

Curriculum Vitae

(last updated: May, 2019)

Steven Jones

Associate Professor, Mathematics Education
Brigham Young University
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EDUCATION

PhD in Mathematics Education, University of Maryland, 2010

- Dissertation topic: Students' understanding of the definite integral

MS in Mathematics, Brigham Young University, 2005

- Masters project topic: Hopf bifurcations and horseshoes in differential equations
- Minor in mathematics education

BS in Mathematics, Brigham Young University, 2003

- Minor in music

ACADEMIC POSITIONS

Associate Professor of Mathematics Education

Brigham Young University. August 2013—current

- Research Foci: Calculus learning/instruction; Bridging the gap mathematics and science/engineering; Connection of quantities to mathematical understanding/thinking
- Courses Taught: Calculus I, II, & III, The Teaching and Learning of Calculus, The History and Philosophy of Mathematics, Teaching Statistics and Probability, Critical Review of School Mathematics

Professor of Mathematics

Sierra Community College. August 2009—August 2013

- Courses Taught: Calculus I & II, Statistics, Trigonometry, Intermediate and Elementary Algebra, Mathematics for Elementary Education

Mathematics Instructor Positions

- Johns Hopkins University, CTY, July 2007—August 2007. (Mathematical Logic)
- LDS Business College, June 2005—August 2005. (College Algebra)
- Brigham Young University, August 2003—April 2005. (Calculus I, Trigonometry, Quantitative Reasoning)

High School Mathematics Department Assistant

Provo High School. November 2001—January 2004

- Data collection and statistical analysis for ASSIST program
- Substitute teaching and tutoring

RESEARCH

Peer-reviewed journal publications

- Jones, S.R. (2019). Students' Application of Concavity and Inflection Points to Real-world Contexts. *International Journal of Science and Mathematics Education*, 17(3), 523-544.
- Jones, S.R. (2018). Prototype images in mathematics education: The case of the graphical representation of the definite integral. *Educational Studies in Mathematics*, 97(3), 215-234.
- Jones, S.R. & Watson, K. (2018). Recommendations for a “target understanding” of the derivative concept for first-semester calculus teaching and learning. *International Journal of Research in Undergraduate Mathematics Education*, 4(2), 199-227.
- Jones, S.R. (2017). An exploratory study on student understandings of derivatives in real-world, non-kinematics contexts. *The Journal of Mathematical Behavior*, 45, 95-110.
- Jones, S.R., Lim, Y., & Chandler, K.R. (2017). Teaching integration: How certain instructional moves may undermine the potential conceptual value of the Riemann sum and the Riemann integral. *International Journal of Science and Mathematics Education*, 15(6), 1075-1095.
- Jones, S.R. & Dorko, A. (2015). Students’ understandings of multivariate integrals and how they may be generalized from single integral conceptions. *The Journal of Mathematical Behavior*, 40(B), 154-170.
- Jones, S.R. (2015). The prevalence of area-under-a-curve and anti-derivative conceptions over Riemann sum-based conceptions in students’ explanations of definite integrals. *International Journal of Mathematics Education in Science and Technology*, 46(5), 721-736.
- Jones, S.R. (2015). Areas, anti-derivatives, and adding up pieces: Integrals in pure mathematics and applied contexts. *The Journal of Mathematical Behavior*, 38, 9-28.
- Jones, S.R. (2015). Calculus limits involving infinity: The role of students’ informal dynamic reasoning. *International Journal of Mathematics Education in Science and Technology*, 46(1), 105-126.
- Jones, S.R. (2013). Adding it all up: Reconceiving the introduction of the integral. *Mathematics Teacher*, 107(5), 372-377.
- Jones, S.R. (2013). Understanding the integral: Students’ symbolic forms. *The Journal of Mathematical Behavior*, 32(2), 122-141.

Peer-reviewed book chapters

- Jones, S.R. (2019). What Education Research related to Calculus Derivatives and Integrals Implies for Chemistry Instruction and Learning. In M. Towns, K. Bain, and J. Rodriguez

(Eds.), *It's just math: Research on students' understanding of chemistry and mathematics* (pp. 187-212). Washington, DC: American Chemical Society.

Peer-reviewed published conference proceedings

Jones, S.R., Jeppson, H., & Corey, D.L. (2019). Potential intellectual needs for Taylor and power series within textbooks, and ideas for improving them. Forthcoming in *Proceedings of the 22nd annual conference on Research in Undergraduate Mathematics Education*. Oklahoma City, OK.

Kuster, G. & Jones, S.R. (2019). Variational reasoning used by students while discussing differential equations. Forthcoming in *Proceedings of the 22nd annual conference on Research in Undergraduate Mathematics Education*. Oklahoma City, OK.

