

*Curriculum Vita*  
**Beth Loveday MacDonald**

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## EDUCATION

- Ph.D. December 2013  
Curriculum and Instruction, Virginia Tech.  
Dissertation Title: MacDonald, B. L. (2013). *Subitizing Activity: Item Orientation with Regard to Number Abstraction*
- M.A.Ed. May 2008  
Master of Arts in Education, Virginia Tech  
Mathematics Specialist Certificate, K-8
- B.A. December 1993  
Elementary Education and Studio Art, Potsdam, State University of New York.  
Elementary Teacher Certificate, N-6

## HIGHER EDUCATION EMPLOYMENT HISTORY

### UTAH STATE UNIVERSITY

**Associate Professor, Mathematics Education (2020-present)**

**School of Teacher Education and Leadership.**

**College of Education and Human Services, Utah State University.**

Responsibilities include pursuing a professional agenda of research in the field of mathematics education, teaching undergraduate and graduate mathematics education courses in the School of Teacher Education and Leadership and Elementary Education, and providing service in mathematics education.

**Assistant Professor, Mathematics Education (2014-2020).**

**School of Teacher Education and Leadership.**

**College of Education and Human Services, Utah State University.**

Responsibilities include teaching mathematics education undergraduate and graduate courses in the School of Teacher Education and Leadership and Elementary Education and pursuing a professional agenda of research and service in the field of mathematics education.

### VIRGINIA TECH

**Graduate Teaching Assistant, Mathematics Education (2012-2013).**

**Department of Teaching and Learning.**

**School of Education, Virginia Tech.**

Supervising mathematics education interns in early field experiences and fulltime internship at the middle and high school level.

**Visiting Clinical Instructor, Mathematics Education (2011-2012).**

**Department of Teaching and Learning.**

**School of Education, Virginia Tech.**

Supervising mathematics education interns in early field experiences and fulltime internship at the middle and high school level. Teaching mathematics education courses for elementary and secondary mathematics pre-service teachers at the undergraduate and graduate level for both the Mathematics Department and the School of Education.

**Professional Development Facilitator, Southwest Virginia Higher Education Center (2011-2013).  
Abingdon, Virginia.**

Responsibilities included designing mathematics and formative assessment professional development workshops for in-service elementary education and middle school education teachers. Informal classroom observations and collaborative grade level planning meetings also were designed to offer support in mathematics pedagogy at the classroom level.

## **K-12 PUBLIC SCHOOL EMPLOYMENT HISTORY**

**Instructional Specialist, K-5 (2009-2011).  
Christiansburg Elementary and Price's Fork Elementary.  
Montgomery County, Virginia**

Responsibilities included planning and teaching collaboratively with classroom teachers and educational specialists, and designing data-driven instructional interventions in a Response to Intervention (RTI) model. Professional development for in-service elementary school teachers teaching mathematics was designed and implemented for the entire county.

**Elementary School Teacher, Grades K, 2, 3, 4, & 5, all subjects (1994-2009).  
Montgomery County Public Schools, Shawsville and Blacksburg, Virginia.**

Responsibilities included planning, designing, and teaching curricula in all content areas to students in a fully inclusive environment. On-going professional development and committee participation were required to promote professional growth and establish school-wide leadership skills. I led committees, clubs, and activities such as, 504 building representative, Odyssey of the Mind coordinator, coach, and judge, Mathematics School Night activities, and Chess Club coach for students in Preschool to Fifth grade.

## **AWARDS & PROFESSIONAL RECOGNITION**

**2020-2022 Guest Lead Editor for a Special Issue**

Invited to serve as a guest lead editor for *Education Sciences* focusing on STEM in Early Childhood Education.

**2021 NSF Funded Mathematics Education Doctoral Conference Participant**

Selected through an application process to participate in a National Science Foundation (NSF) funded conference focusing on developing national foci for mathematics education doctoral courses/programs.

**2020 IES Early Mathematics Online Professional Learning Course Panelist Expert**

Invited to serve as an expert panelist and provide expertise on early childhood mathematics education development for an Institute of Education Sciences (IES) Massive Open Online Course (MOOC).

**2019 Salt Lake City Regional National Council of Teachers of Mathematics Conference Infinity Bar  
Discussant**

Invited by the NCTM conference organizers to lead discussions and answer questions with attendees related to my research.

**2019 Top Downloaded Article in 2017-2018 Award. Paper: MacDonald, B. L., Westenskow, A., Moyer-Packenham, P. S., & Child, B. (2018). Components of place value understanding: Targeting mathematical difficulties when providing interventions. *School Science and Mathematics, 118*(1-2), 17-29. <https://doi.org/10.1111/ssm.12258>**

**2019 Teacher Education and Leadership (TEAL) DC Faculty Fellow**

Selected as the one faculty member from the TEAL department by the college to travel to Washington D.C. in September 2019 to meet with Program Officers regarding National Funding opportunities.

**2018 Faculty Escort for Emma Eccles College of Education and Human Services (CEHS) Valedictorian**

Selected by the college valedictorian as her escort during graduation and commencement events. This role also included helping the valedictorian write her commencement speech.

**2017-2018 Mobile Summer Scientific Institute (MoSI) Teaching Fellow**

Engagement in a week-long summer teaching institute, pedagogical interdepartmental collaboration was developed at Utah State University between faculty in STEM-related fields. Follow-up collaborations occurred over the course of an academic year and allowed for mentorship between fellows when integrating and evaluating scholarship in teaching.

**2016-2017 Emma Eccles Jones College of Education and Human Services (CEHS) Teacher of the Year**

Awarded due to my contributions in teaching and mentorship at the student, class, course, and program level.

**2016-2017 Teacher Education and Leadership (TEAL) Department Teacher of the Year**

Awarded due to my contributions in teaching and mentorship at the student, class, course, and program level.

**2016 Cohort of the Mathematics Education “Service, Teaching and Research” (STaR) Program**

Selected as one of 32 early career mathematics faculty for the 2016 STaR fellowship cohort. Participated with STaR mentors in working groups to facilitate my career as a mathematics educational researcher and teacher. Attended the entire STaR Summer Institute held in Park City, Utah from June 11, 2016 until June 16, 2016. Attended the “regroup” meeting held in conjunction with the AMTE Annual Conference February 9-11, 2017 in Orlando, FL.

