

CURRICULUM VITAE

Steven J. Boyce
September 30, 2025

Education

Ph.D.	2014	Mathematics, Virginia Tech
M.S.	2010	Mathematics, Virginia Tech
M.A.Ed.	2003	Curriculum & Instruction, Virginia Tech
B.S.	2001	Mathematics, Virginia Tech

Employment

Associate Professor	2020 – current	Portland State University
Assistant Professor	2014 – 2020	Portland State University
Graduate Assistant	2008 – 2014	Virginia Tech
Mathematics Teacher	2003 – 2008	Pulaski County High School, Dublin, VA

Dissertation

Modeling students' units coordinating activity, August 12, 2014, directed by Anderson Norton.

Refereed Publications

Book Chapters

- Boyce, S.** (2024). Modeling quantitative and variational reasoning. In P. C. Dawkins, A. J. Hackenberg, & A. Norton (Eds.) *Piaget's genetic epistemology for mathematics education* (pp. 413-445). Springer.
- An, T., **Boyce, S.**, Brown, A., Buchbinder, O., Cohen, S., Dumitrascu, D., Escudro, H., Herbst, P., Ion, M., Krupa, E., Miller, N., Pyzdrowski, L., Sears, R., St. Goar, J., Szyldk, S., & Vestal, S. (2024). (Toward) essential student learning objectives for teaching geometry to secondary preservice teachers. In B. Benken (Ed.) *The AMTE Handbook of Mathematics Teacher Education: Reflection on Past, Present and Future – Paving the Way for the Future of Mathematics Teacher Education, Volume 5*. Information Age Publishing.
- Boyce, S.**, Ion, M., Pyzdrowski, L., An, T., Sears, R., Oppong-Wadie, K., & St. Goar, J. (accepted) Learning from lesson study in Geometry for Teachers courses. In P. Herbst, A. Milewski, L. Pyzdrowski, & N. Miller (Eds.), *The GeT Course: Resources and Objectives for the Geometry Courses for Teachers*.

Boyce, S., Miller, N., & Escudro, H. (accepted). Extending and elaborating on the role of definitions in Geometry for Teachers Courses. In P. Herbst, A. Milewski, L. Pyzdrowski, & N. Miller (Eds.), *The GeT Course: Resources and Objectives for the Geometry Courses for Teachers*.

Margolis, C., & **Boyce, S.** (accepted). Digital task design with feedback in mind. In P. Herbst, A. Milewski, L. Pyzdrowski, & N. Miller (Eds.), *The GeT Course: Resources and Objectives for the Geometry Courses for Teachers*.

Articles

Boyce, S., MacDonald, B. L., & Hackenberg, A. (2024). Units construction and coordination: Past, present, and future. *Investigations in Mathematics Learning*, 16(3), 153-162. <https://doi.org/10.1080/19477503.2024.2357046>

Moss, D. L., Bertolone-Smith, C., **Boyce, S.**, MacDonald, B. L., Grabhorn, J., & Roman, C. O. (2023). Tension between objectivism and constructivism in organizing and enacting student learning in online STEM education. *The Educational Forum*, 87(2). <https://doi.org/10.1080/00131725.2022.2149913>

Boyce, S., & Moss, D. (2022). The role of representation in supporting preservice teachers' understandings of fractions as measures. *International Journal for Mathematics Teaching and Learning*, 23(1), 64-93. <https://www.cimt.org.uk/ijmtl/index.php/IJMTL/issue/view/16>

Boyce, S., Grabhorn, J., & Byerley, C. (2021). Relating units coordination and calculus readiness. *Mathematical Thinking and Learning*, 23(3). <https://doi.org/10.1080/10986065.2020.1771651>

Prasad, P. V., & **Boyce, S.** (2021). Calling a taxi(cab): Supporting ideas of congruence. *PRIMUS*, 32(4), 562-578. <https://doi.org/10.1080/10511970.2021.1871989>

Moss, D. L., **Boyce, S.**, & Lamberg, T. (2019). Representations and conceptions of variables in students' early understandings of functions. *International Electronic Journal of Mathematics Education*, 15(2). <https://doi.org/10.29333/iejme/6257>

Boyce, S., & Norton, A. (2019). Maddie's units coordinating across contexts. *Journal of Mathematical Behavior*. Available at <https://doi.org/10.1016/j.jmathb.2019.03.003>

Boyce, S., & O'Halloran, J. (2019). Active learning in computer-based college algebra. *PRIMUS*. Available at <https://doi.org/10.1080/10511970.2019.1608487>

Boyce, S., & Moss, D. (2018). A re-emergent analysis of early algebraic learning. *The Mathematics Enthusiast*, 15(3).

- Boyce, S., & Norton, A.** (2017). Dylan's units coordinating across contexts. *Journal of Mathematical Behavior*, 45, 121-136.
- Boyce, S., & Norton, A.** (2016). Co-constructing fractions schemes and units coordinating structures. *Journal of Mathematical Behavior*, 41, 10- 25.
- Norton, A., & **Boyce, S.** (2015). Provoking the construction of a structure for coordinating $n + 1$ levels of units. *Journal of Mathematical Behavior*, 40, 211-232.
- Norton, A., **Boyce, S.**, Ulrich, C., & Phillips, N. (2015). Students' units coordination activity: A cross-sectional analysis. *Journal of Mathematical Behavior*, 39, 51-66.
- Norton, A., **Boyce, S.**, Phillips, N., Anwyll, T., Ulrich, C., & Wilkins, J. L. M. (2015). A written instrument for assessing students' units coordination structures. *Journal of Mathematics Education*, 10(2) 111-136.
- Norton, A., **Boyce, S.**, & Hatch, J. (2015). Coordinating units at the CandyDepot. *Mathematics Teaching in the Middle School*, 21(5), 280-287.

