  Course activities emphasize the curricular themes of problem solving, reasoning and proof, communication, connections, and representation; topics in high school mathematics from an advanced perspective
- MATH 3124, Modern Algebra, Spring 2018, Fall 2015, Spring 2015, Spring 2014
  Topics in groups, quotient groups, rings, integral domains, fields
- MATH 4664, Senior Mathematics Education Seminar, Fall 2017, Fall 2016, Fall 2015
  The main goal of the seminar is for you to become reflective mathematics teachers. This involves understanding the nature of mathematics teaching and learning. We will have a semester long theme focusing on *conceptual understanding*. This theme will be used to investigate mathematics content, the teaching of mathematics, and the learning of mathematics.
- MATH 4625, Mathematics for Secondary Teachers I, Fall 2014
  Course activities emphasize the curricular themes of problem solving, reasoning and proof, communication, connections, and representation; topics in discrete mathematics and algebra from a secondary teaching perspective
- MATH 5984, Research in Undergraduate Mathematics Education, Spring, 2018 Spring 2014
  A survey of the body of research on undergraduate mathematics education, readings focused on: student understanding of undergraduate mathematics content and practices; the development and design of research-based undergraduate curricular materials and the theory that supports such work; the teaching of undergraduate mathematics; and, the state of undergraduate STEM education

Portland State University (2007-2013). For each of the following courses, I was the instructor of record and had full responsibility for all aspects of the course.

- MTH 4/593, Geometry for Middle School Teachers, Summer 2010
  Selected topics from informal geometry, both two- and three-dimensional
- MTH 345, Introduction to Ring and Field Theory, Spring 2011
  Topics in rings, integral domains, fields, ordered fields, and polynomial rings
- MTH 344, Introduction to Groups, Fall 2011
  Topics in groups, homomorphisms, and factor groups
- MTH 338, Modern College Geometry, Summer 2009
  Topics in Euclidean and non-Euclidean geometry
- MTH 212, Elementary Math II, Summer 2011
  A constructivist approach to the fundamental concepts of mathematics for pre-service elementary teachers, including: fractions, decimals, probability, and statistics.
- MTH 112, College Algebra II, Winter 2008, Summer 2008
  An integrated treatment of topics from trigonometry
- MTH 111, College Algebra I, Fall 2007
  An integrated treatment of topics from algebra
- MTH 105, Excursions in Mathematics, Spring 2008
  An exploration of a variety of modern mathematical topics, including: the mathematics of voting systems, graphs and networks, symmetry in art and nature, population growth, fractals, and probability
- MTH 95, Intermediate Algebra, Fall 2008
  Topics include problem solving, linear equations, systems of equations, polynomials and factoring techniques, rational expressions, radicals and exponents, quadratic equations
- MTH 70, Elementary Algebra, Fall 2008
  This is a basic course covering first-year high school algebra

Service to the Research Community

Member of the Program Committee of the Special Interest Group of the Mathematical Association of America on Research in Undergraduate Mathematics Education, 2014 – present

Chair of the Family Attending RUME Together Committee of the Special Interest Group of the Mathematical Association of America on Research in Undergraduate Mathematics Education, 2017 – present

Member of the Equity and Mentoring Committee of the Special Interest Group of the Mathematical Association of America on Research in Undergraduate Mathematics Education, 2017 – present

Member of the Nominating Committee of the Special Interest Group of the Mathematical Association of America on Research in Undergraduate Mathematics Education, 2016 – 2017

Reviewer for the Journal of Research in Mathematics Education, 2014 – present

Reviewer for the Journal of Mathematical Behavior, 2013 - present

Reviewer for the Annual Conference of the Special Interest Group of the Mathematical Association of America on Research in Undergraduate Mathematics Education, 2011 – present

Reviewer for the Annual Conference of the North American Chapter of the International Group for the Psychology of Mathematics Education, 2014 – present

Membership in Professional Communities

National Council for the Teaching of Mathematics (NCTM)

Mathematical Association of America (MAA)

Special Interest Group of the Mathematical Association of America in Research in Undergraduate Mathematics (SIGMAA on RUME)