**2009 Outstanding Public School Education Award Recipient. Phi Delta Kappa, April 2009**

Awarded due to my two year professional development model that engaged multi-grade level elementary teacher groups in several lesson study projects.

## RESEARCH INTERESTS

**Research Interests:**

- Investigating cognitive mechanisms, such as mental reversibility, in young children that promote reciprocal and inverse development.
- Investigating teachers’ noticing and STEM curricula development when observing student responses.
- Investigating young children identified as low-achieving’s composite units construction and development.
- Interested in how subitizing can leverage units construction with young children and how this activity relates to their reasoning in other STEM-oriented activities.

## PUBLICATIONS

\*- Denotes student collaboration

†- Denotes invitation

**Refereed/Invited Journal Articles**

30. **MacDonald, B. L.**, Hunt, J. H., & Thomas, J. N. (Revising). Gabby’s strategy variability when constructing units: A case study.

29. **MacDonald, B. L.**, \*Litster, K., \*Ashby, J., & Di Stefano, M. (In Preparation). Relationships between low-achieving children’s reversibility development and their mathematics achievement.

28. **MacDonald, B. L.**, \*Ashby, M. J., & \*Litster, K. (In Preparation). Compensation tasks for struggling students. *Mathematics Teaching and Learning Journal*.

27. **MacDonald, B. L.**, Searle, K. A., Tofel-Grehl, C., & Fischback, L. (In Preparation). ESTITCH Lessons Learned: Proportional Reasoning While Creating Timelines and Coding. *Mathematics Teacher: Learning and Teaching Pre-K-12*, X(X), pp. XXX-XXX.
26. Moss, D., Bertolone-Smith, C., Boyce, S., **MacDonald, B.**, Grabhorn, J., & Roman, C. (Revised and Resubmitted). Tensions between objectivism and constructivism in organizing and enacting student learning in online STEM education. *The Educational Forum*.
25. **MacDonald, B. L.**, Boyce, S., Bertolone-Smith, C., Moss, D. L., Grabhorn, J., & Roman, C. (Revising). Theoretical Framing for Pre-service Teachers' Virtual Cuisenaire Rod Use when Exploring Fraction Tasks. *Contemporary Issues in Technology and Teacher Education*.
24. Tofel-Grehl, C., Hawkman, A.M., Searle, K., Suarez, M., **MacDonald, B. L.**, & Feldon, D. (Under Review). "I can be the weird STEM kid who is also gay": Queer rightful presence in STEM. *Journal of the Learning Sciences*, X(X), pp. XXX-XXX.
23. Tofel-Grehl, C., Searle, K., Hawkman, A.M., & **MacDonald, B.** (2021). Rural teachers' cultural and epistemic shifts in STEM teaching and learning. Submitted to *Theory and Practice in Rural Education*.
22. Hawkman, A. M., Tofel-Grehl, C., Searle, K., & **MacDonald, B. L.** (Under Review). Successes, challenges, and surprises: Teacher reflections on using children's literature to explore complex social issues in the elementary classroom. *Teachers and Teaching*.
21. Bertolone-Smith, C., Puliante, A., Sommers, S., Unigarro, M., Vantasselle, D., & **MacDonald, B. L.** (Revising). What pre-service teachers want "Math" to know: Examining Self-Identified Critical Experiences in Mathematics.
20. Searle, K. A., Tofel-Grehl, C., Hawkman, A. M., Suárez, M. I., & **MacDonald, B. L.** (Under Review). Examining white fragility in the elementary classroom: A case study. *Teaching and Teacher Education*, X(X), pp. XXX-XXX.
19. Suárez, M. I., Hawkman, A. M., Tofel-Grehl, C., **MacDonald, B. L.**, Searle, K., Feldon, D. F., Sommers, T., & Hernandez, M. (Revised and Resubmitted). STEM as a cover: Towards a framework for queer emotions, battle fatigue, and STEM identity. *International Journal of Qualitative Studies in Education*, X(X), pp. XXX-XXX.
18. Wilkins, J. L. M., **MacDonald, B. L.**, & Norton, A. (2021). Construction of subitizing units is related to the construction of arithmetic units. *Educational Studies*, Digital Print.
17. Searle, K.A., Tofel-Grehl, C., & **Macdonald, B.** (In Press). Lighting up history: Integrating mathematics and computational thinking in the science classroom. *Science Scope*, X(X), pp. XXX-XXX.
16. **MacDonald, B. L.**, Hunt, J. H., Litster, K., \*Roxburgh, A., & \*Leitch, M. (2020). Diego's number understanding development through his subitizing and counting. *Investigations in Mathematics Learning* 12(4), pp. 275-288. doi: 10.1080/19477503.2020.1824287
15. **MacDonald, B. L.**, Moss, D. L., & Hunt, J. H. (2020). Dominoes: Promoting units construction and coordination. *Mathematics Teacher: Learning and Teaching Pre-K-12*, 113(7), pp. 551-557. doi: 10.5951/MTLT.2019.0237
14. Litster, K., **MacDonald, B.**, & Shumway, J. F. (2020). Experiencing active mathematics learning: Meeting the expectations for teaching and learning in mathematics classrooms. In A. Appova, R. M. Welder, and Z. Feldman, (Eds.), *Supporting Mathematics Teacher Educators' Knowledge and Practices for Teaching Content to Prospective (Grades K-8) Teachers*. Special Issue: *The Mathematics Enthusiast*, ISSN 1551-3440, vol. 17, nos. 2 & 3, pp. 615-640. ScholarWorks: University of Montana. Retrieve (open access) from: <https://scholarworks.umt.edu/tme>
13. Hunt, J. H., **MacDonald, B. L.**, & Silva, J. (2019). Gina's Mathematics: Thinking, Trick, or "Teaching"? *Journal of Mathematical Behavior*, 56, pp. 1-14. doi: 10.1016/j.jmathb.2019.05.001