Leiva, B., Borrowman, N., Jones, S.R., & Teuscher, D. (2019). Influences from pathways college algebra on students' initial understanding and reasoning about calculus limits. Forthcoming in *Proceedings of the 22nd annual conference on Research in Undergraduate Mathematics Education*. Oklahoma City, OK.

Jones, S.R. (2018). Building on covariation: Making explicit four types of "multivariation." In A. Weinberg, C. Rasmussen, J. Rabin, M. Wawro, and S. Brown (Eds.), *Proceedings of the 21st annual Conference on Research in Undergraduate Mathematics Education* (pp. 1110-1118). San Diego, CA: SIGMAA on RUME.

Theminkosi, M.P. & Jones, S.R. (2018). A study of calculus students' solution strategies when solving related rates of change problems. In A. Weinberg, C. Rasmussen, J. Rabin, M. Wawro, and S. Brown (Eds.), *Proceedings of the 21st annual Conference on Research in Undergraduate Mathematics Education* (pp. 408-415). San Diego, CA: SIGMAA on RUME.

Jones, S.R. & Probst, J.M. (2018). Students' usage of visual imagery to reason about the divergence, integral, direct comparison, limit comparison, ratio, and root convergence tests. In A. Weinberg, C. Rasmussen, J. Rabin, M. Wawro, and S. Brown (Eds.), *Proceedings of the 21st annual Conference on Research in Undergraduate Mathematics Education* (pp. 400-407). San Diego, CA: SIGMAA on RUME.

Naranjo, O. & Jones, S.R. (2018). Students' strategies for setting up differential equations in engineering contexts. In A. Weinberg, C. Rasmussen, J. Rabin, M. Wawro, and S. Brown (Eds.), *Proceedings of the 21st annual Conference on Research in Undergraduate Mathematics Education* (pp. 334-341). San Diego, CA: SIGMAA on RUME.

Jones, S.R. & Naranjo, O. (2017). How students interpret line and vector integral expressions: Domains, integrands, differentials, and outputs. In A. Weinberg, C. Rasmussen, J. Rabin, M. Wawro, and S. Brown (Eds.), *Proceedings of the 20th annual Conference on Research in Undergraduate Mathematics Education* (pp. 673-681). San Diego, CA: SIGMAA on RUME.

- Jones, S.R. & Thompson, C. (2017). Definite integrals versus indefinite integrals: How do students see them as the same or as different? In A. Weinberg, C. Rasmussen, J. Rabin, M. Wawro, and S. Brown (Eds.), *Proceedings of the 20th annual Conference on Research in Undergraduate Mathematics Education* (pp. 682-689). San Diego, CA: SIGMAA on RUME.
- Jones, S.R. (2016). What does it mean to “understand” concavity and inflection points? In Wood, M.B., Turner, E.E., Civil, M., & Eli, J.A. (Eds.), *Proceedings of the 38th annual conference of the North American chapter of the International Group for the Psychology of Mathematics Education* (pp. 597-604). Tucson, AZ: PME-NA.
- Bernard, A.M. & Jones, S.R. (2016). Student problem solving in the context of volumes of revolution. In T. Fukawa-Connelly, N. Infante, M. Wawro & S. Brown (Eds.), *Proceedings of the 19th annual Conference on Research in Undergraduate Mathematics Education* (pp. 554-561). Pittsburg, PA: SIGMAA on RUME.
- Jones, S.R. (2016). Ways of understanding and ways of thinking in using the derivative concept in applied (non-kinematic) contexts. In T. Fukawa-Connelly, N. Infante, M. Wawro & S. Brown (Eds.), *Proceedings of the 19th annual Conference on Research in Undergraduate Mathematics Education* (pp. 917-924). Pittsburg, PA: SIGMAA on RUME.
- Jones, S.R. (2016). Prototype images of the definite integral. In T. Fukawa-Connelly, N. Infante, M. Wawro & S. Brown (Eds.), *Proceedings of the 19th annual Conference on Research in Undergraduate Mathematics Education* (pp. 909-916). Pittsburg, PA: SIGMAA on RUME.
- Gundlach, M., & Jones, S.R. (2015). Students’ understanding of concavity and inflection points in real-world contexts: Graphical, symbolic, verbal, and physical representations. In T. Fukawa-Connelly, N. Infante, K. Keene & M. Zandieh (Eds.), *Proceedings of the 18th annual Conference on Research in Undergraduate Mathematics Education* (pp. 568-573). Pittsburg, PA: SIGMAA on RUME.
- Jones, S.R. (2015). Promoting students’ construction and activation of the multiplicatively-based summation conception of the definite integral. In T. Fukawa-Connelly, N. Infante, K. Keene & M. Zandieh (Eds.), *Proceedings of the 18th annual Conference on Research in Undergraduate Mathematics Education* (pp. 632-638). Pittsburg, PA: SIGMAA on RUME.
- Jones, S.R., & Dorko, A.(2015). Students’ generalizations of single-variable conceptions of the definite integral to multivariate conceptions. In T. Fukawa-Connelly, N. Infante, K. Keene & M. Zandieh (Eds.), *Proceedings of the 18th annual Conference on Research in Undergraduate Mathematics Education* (pp. 639-645). Pittsburg, PA: SIGMAA on RUME.
- Watson, K.L., & Jones, S.R. (2015). Adding explanatory power to descriptive power: Combining Zandieh’s derivative framework with analogical reasoning. In T. Fukawa-Connelly, N. Infante, K. Keene & M. Zandieh (Eds.), *Proceedings of the 18th annual Conference on Research in Undergraduate Mathematics Education* (pp. 1041-1047). Pittsburg, PA: SIGMAA on RUME.