Refereed Conference Proceedings

- Tsutsui, M., & **Boyce, S.** (2024). Transformational reasoning with Adinkra symbols: A lesson play on symmetries. In Kosko, K. W., Caniglia, J., Courtney, S., Zolfaghari, M., & Morris, G. A., (2024). *Proceedings of the forty-sixth annual meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education* (pp. 509-513). Kent State University.
- Boyce, S.**, An, T., Pyzdrowski, L. J., Oppong-Wadie, K., Ion, M., & St. Goar, J. (2023). Learning from lesson study in the college geometry classroom. In S. Cook, B. Katz, & D. Moore-Russo (Eds.) *Proceedings of the 25th Annual Conference on Research in Undergraduate Mathematics Education* (pp. 243-251). Omaha, NE.
- Boyce, S.** (2020). Pseudo-empirical, internalized, and interiorized covariational reasoning. In: Sacristán, A.I., Cortés-Zavala, J.C. & Ruiz-Arias, P.M. (Eds.). (2020). *Mathematics Education Across Cultures: Proceedings of the 42nd Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education, Mexico* (pp. 2298-2302). Cinvestav / AMIUTEM / PME-NA. <https://doi.org/10.51272/pmena.42.2020>
- Drimalla, J., Tyburski, B., Byerley, C., **Boyce, S.**, Grabhorn, J., Roman, C. O., & Moore, K. (2020). An invitation to conversation: Addressing limitations of graphing tasks for assessing covariational reasoning. In: Sacristán, A.I., Cortés-Zavala, J.C. & Ruiz-Arias, P.M. (Eds.). (2020). *Mathematics Education Across Cultures: Proceedings of the 42nd Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education, Mexico* (pp.

2270-2278). Cinvestav / AMIUTEM / PME-NA.
<https://doi.org/10.51272/pmena.42.2020>

- Grabhorn, J., & **Boyce, S.** (2020). Constructing rates of change through a units coordinating lens: The story of Rick. In: Sacristán, A.I., Cortés-Zavala, J.C. & Ruiz-Arias, P.M. (Eds.). (2020). *Mathematics Education Across Cultures: Proceedings of the 42nd Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education, Mexico* (pp. 1182-1185). Cinvestav / AMIUTEM / PME-NA.
<https://doi.org/10.51272/pmena.42.2020>
- Moss, D., **Boyce, S.**, MacDonald, B. L., & Bertolone-Smith, C. (2020). Supporting fractions as measures in an online mathematics methods course. In: Sacristán, A.I., Cortés-Zavala, J.C. & Ruiz-Arias, P.M. (Eds.). (2020). *Mathematics Education Across Cultures: Proceedings of the 42nd Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education, Mexico* (pp. 1667-1671). Cinvestav / AMIUTEM / PME-NA.
<https://doi.org/10.51272/pmena.42.2020>
- Boyce, S.**, Byerley, C., Darling, A., Grabhorn, J., & Tyburski, B. (2019). Relationships between calculus students' structures for static and dynamic reasoning. In S. Otten, Z. de Araujo, A. Candela, & C. Munter (Eds.), *Proceedings of the 41st Annual Meeting of the North American Chapter of the International Group of the Psychology of Mathematics Education (PME-NA)*, St. Louis, MO.
- Byerley, C., **Boyce, S.**, Grabhorn, J., & Tyburski, B. (2019). Investigating STEM students' measurement schemes with a units coordination lens. In *Proceedings of the 22nd Annual Conference on Research in Undergraduate Mathematics Education*, Oklahoma City, Oklahoma
- Boyce, S.**, & Prasad, P. V. (2018). Supporting prospective teachers' understanding of triangle congruence criteria. In (Eds.) A. Weinberg, C. Rasmussen, J. Rabin, M. Wawro, and S. Brown, *Proceedings of the 21st Annual Conference on Research in Undergraduate Mathematics Education* (pp. 139-154), San Diego, California.
- Boyce, S.**, & Moss, D. (2017). Role of representation in prospective teachers' fractions schemes. In E. Galindo & J. Newton (Eds.), *Proceedings of the 39th annual meeting of the North American Chapter of the International Group of the Psychology of Mathematics Education* (pp. 829-837). Indianapolis, IN: Hoosier Association of Mathematics Teacher Educators.

Non-Refereed Publications

Articles

- Boyce, S.** (2022). Reflections on teaching about symmetry and mutuality. *GeT: The News*, 3(2). <https://www.gripumich.org/v3-i2-w2022/>

Boyce, S. (2022, Jan/Feb). Defining mutuality. *Oregon Mathematics Teacher*, 6-9.

Boyce, S., Ion, M., Lai, Y., McLeod, K., Pyzdrowski, L., Sears, R., & St. Goar, J. (2021, May 6). Best-Laid co-plans for a lesson on creating a mathematical definition. AMS Blogs: On Teaching and Learning Mathematics.
<https://blogs.ams.org/matheducation/2021/05/06/best-laid-co-plans-for-a-lesson-on-creating-a-mathematical-definition/>

Boyce, S. (2019, Mar/April). Supporting understanding of congruence using taxicab geometry. *Oregon Mathematics Teacher*, 7-10.