12. **MacDonald, B. L.** & Wilkins, J. L. M. (2019). Subitising Activity Relative to Units Construction: A Case Study. *Research in Mathematics Education*, 21(1), pp. 77-95. doi: 10.1080/14794802.2019.1579667
11. Moyer-Packenham, P. S., Lommatsch, C. W., \*Litster, K., \*Ashby, J., Bullock, E. K., \*Roxburgh, A. L., Shumway, J. F., Speed, E., Covington, B., Hartmann, C., Clarke-Midura, J., Skaria, J., Westenskow, A., **MacDonald, B.**, Symanzik, J., & Jordan, K. (2019). How design features in digital math games support learning and mathematics connections. *Computers in Human Behavior*, 91. 316-332. doi: 10.1016/j.chb.2018.09.036.
10. \*Litster, K., \*Reeder, R., Di Stefano, M., & **MacDonald, B. L.** (2018). Turn it around: Culturally and Linguistically Responsive Teaching. *Utah Mathematics Teacher, Fall/Winter 2018-2019*.
9. Hunt, J. H., **MacDonald, B. L.**, Lambert, R. Sugita, T., & Silva, J. (2018). “Think Pair Show Share”: UDLizing Talk Moves to Increase Classroom Discourse. *Teaching Children Mathematics*, 25(2), pp. 78-85.
8. **MacDonald, B. L.**, Westenskow, A., Moyer-Packenham, P. S., & Child, B. (2018). Components of place value understanding: Targeting mathematical difficulties when providing interventions. *School Science and Mathematics*, 118(1-2), pp. 17-29. DOI: 10.1111/ssm.12258
7. \*Thronsdon, J., **MacDonald, B. L.**, & Hunt, J. H. (2017). A kindergartener’s conception of number. *Australian Primary Mathematics Classroom Journal*, 22(2), pp. 21-25.
6. \*Di Stefano, M., \*Litster, K., & **MacDonald, B. L.** (2017). Mathematics intervention supporting Allen, an English Learner: A case study. *Education Sciences*, 7(57), pp. 1-24. DOI:10.3390/educsci7020057
5. **MacDonald, B. L.** & \*Shumway, J. F. (2016). Subitizing games: Assessing preschool children’s number understanding. *Teaching Children Mathematics*, 22(6), pp. 340-348.
4. **MacDonald, B. L.** (2015). Ben’s perception of space and subitizing activity: A constructivist teaching experiment. *Mathematics Education Research Journal*, 27(4), pp. 563-584. DOI: 10.1007/s13394-015-0152-0
3. Moyer-Packenham, P. S., \*Shumway, J. F., \*Bullock, E., \*Tucker, S. I., \*Anderson-Pence, K. L., Westenskow, A., \*Boyer-Thurgood, J., Maahs-Fladung, C., Symanzik, J., Mahamane, S., **MacDonald, B.**, & Jordan, K., The Virtual Manipulatives Research Group at Utah State University. (2015). Young children’s learning performance and efficiency when using virtual manipulative mathematics iPad apps. *Journal of Computers in Mathematics and Science Teaching*.
2. Bhandari, T., **MacDonald, B. L.**, Martin, J., Turner, W. D., Modena, A. C., Simmons, J. M., & Asselin, S. B. (2013). Professional seminar: Valuing a one-credit course through the lens of doctoral students. *International Journal of Teaching and Learning in Higher Education*, 25(3), 346-357.
1. † Schulz, J. & **MacDonald, B.** (2010). Lesson study: Building a professional development learning community and developing teachers’ awareness of formative assessment. *Virginia Educational Leadership Journal*, 7(10), 54-64.

### **Books**

1. **MacDonald, B. L.** & Thomas, J. N. (In Preparation). *Teaching Mathematics Conceptually: Guiding Instructional Principles for 5-10 year olds*. London: Sage.

### **Book Chapters**

3. † **MacDonald, B. L.** (In Preparation). Using the constructs of genetic epistemology to develop agendas of research: Research in subitizing to examine early number construction. In P. C. Dawkins, A. J. Hackenberg, & A. Norton (Eds.), *Piaget’s Genetic Epistemology in and for ongoing Mathematics Education Research*. New York: Springer.
2. † Clements, D. H., Sarama, J., & **MacDonald, B. L.** (2019). Subitizing: The neglected quantifier. (pp. 13-45). In A. Norton & M. W. Alibali (Eds.), *Constructing number: Merging perspectives from Psychology and Mathematics Education*. New York: Springer.

1. **MacDonald, B. L.** & Wilkins, J. L. M. (2016). Seven types of subitizing activity characterizing young children's mental activity (pp. 256-286). In S. Marx (Ed.), *Qualitative research in STEM*. New York: Routledge.

### Conference Proceedings

16. **MacDonald, B. L.**, Boyce, S., Bertolone-Smith, C., Moss, D. L., Grabhorn, J., & Roman, C. (2021). Theoretical framing for preservice teachers' virtual Cuisenaire Rod use when exploring fraction tasks. In X.X. Editors (Ed.) *Proceedings of the 43rd Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education* (pp. XXXX-XXXX), Philadelphia, PA.

15. Suárez, M. I., Hawkman, A. M., **MacDonald, B.**, Searle, K., & Tofel-Grehl, C. (2021). Violence manifested through an informal STEM camp for queer youth in rural America. Paper submitted to the *2020 American Educational Studies Association Annual Conference*, San Antonio, TX.

14. Searle, K.A., Tofel-Grehl, C., Hawkman, A., **MacDonald, B.**, & Suárez, M. I. (2021). Developing student-teacher relationships through integrated STEM curricula. Paper presented virtually to the *Utah Academy of Sciences, Arts, and Letters*.