Dorko, A., & Jones, S.R. (2015). Generalization in undergraduate mathematics education. In T. Fukawa-Connelly, N. Infante, K. Keene & M. Zandieh (Eds.), *Proceedings of the 18th annual Conference on Research in Undergraduate Mathematics Education* (pp. 461-465). Pittsburg, PA: SIGMAA on RUME.

Jones, S.R. (2014). The frequencies of various interpretations of the definite integral in a general student population. In S. Oesterle, P. Liljedahl, C. Nicol & D. Allan (Eds.), *Proceedings of the 38th annual meeting of the International Group for the Psychology of Mathematics Education* (Vol. 3, pp. 401-408). Vancouver, BC: PME.

Jones, S.R. (2014). Three conceptualizations of the definite integral in mathematics and physics contexts. In T. Fukawa-Connelly, G. Karakok, K. Keene & M. Zandieh (Eds.), *Proceedings of the 17th annual Conference on Research in Undergraduate Mathematics Education* (pp. 731-738). Denver, CO: SIGMAA on RUME.

Non-proceedings research presentations

Jones, S.R. (2019). *Education research at the interface of mathematics and science: Curricular alignment between the disciplines*. Working group hosted at the Conference for Research in Undergraduate Mathematics Education. Oklahoma City, OK.

Jones, S. R. (2018). *Helping STEM students understand and use calculus*. Invited presentation at the BYU College Volunteer Leadership Council. Provo, UT.

Jones, S. R. (2017). *Toward a comprehensive definite integral framework: Fits and starts, overreaches, collaborations, and adding the pieces together*. Invited colloquium at Oklahoma State University. Stillwater, OK.

Jones, S. R. & Bailey, L. (2017). *STEM connections: Examples of conceptual blending between biology and mathematics*. Poster presented at the Transformation Research in Undergraduate STEM Education conference. St. Paul, MN.

Williams, K., Baek, D., Nelson, N., Quirante, T., Rice, N., Rose, S., Jones, S., & Bailey, E. (2016). *Teaching Hardy-Weinberg equilibrium using population-level Punnett squares: Emphasizing biology while facilitating calculation*. Poster presented at the Society for the Advancement of Biology Education Research. Minneapolis, MN.

Dorko, A., Weber, E., & Jones, S.R. (2014). *Some ideas about how calculus students generalize from single to multivariate contexts*. Colloquium at University of Maine's Center for Research in STEM Education. Orono, ME.

Chandler, K.R; Lim, Y.; & Jones, S.R. (2014). *A new way to introduce the integral: Focusing on Riemann sums for better application in physics and engineering*. Mentored Research Conference. Brigham Young University. Provo, UT.

Jones, S.R. (2012). *Focusing on meaning in preparing elementary school teachers*. Sacramento Valley Community College Mathematics Conference. Sierra College, CA.

Fey, J.T. & Jones, S.R. (2007). *Activities that promote intuition and precision in geometric thinking*. National Council of Teacher of Mathematics Regional Conference. Richmond, VA.

Fukawa-Connelly, T. & Jones, S.R. (2006). *We know what they knew, but what do they know?* The 9th annual Conference on Research in Undergraduate Mathematics Education. Rutgers, NJ.

Invited book reviews

Leatham, K.R., Johnson, K.R. & Jones, S.R. (2015). An introduction to research in mathematics education [Review of the book *MasterClass in mathematics education: International perspectives on teaching and learning* by P. Andrews & T. Rowland (eds.)]. *Journal for Research in Mathematics Education*, 46(4), 497-504.

Other research experiences

Doctoral Dissertation: Jones, S.R. (2010). *Applying mathematics to physics and engineering: Symbolic forms of the integral*. Unpublished doctoral dissertation. University of Maryland.