Boyce, S. & Barber, H. (2016, September/October). Teaching and learning the value of mathematics education research. *Oregon Mathematics Teacher*, 13-17.

Presentations at Professional Meetings

Oppong-Wadie, K., & **Boyce, S.** (2025, June). Engaging K-6 preservice secondary teachers in Geometry through Adinkra. *Joint Conference for Elementary Literacy and Mathematics, NCTE and NCTM*, Chicago, IL.

Cirillo, M., Seiwel, A., **Boyce, S.**, Brown, A., Griffin, C., Miller, N., Norman, F., & Parrott, A. (2025, February). Supporting preservice secondary teachers' understanding of the importance of defining and definitions. *29th Annual Association of Mathematics Teacher Educators (AMTE) Conference*, Reno, NV.

Harrington, C., Zwanch, K., Kerrigan, S., **Boyce, S.**, Antonides, J., Tillema, E., & Hackenberg, A. J. (2024, November). Complex connections: Reimagining pure and applied research in units construction and coordination. Working Group Paper presented at the Annual Meeting of the North American Chapter of the International Group of the Psychology of Mathematics Education (PME-NA), Cleveland, NV.

Izsák, A., Byerley, C., & **Boyce, S.** (2024, September). Building robust connections among measurement, multiplication, and calculus. *National Council of Teachers of Mathematics (NCTM) Research Conference*, Chicago, IL.

Boyce, S. (2024, August). College pathways for all. *Oregon Leaders of Mathematics Conference*, Corvallis, OR.

Zwanch, K., Kerrigan, S., MacDonald, B. L., **Boyce, S.**, Antonides, J., Harrington, C., Byerley, C., & Tillema, E. (2023, October). *Complex Connections: Reimagining Units Construction and Coordination for MKT and Combinatorial Reasoning*. Working Group Paper presented at the Annual Meeting of the North

American Chapter of the International Group of the Psychology of Mathematics Education (PME-NA), Reno, NV.

- Boyce, S., & Ion, M.** (2023, October). Geometry students' ways of thinking about Adinkra symbols. Poster presented at the Annual Meeting of the North American Chapter of the International Group of the Psychology of Mathematics Education (PME-NA), Reno, NV.
- Boyce, S., Essel, J., Oppong-Wadie, K., & Tsutsui, M.** (2023, October). Exploring the mathematical aesthetics of Adinkra symbols. *Northwest Math Conference*, Portland OR.
- Boyce, S., & Moore, K.** (2023, October). Dual credit opportunities for all. *Northwest Math Conference*, Portland, OR.
- MacDonald, B. L., Zwanch, K., Kerrigan, S., **Boyce, S.**, Byerely, C., Moss, D. L., Bertelone-Smith, C., Roman, C. O., & Grabhorn, J. (November, 2022). *Complex Connections: Reimagining Units Construction and Coordination with Algebraic and Covariational Reasoning*. Working Group Paper to be presented at the Annual Meeting of the North American Chapter of the International Group of the Psychology of Mathematics Education (PME-NA), Nashville, TN.
- Boyce, S.** (2022, August). Changes to content and methods preparation in response to the Oregon Mathways vision. *Teachers of Teachers of Mathematics Conference*, Bend, OR.
- Boyce, S., & Ahearn, M.** (2022, July). Reimagining high school geometry. *Oregon Leaders of Mathematics Conference*, Linfield, OR.
- Boyce, S., Denny, N., Jordan, A., Muhs, C., Roman, C. O., & Wolf, A.** (2022, July). Integrating data science into secondary math courses. *Oregon Leaders of Mathematics Conference*, Linfield OR.
- Boyce, S.** (2022, March). Geometry students' ways of thinking about Adinkra symbols. Pacific Northwest MAA Sectional Annual Meeting. Newberg, OR.
- Boyce, S., & Roman, C. O.** (2022, February). Instructors' dispositions to incorporate data science in mathematics courses. 2022 *Research in Undergraduate Mathematics Education Conference*, Boston, MA.
- Boyce, S., & Pyzdrowski, L.** (2022, February). Engaging prospective teachers in defining mutuality. *26th Annual Association of Mathematics Teacher Educators (AMTE) Conference*, Las Vegas, NV.