13. **MacDonald, B. L.**, Tofel-Grehl, C., Searle, K. A., Hawkman, A. M., & Suárez, M. I. (2020). Putting the "M" back in STEM: Considering how units coordination relates to computational thinking. In A. I. Sacristán, J. C. Cortés-Zavala, & P. M. Ruiz-Arias (Eds.) *Proceedings of the 42nd Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education* (pp. 2336-2340), Mazatlan, Sinoloa, Mexico. doi: 10.51272/pmena.42.2020-394

12. Moss, D., Boyce, S., **MacDonald, B. L.**, & Bertolone-Smith, C. (2020). Supporting fractions as measures in an online mathematics methods course. In A. I. Sacristán, J. C. Cortés-Zavala, & P. M. Ruiz-Arias (Eds.) *Proceedings of the 42nd Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education* (pp. 1667-1671), Mazatlan, Sinoloa, Mexico. doi: 10.51272/pmena.42.2020-263

11. **MacDonald, B. L.**, Hunt, J. H. & Jordan, K. (2020). Differences in students with learning disabilities (LD) units construction/coordination and subitizing. In A. I. Sacristán, J. C. Cortés-Zavala, & P. M. Ruiz-Arias (Eds.) *Proceedings of the 42nd Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education* (pp. 2330-2335), Mazatlan, Sinoloa, Mexico. doi: 10.51272/pmena.42.2020-393

10. **MacDonald, B. L.** (2018). Relationships Between Units Coordination and Subitizing. In T. E. Hodges, G. J. Roy, A. M. Tyminski (Eds.). *Proceedings of the 40th Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education* (pp. 155-162). Greenville, SC: University of South Carolina and Clemson.

9. Hunt, J. H., **MacDonald, B. L.**, & Silva, J. (2018). Tacit, Trick, or "Teach": What is Gina's Mathematical Reality? In T. E. Hodges, G. J. Roy, A. M. Tyminski (Eds.). *Proceedings of the 40th Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education* (pp. 914-921). Greenville, SC: University of South Carolina and Clemson.

8. Bundock, K., Hunt, J. H., & **MacDonald B. L.** (2017). Writing to learn mathematics: A strategy for promoting reflective abstraction for students with learning disabilities. In E. Galindo & J. Newton (Eds). *Proceedings of the 39th Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education* (pp. 1133). Indianapolis, IN.

7. **MacDonald, B. L.**, Hunt, J. H., & Bundock, K. (2017). Children with Learning Disability's Composite Unit and Subitizing Activity Development. *47th Annual Meeting of the Jean Piaget Society*. San Francisco, CA.

6. **MacDonald, B. L.**, \*Ashby, M. J., \*Litster, K. (2016). Preliminary findings of first grade students' development of reversibility. In M. B. Wood, E. E. Turner, M. Civil, & J. A. Eli (Eds.), *Proceedings of the 38th Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education* (pp. 205-205). Tuscan, AZ.

5. **MacDonald, B. L.**, Boyce, S., \*Xu, C. Z. & Wilkins, J. L. M. (2015). Frank's perceptual subitizing activity relative to number understanding and orientation: A teaching experiment. In T. G. Bartell, K. N. Bieda, R. T. Putnam, K. Bradfield, & H. Dominguez (Eds.), *Proceedings of the 37<sup>th</sup> Annual Psychology of Mathematics Education Conference, North American Chapter*. (pp. 149-156). Lansing, MI.

4. \*Bullock, E., Moyer-Packenham, P. S., \*Shumway, J. F., **MacDonald, B.**, & \*Watts, C. (2015). Effective Teaching with Technology: Managing Affordances in iPad Apps to Promote Young Children's Mathematics Learning. *Proceedings of the Society for Information Technology and Teacher Education International Conference*. Las Vegas, NV.

3. Moyer-Packenham, P. S., Westenskow, A., \*Shumway, J. F., \*Bullock, E., \*Tucker, S. I., \*Anderson-Pence, K. L., \*Boyer-Thurgood, J., Maahs-Fladung, C., Symanzik, J., \*Mahamane, S., **MacDonald, B.**, & Jordan, K., The Virtual Manipulatives Research Group at Utah State University. (2014). The effects of different virtual manipulatives for second graders' mathematics learning in the touch-screen environment. *Proceedings of the 12<sup>th</sup> International Conference of the Mathematics Education into the 21<sup>st</sup> Century Project*, (Vol. 1, p. 1-6). Herceg Novi, Montenegro

2. **MacDonald, B. L.**, Xu, C. Z., & Wilkins, J. L. M. (2012). Relating children's topological understandings with number understanding through subitizing. In L. R. Van Zoest, J.-J. Lo, & J. L. Kratky (Eds.), *Proceedings of the 34<sup>th</sup> Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education* (pp. 1009), Kalamazoo, MI.

1. Boyce, S., Wilkins, J. L. M., & **MacDonald, B. L.** (2011). Teaching students to estimate probabilities: The frequentist approach and its relationship with statistical understanding. In L. R. Weist, & T. D. Lamberg (Eds.), *Proceedings of the 33<sup>rd</sup> Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education* (pp. 233-240), Reno, NV.

### **Research Symposiums**

1. **MacDonald, B. L.** & \*Roxburgh, A. (2019). *Differentiating Instruction in Mathematics Education*. Paper symposium organized by A. J. Hackenberg at the Annual Research Conference of the National Council of Teachers of Mathematics (NCTM), San Diego, CA.

### **Working Groups**

5. **MacDonald, B. L.**, Boyce, S., Byerley, C., Moss, D., Bertolone-Smith, C. M., Grabhorn, J., & Roman, C. (2021). Complex connections: Reimagining units construction and coordination. In X. X. Editors (Eds.) *Proceedings of the 43rd Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education* (pp. XXX-XXX), Philadelphia, PA.

4. **MacDonald, B. L.**, Boyce, S., Byerley, C., Moss, D., Bertolone-Smith, C. M. & Grabhorn, J. (2020). Complex connections: Reimagining units construction and coordination. In A. I. Sacristán, J. C. Cortés-Zavala, & P. M. Ruiz-Arias (Eds.) *Proceedings of the 42nd Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education* (pp. 169-170), Mazatlan, Sinoloa, Mexico. doi: 10.51272/pmena.42.2020-13.

3. **MacDonald, B. L.**, Boyce, S., Hunt, J. H., Byerley, C., Moss, D., & Bertolone-Smith, C. M. (2019). Complex connections: Reimagining units construction and coordination. 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.

2. **MacDonald, B. L.**, Boyce, S. J., Hunt, J. H., Byerley, C., & Moss, D. L. (2018). Complex connections: Reimagining units coordination. In T. E. Hodges, G. J. Roy, A. M. Tyminski (Eds.). *Proceedings of the 40th Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education* (pp. 1439-1448). Greenville, SC: University of South Carolina and Clemson.