Physics Education Research Project Member
University of Maryland, Sep 2008—Aug 2010
Analyzed data of engineering students' understanding of mathematics equations.

Non-Euclidean Geometry Curriculum Development
University of Maryland. Sep 2005—Dec 2005
Assisted in creating lesson modules for a discovery-based undergraduate Non-Euclidean geometry class.

AWARDS and GRANTS

Calculus in Virtual Reality
National Science Foundation
Dec 2018—Aug 2020: \$23,006

High Impact Teaching Support Award
BYU, College of Physical and Mathematical Sciences
Nov 2017—Oct 2018: \$1,350

Travel Support for Mentored Undergraduate Students
BYU, College of Physical and Mathematical Sciences
Fall 2014: \$800, Fall 2016: \$750, Fall 2017: \$900

MAC-MTL Doctoral Student Fellowship
National Science Foundation
Aug 2005—Aug 2009, \$25,000/year

Goldhaber Travel Award
University of Maryland, College Park
Nov 2006: \$350

STUDENT MENTORING IN RESEARCH

Masters Student Thesis Advisor:

- Nathan Smith: Sep 2018–current; Quantities in calculus instruction
- Haley Jeppson: Sep 2017–current; Coherence among calculus concepts
- Tamara Stark: Sep 2017–current; Authenticity of applied mathematics problems
- Kia Hall: Aug 2016–Jun 2018; Pre-service teachers' understanding of inferential statistics
- Omar Naranjo: Nov 2015–Aug 2017; Students' understanding of differential equations
- Stephen Scott: Nov 2013–Dec 2017; Mathematical modelling and tasks

Masters Student Thesis Committee:

- Chelsey van de Mewre: Jan 2019–current; Students' proof reasoning
- Joelle Keliiliki: Jan 2016–Aug 2017; Gestures and teaching integration
- Anand Bernard: Jan 2015–July 2017; Influences on curricular reasoning
- Steve Lauzon: Jan 2015–Aug 2016; Students' developing proof schemes

Graduate student research mentoring:

- Haley Jeppson: Apr 2018–current; Taylor Series instruction; Multivariational reasoning
- Tami Stark: Apr 2019–current; Students' reasoning about units
- Omar Naranjo: Apr 2016–Feb 2018; Student understanding of line and vector integrals
- Anand Bernard: Apr 2015–Aug 2017; Problem solving with volumes of revolution
- Kevin Watson: Apr 2014–Jun 2017; Target understanding of the derivative

Undergraduate student research mentoring:

- Leilani Fonbuena: Oct 2018–current; Student thinking about vectors and vector fields
- Brianna Leiva: May 2017–current; College Algebra influence on understanding limits
- Navy Borrowman: Jun 2018–current; College Algebra influence on understanding limits
- John Mitchell Probst: Jan 2017–Feb 2018; Student understanding of convergence tests
- Perry Nielson: Aug 2017–Dec 2017; Education research's use of p-values
- Cache Thompson: Apr 2016–Oct 2017; Students' understanding of integrals
- Brianna Jones: Apr 2015–July 2015; Data analysis for several studies
- Trevor Johnson: Apr 2015–July 2015; Data analysis for several studies
- Michael Gundlach: May 2014–Feb 2015; Understanding of concavity and inflection pts
- YaeRi Lim: Oct 2013–Aug 2014; Instruction on, and learning of, the definite integral
- Katie Chandler: Oct 2013–Aug 2014; Instruction on, and learning of, the definite integral

PROFESSIONAL CITIZENSHIP (SELECTED ITEMS ONLY)

Regular participant in the Special Interest Group of the Mathematical Association of America on Research in Undergraduate Mathematics Education.

Organizer for the 2019 RUME Working Group: Education Research at the Interface of Mathematics and Science.

Participant in the North American Chapter of the International Group for the Psychology of Mathematics Education.

Invited member of the NSF-funded Transformational Research in Undergraduate STEM Education Conference. July 2018

Calculus Committee, co-chair
Brigham Young University, Aug 2013—current (co-chair since Aug 2017)

Graduate Committee
Brigham Young University, Aug 2013—current

Department Writing Group, chair
Brigham Young University, Aug 2016—current

Course Content Restructuring Committee
Brigham Young University, May 2017—Dec 2017

Statistics Course Development Committee
Brigham Young University, Jun 2014—Apr 2015

Math Tutoring Lab hiring process review
Brigham Young University, Jan 2014—Mar 2014

Curriculum Review for Statistics and Calculus Classes
Sierra College, Aug 2012—Aug 2013

College Senate Academic Task Force
Sierra College, Apr 2012—Aug 2013

Textbook Selection Committee
Sierra College, Aug 2011—Mar 2012