- Boyce, S.** (2020, February). Supporting coherent meanings and representations of geometric (in)congruence, *24th Annual Association of Mathematics Teacher Educators (AMTE) Conference*, Phoenix, AZ.
- MacDonald, B. L., Moss, D. L., **Boyce, S.**, Bertolone-Smith, C. M., & Leitch M. (2020, February). Supporting prospective teachers' conceptions of fractions as measures in an online environment, *24th Annual Association of Mathematics Teacher Educators (AMTE) Conference*, Phoenix, AZ.
- Boyce, S.**, Byerley, C., Darling, A., Grabhorn, J., & Tyburski, B. (2019, November). *Relationships between calculus students' structures for static and dynamic reasoning*. Paper presented at the Annual Meeting of the North American Chapter of the International Group of the Psychology of Mathematics Education (PME-NA), St. Louis, MO.
- MacDonald, B. L., **Boyce, S.**, Byerley, C., Moss, D., Bertolone-Smith, C. M., Grabhorn, J., & Roman, C. (October, 2021). *Complex Connections: Reimagining Units Construction and Coordination*. Working Group Paper presented at the Annual Meeting of the North American Chapter of the International Group of the Psychology of Mathematics Education (PME-NA), Philadelphia, PA.
- MacDonald, B. L., **Boyce, S.**, Hunt, J. H., Byerley, C., & Moss, D. (2019, November). *Complex Connections: Reimagining Units Construction and Coordination*. Working Group Paper to be presented at the Annual Meeting of the North American Chapter of the International Group of the Psychology of Mathematics Education (PME-NA), St. Louis, MO.
- Alzaga Elizondo, H., Ellis, B., & **Boyce, S.** (2019, April). *Putting the fundamental back in the Fundamental Theorem of Calculus*. Presentation at the Annual Meeting of the Pacific Northwest Sectional of the Mathematics Association of America, Portland, Oregon.
- Grabhorn, J. A., & **Boyce, S.** (2019, April). *Relationships between calculus students' units coordination and covariational reasoning*. Presentation at the Annual Meeting of the Pacific Northwest Sectional of the Mathematics Association of America, Portland, Oregon.
- Darling A., Byerley, C., & **Boyce, S.** (2019, February). *Connecting constructs: Coordination of units and covariation*. Poster presented at the 22nd Annual Conference on Research in Undergraduate Mathematics Education, San Diego, California.
- Byerley, C., **Boyce, S.**, Grabhorn, J., Tyburski, B., & Darling, A. (2019, February). *Investigating STEM students' measurement schemes with a units coordinating lens*. Research report presented at the 22nd Annual Conference on Research in Undergraduate Mathematics Education, San Diego, California.

Boyce, S., Grabhorn, J., & Byerley, C. (2018, October). *Relationships between units coordination and understanding calculus concepts*. Poster presented at the Annual Meeting of the North American Chapter of the International Group of the Psychology of Mathematics Education (PME-NA), Greenville, SC.

Grabhorn, J., **Boyce, S., & Byerley, C.** (2018, October). *Relating units coordinating and readiness for calculus*. Poster presented at the Annual Meeting of the North American Chapter of the International Group of the Psychology of Mathematics Education (PME-NA), Greenville, SC.

Boyce, S. (2018, September). *Teachers of teachers of geometry*. Presentation for the Teachers of Teachers of Mathematics Annual Conference. Ashland, OR.

Boyce, S., & Prasad, P. V. (2018, February) *Supporting prospective teachers' understanding of triangle congruence criteria*. Poster presented at the 21st Annual Conference on Research in Undergraduate Mathematics Education, San Diego, California.

Grabhorn, J., **Boyce, S., & Byerley, C.** (2018, February) *Relationships between calculus students' ways of coordinating units and their ways of understanding integration*. Poster presented at the 21st Annual Conference on Research in Undergraduate Mathematics Education, San Diego, California.

Prasad, P. V., & **Boyce, S.** (2018, January). *Supporting prospective teachers' understandings of triangle congruence*. Presentation at the Joint Mathematics Meetings, San Diego, California.

Abel, J., **Boyce, S., & Grabhorn, J.** (2017, October). *Incorporating assessments of students' attitudes and beliefs in secondary classrooms*. Presentation for the 56th Annual Northwest Math Conference, Portland, Oregon.

Grabhorn, J., **Boyce, S., & Abel, J.** (2017, October). *Development of the application of conceptual knowledge framework for mathematics*. Presentation for the 56th Annual Northwest Math Conference, Portland, Oregon.

Boyce, S., & Moss, D. (2017, October). *Role of representation in teachers' fractions schemes*. Paper presented at the Annual Meeting of the North American Chapter of the International Group of the Psychology of Mathematics Education (PME-NA), Indianapolis, IN.

Boyce, S., (2017, September) *Supporting prospective teachers' understanding of triangle congruence*. Presentation for the Teachers of Teachers of Mathematics Annual Conference. Newberg, OR.

- Boyce, S., & Moss, D.** (2017, April). *The role of representation in assessing prospective teachers' fractions schemes*. Research report at the NCTM Research Pre-Conference, San Antonio, TX.
- Boyce, S., & Wyld, K.** (2017, March). *Supporting students' understanding of calculus concepts: Insights from middle-grades mathematics education research*. Preliminary research report at the Annual Conference on Research in Undergraduate Math Education in San Diego, CA.
- Boyce, S., Moss, D., et al** (2017, February). *Role of representation in assessing prospective teachers' understandings of fractions as measures*. Presentation at the 21st Annual Conference of the Association of Mathematics Teacher Educators, Orlando, FL.
- Stevens, A., Ziegfried, J., Lovin, L., Busi, R., & **Boyce, S.** (2017, February). *Sharing instructional activities that promote robust fraction knowledge in prospective prek-8 teachers*. Presentation at the 21st Annual Conference of the Association of Mathematics Teacher Educators, Orlando, FL.
- Boyce, S., & Norton, A.** (2015, November). *Dylan's coordinating units across contexts*. Poster presented at PME-NA 2015, East Lansing, MI.
- MacDonald, B. L., **Boyce, S.**, Xu, Congze, & Wilkins, J. L. M. (2015, November). *Frank's perceptual subitizing activity relative to number understanding and orientation: a teaching experiment*. Research report presented at the PME-NA 2015 in East Lansing, MI.
- Boyce, S.** (2015, September). *What makes a model of a fraction "linear"?* Presentation for the Teachers of Teachers of Mathematics Annual Conference. Corvallis, OR.
- Boyce, S.** (2015, April). *Modeling the variations in an individual students' understandings of fraction*. Presentation for the Annual Meeting for the American Educational Research Association. Chicago, IL.