1. Lewis, K. E., Sheldon, J., Rands, K., Hunt, J. H., Tan, P., Lambert R., & **MacDonald, B. L.** (2017). Critical perspectives on disability and mathematics education. In E. Galindo & J. Newton (Eds). *Proceedings of the 39th Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education* (pp. 1474-1480). Indianapolis, IN.

## RESEARCH IN PROGRESS

- Primary Investigator on an embedded mixed methods study design examining both teacher and student effects of an embedded professional development that utilizes Number Talks in upper Elementary grade levels. This collaborative work with the Davis School district includes educational leaders from the Mathematics Education Collaborative (MEC), Cathy Humphreys and Debbie Olsen, Hilda Borko from Stanford University, and David Woodward from Forefront Education.
- Senior research consultant for the CHAOS Learning Lab where particular intersections (e.g., Cultural Studies, Queer Theory) are examined with Science, Technology, Engineering, and Mathematics (STEM) professional development and student learning.
- Co-Investigator on a mathematics teacher education project examining pre-service teachers' fraction development while engaging with tasks designed to elicit fractions as a form of measure understandings. This collaborative design based research study includes Steven Boyce, Portland State University, Diana Moss, University of Nevada, Reno, and Claudia Bertolone-Smith, University of California, Chico.
- Primary Investigator on a qualitative, exploratory study (Early COUNT – Conceptual Understandings of Number Trajectories) where myself, a special education/mathematics education associative professor, two first grade teachers, two graduate students, and one undergraduate students investigated how alternative subitizing activity, first grade students may evidence relates to their units construction (2018). Findings from this study are being used to inform a larger NSF grant proposal where children identified as having a learning disability may develop units in natural number and fraction tasks.

## GRANTS FUNDED

**Collaborator.** (\$34,920.00). *EyeLink 1000 Plus eye tracking system Equipment Grant*. Utah State University Office of Research Capital Equipment Grant. (with Lead PI – Kerry Jordan and collaborators – Brent Chamberlain, David Feldon, Ron Gillam, Wade Goodridge, and Colby Tofel-Grehl). Funded by Utah State University's Office of Research and Graduate Studies.

**Senior Personnel.** (\$31,439.00) *Supplement to Project E-STITCH: Elementary STEM Teaching Integrating Textiles and Computing Holistically* (2019-2021). National Science Foundation ITEST Program.

**Co-Principal Investigator.** (\$40,000.00). *Improving Mathematics Preparation of Elementary School & Special Education Teachers* (2016-2017). Funded by Utah State University's Curriculum and Development Office. (with Lead PI – James Cangelosi and Co-PIs - Patricia Moyer-Packenham and Jean Culbertson).

**Principal Investigator.** (\$18,595.00). *Supporting Kindergarten, First grade, and Second Grade Students' Ability to Utilize Mental Reversibility When Solving Computational Problems* (2015-2016). Funded by Utah State University's Office of Research and Graduate Studies Research Catalyst Grant.

**Co-Principal Investigator.** (\$10,000.00). *Lesson Study: Building a Professional Development Learning Community and Developing Teachers' Awareness of Formative Assessment*. (2008-2009). VAASCD Research Grant. Project goal: qualitatively measure changes in teachers' use of assessment while engaged in a year-long Lesson Study experience. (with PI - Jonathan Schulz)

## GRANTS PENDING

**Principal Investigator.** (\$293,420). *Collaborative Research: Utilizing Number to Initiate Fraction Inquiry (UNIFI) for Students with Learning Disabilities.* Submitted to the National Science Foundation (NSF) Directorate for Education and Human Resources (EHR) Core (NSF 21-588) (with Co-PIs: Jessica Hunt and Kerry Jordan).

**Principal Investigator.** (\$493,986). *Teachers Engagement with Number Talks (TENTs).* Submitted to the National Science Foundation (NSF) Discovery Research PreK-12 (DRK-12) (NSF 20-572) (with Co-PI: Hilary Tanck).

**Co-Principal Investigator.** (\$1,481,227). *The Migration Data Project: Coding as a Fulcrum for Elementary Interdisciplinary Learning.* Submitted to the National Science Foundation (NSF). (with PI: Colby Tofel-Grehl).

## TEACHING

### UNIVERSITY TEACHING

**Utah State University, Logan, Utah (2014-present)**  
**College of Education and Human Services**

\* - Denotes course development/re-development

*Courses Taught – Utah State University (18 courses)*

Doctoral Courses (Face to Face, Broadcast, Online):

TEAL 7551 – Mathematics Education Research Foundations

TEAL 7552 - Mathematics Education Learning Theory

TEAL 7553 - Mathematics Education Curriculum Content & Evaluation

TEAL 7554 – Mathematics Education Teacher Preparation & Pedagogy

TEAL 7555 – Mathematics Education Current Issues and Policy

\*TEAL 7557 – Advanced Research Design in Mathematics Education and Leadership

Masters Courses (Online):

TEAL 6521 – Mathematics for Teaching K-8: Numbers & Operations

TEAL 6522 – Mathematics for Teaching K-8: Rational Numbers & Proportional Reasoning

TEAL 6523 – Mathematics for Teaching K-8: Algebra

\*TEAL 6524 – Mathematics for Teaching K-8: Geometry & Measurement

\*TEAL 6525 – Mathematics for Teaching K-8: Data Analysis & Problem Solving

TEAL 6300 – Workshop in Mathematics Education

TEAL 6551 – Mathematics for Teaching K-8: Assessment & Intervention

\*TEAL 6552 – Mathematics Education Leadership Knowledge and Skills

Undergraduate Courses (Face to Face, Broadcast, Online):

ELED 4060 – Teaching Mathematics & Practicum Level III

\*ELED 4061 – Teaching Elementary School Mathematics I: Rational Number, Operations, and Proportional Reasoning

\*ELED 4062 – Teaching Elementary School Mathematics II: Number, Operations, and Algebraic Reasoning

TEAL 4630/6630 – Teaching Middle School Mathematics

**Virginia Tech, Blacksburg, Virginia (2011-2013 – 2 courses)**  
**School of Education, Department of Teaching and Learning**

Graduate Courses Taught

EDCI 5234 – Advanced Curriculum and Instruction in Elementary/Middle Mathematics Classroom

EDCI 5784 – Assessment and Diagnosis in the Mathematics Classroom

**Virginia Tech, Blacksburg, Virginia (2011-2012 – 2 courses)**  
**College of Science, Department of Mathematics**

### Undergraduate Courses Taught

MATH 1614 – Number and Computing for Teachers  
MATH 1624 – Geometry and Computing for Teachers

**Radford University, Radford, Virginia (2010 – 1 course)**  
**College of Education and Human Development, School of Teacher Education and Leadership**

### Undergraduate/Graduate Courses Taught

EDSP 445/545 – Adaptive Strategies in Arithmetic

## **PROGRAM AND COURSE DEVELOPMENT**

**Utah State University, Logan, Utah (2014–Present: 6 courses)**

### **Undergraduate Course and Program Development:**

I led collaborative meetings between the TEAL department mathematics educators and the MATH department mathematics educators to design course descriptions and syllabi for four new courses for students majoring in elementary education, K-6 education, early childhood education, and dual enrolled elementary education and special education. Typically, two hours/week meetings for 30 weeks/calendar year (2014-2015) were spent designing courses, leading program meetings, working with advising, and mentoring doctoral students throughout this process. Anticipated start for these courses will be fall of 2015.

I led the “Elementary Education Program Committee” meetings to determine how the 12 Elementary Education programs could possibly be changed to allow for an additional 3 credits to be included. These meetings included the Special Education department chair and advisor, the Teacher Education and Leadership department chair, advising director and faculty member, the Deaf Education advisor, and the Accreditation staff.

### **Approved Course Titles:**

MATH 2010 Number Sense, Numeration, and Algebraic Thinking, for Elementary School Teachers (3 credits)  
MATH 2020 Euclidean Geometry and Statistics for Elementary School Teachers (3 credits)  
ELED 4061 Teaching Elementary School Mathematics I: Rational Number, Operations, and Proportional Reasoning (3 credits)  
ELED 4062 Teaching Elementary School Mathematics II: Number, Operations, and Algebraic Reasoning (3 credits)

### **Masters Course and Program Development:**

I redeveloped a current course, *TEAL 6525 Data Analysis and Problem Solving*. Innovative course features that I included were integrated science, data analysis, and algebraic reasoning activities and video footage of students engaging with these activities. This afforded students to engage and reflect on STEM activities and see the value of such integration. I also included more technology-based tools (e.g., Tinkerplots) to afford students opportunities to use an effective instructional tool, to show evidence of aforementioned engagement with activities, and to develop valuable insight to technology-based integration when teaching. These innovations were tested and evaluated the subsequent semester and have been found to provide rich value for each student enrolled in this course.

I developed a mathematics education leadership course, *TEAL 6552 Mathematics Education Leadership Knowledge and Skills*. Innovative course features that I included were activities that required students to interview administrators, plan with fellow teachers, observe classroom instruction, and create authentic learning trajectories around children’s learning experiences. These activities are typically absent in an online asynchronous class. By including these innovative course features, students are more readily able to understand how mathematics leaders use advanced curriculum and instruction to inform reflective embedded professional development. These innovations are currently being tested and evaluated.

I oversaw graduate student re-development of *TEAL 6524 Algebraic Reasoning* in the summer of 2020. As a graduate student worked on this course redevelopment, I ordered exam copies of books and provided feedback on course design.

### **Approved Course Title:**

TEAL 6552 Mathematics Education Leadership Knowledge and Skills

### **Doctoral Course and Program Development:**

I revised a current course, TEAL 7810 Mathematics Education Advanced Research Design & Proposal Writing, to develop a new course, TEAL 7557 Mathematics Education Advanced Research Design & Proposal Writing. Additionally, I have increased the rigor of this course by including an “Academic Writing Club” where doctoral students would be required to meet and discuss portions of their dissertation proposals to better form a scholarly understanding of what it means to write academically and what constitutes as an effective dissertation proposal. Further, a textbook and more comprehensive reading aligned with theoretical and conceptual frameworks was required which were researched extensively prior to the formation of this course.

### **Approved Course Title:**

TEAL 7557 Mathematics Education Advanced Research Design & Proposal Writing (3 credits)

## **RESEARCH SUPERVISION PHD GRADUATES/DISSERTATIONS COMPLETED (16)**

### **MAJOR CHAIR**

Lauren Burton. *A case study on how meeting the academic needs of students substantially below grade level in mathematics affects their self-efficacy beliefs and engagement.* (Dissertation defended, July 2, 2018; Utah State University.)

Awards: CEHS Graduate Student Research Award (2017), \$3,000.

Melanie Durfee. *Managing student-to-student discourse: Shifting the mathematical authority.* (Dissertation defended, August 2, 2018; Utah State University.)

Awards: CEHS Graduate Student Research Award (2018), \$470.

### **COMMITTEE MEMBER**

Katie Anderson-Pence. *Examining the impact of different virtual manipulatives types in the nature of students’ small group discussions: An exploratory mixed methods case study of techno-mathematical discourse.* (Dissertation defended, April 3, 2014; Utah State University.)

Awards: TEAL Graduate Research assistant of the Year (2013)

Stephen Tucker. *An exploratory study of attributes, affordances, abilities, and distance in students’ use of virtual manipulative mathematics iPad apps.* (Dissertation defended June 4, 2015; Utah State University.)

Awards: CEHS Graduate Research Assistant of the Year (2015)

Jessica Shumway. *A counting-focused instructional treatment for developing number system knowledge in second-grade: A mixed methods study on children’s number sense.* (Dissertation defended, March 25, 2016; Utah State University.)

Awards: TEAL Graduate Research Assistant of the Year (2012); Lawson Scholarship Award (2013-14; 2015-16)

Jennifer Boyer-Thurgood. *The anatomy of an APP: Using Grounded Theory to conceptualize and evaluate mathematics learning apps.* (Dissertation defended, March 30, 2016; Utah State University.)

Awards: CEHS Graduate Teaching Assistant of the Year (2014); TEAL Graduate Teaching Assistant of the Year (2012)

Scott Smith. *An exploratory study of fifth-grade students’ reasoning about the relationship between fractions and decimals when using number line-based virtual manipulatives.* (Dissertation defended, September 29, 2016; Utah State University.)