Recent Invited & Colloquium Presentations

- Boyce, S.** (2025, September). *What does it mean (take) for a corequisite math course to be successful?* Oregon Statewide Corequisite Workshop. Portland, OR.
- Boyce, S.** (2024, November). *Calculus students' conceptual structures*. RUME Seminar, University of Oklahoma.
- Boyce, S.** (2024, August). *Math Start at Portland State University*. K-8 Teachers of Math in Rural Oregon Collective Working Group.

- Boyce, S., Miller, N., & Escudro, H.** (2024, April). *Extending and elaborating on the role of definitions in GeT Courses*. GeT: A Pencil Seminar.
- Boyce, S.,** (2019, December). *What are the mathematical demands of teaching high school geometry?* GeT: A Pencil Seminar.
- Boyce, S.** (2019, December). *Exploratory Graphing*. SEMINAL Project Network Improvement Community Seminar.
- Boyce, S.** (2019, June). *Adapting lessons and practices in mathematics*. Presentation for the 3rd Annual Oregon State University Ambitious Math and Science Summer Institute, Corvallis, OR.
- Boyce, S.** (2018, May). *Adaptive learning: Early Results in MTH 111 and MTH 112*. Presentation for Portland State University's Office of Academic Innovation.
- Boyce, S.** (2017, December). *Incorporating assessments of students' attitudes and beliefs in secondary mathematics classrooms*. Presentation for the Quantitative Data Analysis Seminar, Portland, OR.
- Boyce, S., Abel, J., & Grabhorn, J. A.,** (2017, June). *Incorporating common measures in STEM classrooms*. Presentation for the Oregon State University Ambitious Math and Science Summer Institute, Corvallis, OR.
- Boyce, S.** (2016, October). *A framework for assessing the application of conceptual knowledge in mathematics*. Presentation for the Oregon Department of Education, Salem, OR.
- Boyce, S.** (2015, October). *Students' thinking about graphs*. Presentation for the Challenge Program Workshop at Portland State University, Portland, OR.
- Boyce, S.** (2015, March). *Mathematical modeling in mathematics education*. Presentation for the Virginia Tech Department of Mathematics Visitor's Day, Blacksburg, VA.
- Boyce, S.** (2015, March). *Modeling units coordinating activity*. Presentation for the Portland State University Stats-Lunch Series. Portland, OR.
- Boyce, S.** (2015, March). *Modeling the variations in an individual student's understandings of fraction*. Presentation for the Portland State University Mathematics Education Research Seminar, Portland, OR.

Honors, Grants, and Fellowships

Data Reasoning +1 Pathway Design: Course buyout for Spring 2025. **PI Steven Boyce.** Oregon Department of Education Mathways Grant. \$13, 636. February 1, 2025 - June 30, 2025.

Cultivating Math Resilience: Fostering a Rural School-University Partnership Working to Promote Math Confidence in Post-Pandemic Education. PI Mathew Uretsky, Senior Personnel **Steven Boyce**). Submitted to NSF DR-K12. \$99, 751. Submitted July 24, 2024. **Accepted for funding**. August 1, 2024 - July 30, 2025.

Teaching Mathematics with Technology: Integrating Data Science Learning Goals Into Secondary and Community College Mathematics Courses (TMT-DS). (**PI Steven Boyce**). Faculty Enhancement Grant: \$14, 314. **Accepted for funding**. July 1, 2021 - September 30, 2023.

Integrating Knowledge for Teaching Mathematics with Technology with Knowledge for Teaching Data Science. (**PI Steven Boyce**). Collaborative Proposal with Portland Community College. Submitted to NSF IUSE. \$299, 882. Submitted July 21, 2021. Not selected for funding.

Streamlining Data Science Education and Research from Community Colleges to Master Program in Portland State University. (PI Panayot Vassilevski, **Co-PI Steven Boyce**). Collaborative Proposal with Portland Community College. Submitted to NSF Data Science Corps. \$1,481,682. Submitted February 12, 2021. Not selected for funding.

Outstanding Researcher Award, Columbia-Willamette Chapter of Sigma Xi. April 2020. \$500.

MIRL 3.0: Mathematics in Real Life. (PI Torrey Kulow, **Co-PI Steven Boyce**). Submitted to Oregon Department of Education. \$ 74,173. Submitted February 15, 2020. **Accepted for funding**.

DIRACC Phase 2: Developing and Investigating a Rigorous Approach to Conceptual Calculus – Scaling up. (**PSU PI Steven Boyce**; PSU Co-PI Sean Larsen). Collaborative Proposal with Arizona State University (PI Fabio Milner) and University of California, Berkeley (PI Linda Morell). Submitted to NSF IUSE. \$881,975. Submitted December 11, 2018. Not selected for funding.

MIRL 2.0: Mathematics in Real Life Continuation and Expansion (**PI Steven Boyce**, Co-PI Torrey Kulow). Submitted to Oregon Department of Education. \$215,000. Submitted September 22, 2017. **Accepted for funding**.

PDXEMINAL: Portland State University Student Engagement in Mathematics through an Institutional Network for Active Learning (**PI Steven Boyce**; Co-PI Sean Larsen and Paul Latiolais). Submitted to APLU. \$98, 293. Submitted October 10, 2017. Not selected for funding.