Emma Bullock. *An explanatory sequential mixed methods study of the school leaders’ role in students’ mathematics achievement through the lens of complexity theory* (Dissertation defended, March 31, 2017; Utah State University.)

Awards: CEHS Graduate Research Assistant of the Year (2016); Lawson Scholarship Award (2016-17)

Jennifer Thronsen. *Effects of preschool attendance on early mathematical literacy.* (Dissertation defended, March 12, 2018; Utah State University.)

Christina Watts. *Learning logic: A mixed methods study to examine the effects of context ordering reasoning about conditionals* (Dissertation defended March 14, 2018; Utah State University.)

Awards: TEAL Graduate Research Assistant of the Year (2017); Lawson Scholarship Award (2017-18)

Andrew Glaze. *Teachers' conceptions of mathematics and intelligent tutoring use: A Mixed Methods approach*. (Dissertation defended, April 15, 2019; Utah State University.)

Kami Dupree. *A multiple case study of Secondary mathematics teachers' responses to pivotal teaching moments*. (Dissertation defended, April 19, 2019; Utah State University.)

Awards: TEAL Dissertation of the Year (2019)

Kristy Litster. *The relationship between small group discourse and student enacted levels of cognitive demand when engaging with mathematics tasks at different depth of knowledge levels*. (Dissertation defended, July 18, 2019; Utah State University.)

Awards: TEAL Dissertation of the Year (2020)

Samuel Gedeberg. *Students' perceptions of the learning environment and motivation and its relationship to their persistence and retention in online developmental mathematics courses*. (Dissertation defended, October 30, 2019; Utah State University.)

Derrick Harkness. *Teaching Students to Communicate with the Precise Language of Mathematics*. (Dissertation defended May 29, 2020; Mathematics, Utah State University.)

Thomas Mgonja. *An Exploratory Study Examining the Use of Culturally Relevant Pedagogy in Undergraduate Mathematics with Students of Color*. (Dissertation defended April 22, 2021; Utah State University.)

### **PHD PROPOSALS COMPLETED (10)**

#### **MAJOR CHAIR**

Angela Frabasilio (2018-present); School of Teacher Education and Leadership, Utah State University (Dissertation Proposal defended on January 31, 2020). *Relationships Between Middle School Students' Adaptive Reasoning When Creating Learner-Generated Drawings and Partner Talk During Inquiry-Based Mathematical Tasks*.

Awards: CEHS Graduate Student Research Award (2021), \$879.52.

Michael Leitch (2018-present); School of Teacher Education and Leadership, Utah State University (Dissertation Proposal defended February 11, 2021). *Teacher Learning of Fractions Division with Area Models*.

Carrie Bala (2018-present); School of Teacher Education and Leadership, Utah State University (Dissertation Proposal defended May 27, 2021). *The Influence of a Values Affirmation Intervention on Students' Social, Mathematical, and Epistemological Empowerment*.

Awards: School of Graduate Studies Student Travel Award (2021), \$550.00.

Vicki Lyons (2018-present); School of Teacher Education and Leadership, Utah State University (Dissertation Proposal defended May 28, 2021). *The Essential Nature of Psychological Safety in Advanced Placement Students' Mathematical Discourse*.

Amy Kinder (2020-present); School of Teacher Education and Leadership, Utah State University (Dissertation Proposal defended September 24, 2021). *A Mixed Methods Study Examining the Effects that Video Club's Collaborative Discussions and Planning have on Mindset and Reflecting on Instruction*.

#### **CO-CHAIR**

Danielle Divis (2020-present); School of Teacher Education and Leadership, Utah State University (Dissertation Proposal defended on April 29, 2021). *The Role of Music Context in High School Students' Translations Among Representations in Algebra*

Awards: Graduate Research and Creative Opportunities Dissertation Award (2021), \$1,000.00

### **COMMITTEE MEMBER**

Rachel Reeder (2017-present); School of Teacher Education and Leadership, Utah State University (Dissertation Proposal defended January 16, 2020). *Investigating K-1 Spanish Dual Language Immersion Teachers' Conceptions of Mathematics-focused Content-Based Language Teaching.*

Allison Roxburgh (2018-present); School of Teacher Education and Leadership, Utah State University (Dissertation Proposal defended February 12, 2021). *How Preservice Teachers' Awareness of Design Features and Academic language Features Relates to Choosing and Evaluating Digital Math Games for English Language Learners.*

Joseph S. Kozlowski (2019-present); School of Teacher Education and Leadership, Utah State University (Dissertation Proposal defended April 29, 2021). *Kindergarten-aged Children's Engagement in Mathematics Through Awareness of Design Features: A Comparison Across Different Coding Toys.*

Lise Welch (2020-present); School of Teacher Education and Leadership, Utah State University (Dissertation Proposal defended August 3, 2021). *Connections Between Mathematics and Computational Thinking: Kindergarten Students' Demonstration of Mathematics Knowledge in a Computational Thinking Assessment.*

### **PHD SUPERVISORY & PROGRAM COMMITTEES (6)**

#### **MAJOR CHAIR**

Lorraine Gale (2020-present); School of Teacher Education and Leadership, Utah State University

KimberLeigh Hadfield (2020-present); School of Teacher Education and Leadership, Utah State University

#### **CO-CHAIR**

Sandra Miles (2020-present); School of Teacher Education and Leadership, Utah State University

#### **COMMITTEE MEMBER**

Kimberly Beck (2021-present); School of Teacher Education and Leadership, Utah State University

Trent J. Fawcett (2017-present); School of Teacher Education and Leadership, Utah State University

Jet Warr (2018-present); School of Teacher Education and Leadership, Utah State University

### **EDUCATION SPECIALIST STUDENTS COMPLETED (2)**

Don Busenbark. Comprehensive Exam successfully completed November 1, 2018; School of Teacher Education and Leadership, Utah State University.

Janiece Seegmiller. Comprehensive Exam successfully completed December 2, 2020; School of Teacher Education and Leadership, Utah State University.

### **MASTERS STUDENTS COMPLETED (15)**

#### **MAJOR CHAIR (PLAN B – Project Based Thesis)**

Allison Roxburgh. *Struggling Students' use of representation when developing number sense and problem solving abilities*, Creative project defended December 8, 2016; School of Teacher Education and Leadership, Utah State University.