Investigations of Calculus Students' Units Coordination. (**PI Steven Boyce**). Faculty Enhancement Grant: \$14, 790. Submitted February 15, 2017. **Accepted for funding.**

Investigations of Calculus Students' Units Coordination. (**PI Steven Boyce**). Faculty Enhancement Grant: \$14, 790. Submitted February 15, 2016. Not selected for funding.

MIRL: Mathematics in Real Life (**PI Steven Boyce**). Submitted to ODE. \$250,000. Submitted January 22, 2016. **Accepted for funding.**

IC³: Interventions to Overcome Conceptual Constraints in Calculus (**PI Steven Boyce**; Co-PI Sean Larsen and Paul Latiolais). Submitted to NSF:IUSE. \$245,566. Submitted November 4, 2015. Not selected for funding.

IOCCC: Interventions to Overcome Conceptual Constraints in Calculus (**PI Steven Boyce** Co-PI Sean Larsen and Paul Latiolais). Submitted to NSF:IUSE. \$239, 614. Submitted May 1, 2015. Not selected for funding.

Portland State University Professional Travel Grant. \$1,979. **Awarded** March 2015.

STaR (Service, Teaching and Research) Fellowship from the Association of Mathematics Teacher Educators, **Awarded** January 1, 2015.

Other Research and Other Creative Achievements

CandyBot software product. An educational game designed to support middle school students' learning about fractions and functions by using symbols to represent functions that transform inputs into desired outputs. Released April 2, 2015 for iPads and iPad Minis with iOS version 6.0 or higher. Co-developed with Serdar Aslan, Anderson Norton, and Osman Balci.

Teaching, Mentoring and Curricular Achievements

Courses Taught

Undergraduate Courses

MTH 211 Foundations of Elementary Mathematics I (Fall 2015)

MTH 212 Foundations of Elementary Mathematics II (Spring 2015, Winter 2016)

MTH 251 Calculus I (Spring 2015, Fall 2019)

MTH 252 Calculus II (Fall, 2019, Winter, 2020)

MTH 253 Calculus III (Spring 2020, Fall 2020, Spring 2021, Winter 2025, Spring 2025)

MTH 261 Introduction to Linear Algebra (Winter 2015)

MTH 338 Modern College Geometry (Spring 2017, Winter 2019, Spring 2019, Spring 2020, Winter 2021, Spring 2021, Winter 2023, Spring 2023, Spring 2024, Spring 2025)

Courses Cross-listed as Undergraduate and Graduate

MTH 4/583 Topics in Geometry for Teachers (Summer 2015, Winter 2017, Summer 2018, Summer 2021, Fall 2022)
MTH 4/584 Topics in Algebra for Teachers (Fall 2014, Fall 2017, Fall 2020)
MTH 4/585 Topics in Analysis for Teachers (Winter 2015, Spring 2016, Winter 2018, Winter 2023, Summer 2024)
MTH 4/587 Topics in Discrete Math for Teachers (Summer 2017, Summer 2023)
MTH 4/588 Topics in Computing for Teachers (Fall 2015, Fall 2018, Spring 2023)
MTH 4/590 Computing in Mathematics for Middle School Teachers (Summer 2016)
MTH 4/593 Geometry for Middle School Teachers (Winter 2020)
MTH 4/597 Mathematics in the Middle School Classroom (Winter 2016)

Graduate Courses

MTH 589 Topics in Mathematical Exposition and Curriculum Development (Summer, 2020, Winter 2024)
MTH 690 Introduction to Research in Mathematics Education (Fall 2019, Fall 2023)
MTH 692 Research Methodology and Design (Winter 2019, Winter 2024)
MTH 693 Research on the Learning of Mathematics (Winter 2017)
MTH 694 Research on the Teaching of Mathematics (Fall 2024)
MTH 695 Topics in Research in Mathematics Education (Spring 2016, Spring 2018, Spring 2024)
MTH 696 Mathematical Knowledge for Teaching and Educational Research, Grades PK-16 (Fall 2022, Fall 2023, Fall 2024)

Dissertation Chair for Doctorate in Mathematics Education students:

Christopher Orlando Roman Completed Spring 2025.

Investigating Rate of Change Development of Two Latina Undergraduate Students from an Anti-Deficit Perspective: A Cultural Approach to Mathematical Caring Relations

Matthew Tsutsui, expected completion Spring 2026.

Dissertation Committee for Doctorate in Mathematics Education students:

Kathryn Roman, Completed Spring 2025.

What This Work Really Takes: Lessons, Tensions, and Student Perspectives in a Social Justice Math Classroom

Hortensia (Tenchita) Alzaga Elizondo, Completed Fall 2022.

Collecting Proving Activity in a Synchronous Online Environment

Matthew Peterson, Completed Winter 2020.

Mathematical Silences

Jason Dolor, Completed Fall 2017.

Assessing Statistics Teachers' Knowledge of Probability in the Context of Hypothesis Testing

Dissertation Committee for Doctorate in Educational Leadership students:

Brea Cohen, Fall 2019

Project Adviser for Master of Science in Mathematics for Teachers students:

Kaiyun Lin, Chair, Completed Spring 2025.

Angle and Angle Measurement: What Teachers and Students Should Know.

Stephanie Partlow, Chair, Completed Spring 2025.

Dijkstra's and Floyd's Shortest Path Algorithms
Thomas Brown, Chair, Completed Winter 2025.

Creating Lessons that Engage Students through Problem Based Learning (PBL).
Catherine Ordway, Chair, Completed Spring 2024.

Modular Arithmetic and its Applications in Cryptography
Jacqueline Rutherford, Chair, Completed Spring 2024.

Fractals in African Architecture and Art
Jaylin Kua, Chair, Completed Spring 2024

How the Cookie Crumbles
Kara Jinks, Chair, Completed Spring 2024

Teaching Calculus for Social Justice Using Data about Transgender Legal Rights
Kelly Phillips, Chair, Completed Spring 2024

The Mathematics of Gerrymandering in the Community College Classroom
Malika Gillete, Chair, Completed Spring 2024

Algebraic Mathematical Modeling in a Social Justice Context
Manquin (Maddi) Gao, Chair, Completed Spring 2024

Understanding and Exploring the Concept of Limit in Calculus for Mathematics Teaching and Learning
Lanee Henrickson, Chair, Completed Winter 2024.

Approaches and Motivations for Focusing on Definitions in High School Geometry
Chris Shurts, Chair, Completed Fall 2023.

The Mathematics of Voting Theory
Lauren Duncan, Member, Completed Summer 2023

Survival and Hazard Functions
Molly Robinson, Chair, Completed Spring 2023

The Ratios of Racism: Using Proportional Reasoning to Make Sense of Populations and Congressional Representation
Kayla Southall, Chair, Completed Winter 2023

Developing Students' Foundational Mathematics Understanding Through Covariational Reasoning
Kevin Grassmann, Chair, Completed Summer 2022

Taylor series in the High School Classroom
Kruti Jayesh, Chair, Completed Winter 2022

Making Sense with Radians
Eli McElroy, Chair, Completed Fall 2021

Teaching Python Programming Through the Design of a Quadratic Functions Calculator
Evonne Crawford, Chair, Completed Summer 2021

Integrating Accumulation Function and Riemann Sum Concepts when Introducing Integration
Michelle Kutter, Chair, Completed Summer 2021

Applying Conic Sections in the Integrated Secondary Classroom
Brandon Morehouse, Member, Completed Spring 2021

The Fourier Transform: History and Applications of Fourier Analysis
Maitryee Desai, Member, Completed Spring 2021

Trigonometry: More than SOH CAH TOA

Aziz Hamdah, Chair, Completed Summer 2020

Binary numbers from a historical and modern perspective

Sarah Sterner, Chair, Completed Summer 2020

Statistical Learning in a Social Justice Context

Kristin Buys, Chair, Completed Summer 2020.

Optimization in the Calculus Classroom

Kristen Arave, Member, Completed Winter 2020

Optimization in the Calculus Classroom

Royce Olarte, Chair, Completed Fall 2018.

An Accumulation Approach to Line Integrals

Laura Dunlap, Chair, Completed Summer 2018.

Linear Programming Problems and the Simplex Method

Morvarid Pourhassan, Chair, Completed Winter 2018.

Finding a Place for Mathematical Modeling and Ill-Structured Problems in Today's Math Curriculum

Matthew Ridge, Chair, Completed Summer 2017.

An Exploration of Taylor Polynomials and Taylor Series with Geogebra

Mary Clare Metscher, Chair, Completed Spring 2017

A Woman's Work: Sophie Germain and Her Contributions to the Study of Prime Numbers

Hortensia Alzaga Elizondo, Chair, Completed Spring 2017

Building a Better Understanding of Fractions for Preservice Teachers Through Baisimals

William O'Connell, Chair, Completed Spring 2016

Teaching the Function Concept in the Context of Automotive Technology by Encouraging Reflection

Nada Bushey, Chair, Completed Fall 2014.

Pascal's Triangle and Probability

Thesis Adviser for Undergraduate Honors:

Micah Kurzer, Chair, Completed Spring 2018

The Contrast of Covariational Reasoning and Other Problem Solving Methods of a Calculus Student

Mentor for Graduate Teaching Interns (MTH 504)

Kaiyuan Lin (Winter 2023, in Calculus)

Awen Gatten (Winter 2023, in Calculus)

Kelly Phillips (Spring 2023, in Modern College Geometry)

David Brown (Spring 2021, in Modern College Geometry)

Christopher O. Roman (Spring 2021, in Calculus)

Aziz Hamdah (Winter 2020, in Modern College Geometry)

Mario Ruiz-Chiquillo Spring 2019, in Modern College Geometry)

Jeffrey Grabhorn (Winter 2019, in Modern College Geometry)

Brittany Carter (Spring 2017, in Modern College Geometry)

Mentor for Undergraduate Teaching Interns (MTH 404)

Madilyn Marshall (Fall 2016, in Foundations of Elementary Mathematics II)

Other Coordination Activities

Project Member (Summer 2022 - current) *Math Start Initiative* through Portland State University's Learning Center (PI Gwen Shusterman, PSU)

Project Member (Fall 2017 – current) and Lead (Fall 2018 – Fall 2021) APLU Active and Adaptive Project Integrating Active Learning and Adaptive Course Materials in Math/Stats through Portland State University's Office of Academic Innovation (PI Sukwant Swaj, PSU)

Course Coordinator and Curriculum Developer, MTH 251, MTH 252, MTH 253 (Fall 2018 – Spring 2021)

Mathematics Assessment Coordinator (Fall 2015 – Spring 2017): HHMI Student Learning and Faculty Development Community Grant (PI Gwen Shusterman, PSU)

Coordinator, Mathematics Education Research Seminar (2014 – 2016; 2024-current)

Community Outreach Achievements

Volunteer Learning Assistant, Portland Public Schools (Fall 2016 – current)

Faculty Mentor, Challenge Program Dual Credit Calculus (Fall 2016 – current)

Professional Learning Community Facilitation Leader, Clackamas Community College Accelerated College Credit Program (Fall 2019 - current)

Member, Panelist Review for the Oregon Presidential Awards for Excellence in Mathematics and Science Teaching (Winter 2025)

Member, SEMINAL Network Improvement Community Planning Committee (Fall 2021 - Spring 2022).

Member, Content Panel for the Oregon Mathematics Standards (Spring 2019 – Fall 2020)

Geometry Exam Creator and Grader, Oregon Invitational Math Tournament (Spring 2016, Spring 2019).

Panelist on STEM Education, Oregon Council of Teachers of Mathematics Conference 2016

Project Personnel, NCLB University-School Partnership Providing Professional Development for Teachers in Rural Oregon, Fall 2016 (PI PSU Geology Professor Emeritus Michael Cummings)

Scholarly Works in Progress

Boyce, S., Byerley, C., & Tyburski, B. (In Review). Undergraduate STEM students' fractions schemes. *Investigations in Mathematics Learning*.

Boyce, S., Sears, R., Pyzdrowski, L., Stevens, I., & Oppong-Wadie, K. (submitted). Noticing for the 5Rs for the College Geometry Lesson Study. To be submitted to *International Journal for Research in Undergraduate Mathematics Education* Special Issue on University teachers' practices, understandings, and training.

St. Goar, J., McCleod, K., Ekici, C., An, T., & **Boyce, S.** (in preparation). Learning from Lesson Study: Proving Side-Angle-Side using Transformations. To be submitted to PRIMUS.

Governance Activities for the University, College, Department

University:

Member, Academic Requirements Committee (Fall 2022 - current)
Co-chair, Faculty Senate Budget Committee (Fall 2018 – Spring 2021)
Member, Faculty Senate Budget Committee (Fall 2017 – Spring 2021)
Member, Faculty Senate Budget Committee Sub-Committee on Online Education (Fall 2017 – Summer 2018)
Member, Search Committee for the Graduate School of Education, Department of Curriculum & Instruction Tenure-Track position with expertise in Secondary Mathematics (Fall 2016).

College:

Member, OGS/CollegeNet Ad Hoc Committee (2016).

Department of Mathematics and Statistics:

Mathematics Education Committee (Fall 2014 – current; Chair Fall 2022 - current)
Member, Mathematics Education Ph.D. Committee (Fall 2015 – current)
Member, MSMTCH Committee (Fall 2015-current, Chair 2016-2017; 2022-present)
Graduate Teacher Education Preparation in Mathematics Adviser (Fall 2015 – Spring 2016; Fall 2024 - current)
Member, Math Education Ph.D. Exam Committee (Fall 2016, Fall 2018, Fall 2021, Fall 2022, Spring 2024)
Member, Undergraduate Program Ad-hoc Committee (Fall 2018-Spring 2019)
Member, Diversity Committee (Fall 2022 - Spring 2023)
Calculus Coordinator (Fall 2019 - Spring 2021)
Chair, Math Education Ph.D. Exam Committee (Fall 2018, Fall 2022)
Member, DWF Task Force Ad-hoc Committee (Spring 2019-Fall 2019)
Member, Algebra and Analysis Ph.D. Exam Committee (Fall 2018)

Professionally-related Service

Editorial Board Member, *Investigations in Mathematics Learning* (2024 - present)
Co-Editor, *GeT: The News* (2024 - present)
Guest Editor, *Special Issue of Investigations in Mathematics Learning* (2024 Volume 3)
Reviewer, *Journal for Research in Mathematics Education* (2013 - present)
Reviewer, *Journal of Mathematical Behavior* (2015 – present)
Reviewer, *Mathematical Thinking and Learning* (2015 – present)
Reviewer, *Investigations in Mathematical Learning* (2017 – present)
Reviewer, *PRIMUS* (2017 – present)
Reviewer, *North American Chapter of the International Group for Psychology in Mathematics Education Annual Conference* (2010 – present)

Reviewer, *Special Interest Group of the Mathematical Association of America for Research in Undergraduate Mathematics Education Annual Conference* (2012 – present)
Planning Committee, *Seminal Network Improvement committee* (2021-2022)
Panelist, NSF DR-K12 (2019, 2020)
Reviewer, *Mathematics Teacher* (2010 – 2014).

Memberships in Professional Societies

Associate Vice President, Local Arrangements Committee Chair, Association of Mathematics Teacher Educators (AMTE) (2025-present)
President, *Teachers of Teachers of Mathematics* (Oregon AMTE Affiliate) (2022 - present)
Member, National Council of Teacher of Mathematics (2002 – present)
Member, Psychology of Mathematics Education (2010 – present)
Member, MAA SIGMAA on Research in Undergraduate Mathematics Education (2013 – present)
Member, Association of Mathematics Teacher Educators (2014 – present)
Member, Teachers of Teachers of Mathematics (2015 – present)
Member, Oregon Council of Teachers of Mathematics (2016 – present)
Member, MAA SIGMAA on Mathematics for Secondary Teachers (2018 – present)
Member, American Educational Research Association (2014 – 2015)