Caci Jensen. *Relationships between teachers' past experiences learning mathematics and their pedagogical practices and beliefs*, Creative project defended November 30, 2018; School of Teacher Education and Leadership, Utah State University.

**MAJOR ADVISOR (PLAN C – Exit Interview)**

Haley Brenchley. Exit Interview February 21, 2018; School of Teacher Education and Leadership, Utah State University.

Jalyn Kelley. Exit Interview April 10, 2018; School of Teacher Education and Leadership, Utah State University.

Kevin Smith. Exit Interview August 4, 2018; School of Teacher Education and Leadership, Utah State University.

Kristin Meanea. Exit Interview November 5, 2018; School of Teacher Education and Leadership, Utah State University.

Tami DeCoursey. Exit Interview November 6, 2018; School of Teacher Education and Leadership, Utah State University.

Rebecca Warnes. Exit Interview April 16, 2019; School of Teacher Education and Leadership, Utah State University.

Hailey Flinders Faiola. Exit Interview April 24, 2019; School of Teacher Education and Leadership, Utah State University.

Lauren Kidd. Exit Interview July 16, 2019; School of Teacher Education and Leadership, Utah State University.

Danelle Mineer. Exit Interview July 16, 2019; School of Teacher Education and Leadership, Utah State University.

Deborah Kent. Exit Interview July 16, 2019; School of Teacher Education and Leadership, Utah State University.

Kadee Skeem. Exit Interview July 16, 2019; School of Teacher Education and Leadership, Utah State University.

Teryn Ercanbrack Exit Interview April 6, 2020; School of Teacher Education and Leadership, Utah State University.

Sandra Miles, Exit Interview July 13, 2020; School of Teacher Education and Leadership, Utah State University.

**CURRENT MASTERS STUDENTS (2)**

**MAJOR ADVISOR (PLAN C)**

Morgan McLaws (2021-present); School of Teacher Education and Leadership, Utah State University.

Calise Brogdon (2021-present); School of Teacher Education and Leadership, Utah State University.

**UNDERGRADUATE SUPERVISOR FOR HONOR'S THESIS COMPLETED (1)**

**COMMITTEE MEMBER**

Sara Ambrust (September 2014-May 2015); School of Teacher Education and Leadership; Utah State University

## PRESENTATIONS

### International and National Presentations

\*- Denotes student collaboration

†- Denotes invited

42. **MacDonald, B. L.**, Boyce, S., Moss, D. L., Bertolone-Smith, C., Grabhorn, J., & Roman, C. (2022, February). *Using a Framework to Teach and Inform Research in Online Mathematics Methods Courses*. Presentation conducted at the 26<sup>th</sup> Annual Conference of the Association of Mathematics Teacher Educators (AMTE), Las Vegas, NV.

39. **MacDonald, B. L.**, Boyce, S., Byerley, C., Moss, D., Bertolone-Smith, C. M. & Grabhorn, J. (2021, October). *Complex Connections: Reimagining Units Construction and Coordination*. Working Group Paper presented at the 43<sup>rd</sup> Annual Meeting of the North American Chapter of the International Group of the Psychology of Mathematics Education (PME-NA), Philadelphia, PA.

40. **MacDonald, B. L.**, Boyce, S., Bertolone-Smith, C., Moss, D. L., Grabhorn, J., & Roman, C. (2021, October). *Theoretical framing for preservice teachers' virtual Cuisenaire Rod use when exploring fraction tasks*. Paper presented at the 43<sup>rd</sup> Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education (PME-NA), Philadelphia, PA.

39. **MacDonald, B. L.**, Boyce, S., Byerley, C., Moss, D., Bertolone-Smith, C. M. & Grabhorn, J. (2021, June). *Complex Connections: Reimagining Units Construction and Coordination*. Working Group Paper presented at the 42<sup>nd</sup> Annual Meeting of the North American Chapter of the International Group of the Psychology of Mathematics Education (PME-NA), Mazatlan, Sinoloa, Mexico.

38. **MacDonald, B. L.**, Tofel-Grehl, C., Searle, K., Hawkman, A. M., & Suárez, M. I. (2021, June). *Putting the "M" back in STEM: Considering how units coordination relates to computational thinking*. Paper presented at the 42<sup>nd</sup> Annual Meeting of the North American Chapter of the International Group of the Psychology of Mathematics Education (PME-NA), Mazatlan, Sinoloa, Mexico.

37. **MacDonald, B. L.**, Hunt, J. H. & Jordan, K. (2021, June). *Differences in students with learning disabilities (LD) units construction/coordination and subitizing*. Paper presented at the 42<sup>nd</sup> Annual Meeting of the North American Chapter of the International Group of the Psychology of Mathematics Education (PME-NA), Mazatlan, Sinoloa, Mexico.

36. Moss, D., Boyce, S., **MacDonald, B.**, & Bertolone-Smith, C. (2021, June). *Supporting fractions as measures in an online mathematics methods course*. Paper presented at the 42<sup>nd</sup> Annual Meeting of the North American Chapter of the International Group of the Psychology of Mathematics Education (PME-NA), Mazatlan, Sinoloa, Mexico.

35. Suárez, M. I., Hawkman, A. M., Tofel-Grehl, C., **MacDonald, B. L.**, & Searle, K. (2021, April). STEM as a cover: Towards a framework for queer emotions, battle fatigue, and STEM identity [Roundtable session]. Paper accepted to the *2021 American Educational Research Association Annual (AERA) Conference*, Orlando, FL. (Moved to virtual conference due to COVID-19)

34. Bertolone-Smith, C., Boyce, S., **MacDonald, B.**, & Moss, D. (2021, February). Comparing online and face-to-face environments when prospective teachers conceive of fractions as measures. *25th Annual Association of Mathematics Teacher Educators (AMTE) Conference*, Orlando, FL. (Moved to virtual conference due to COVID-19)

33. Litster, K. & **MacDonald B. L.** (2021, February). Using Discourse to Help Students Develop Multiple Ways of Subtracting Fractions. *25th Annual Association of Mathematics Teacher Educators (AMTE) Conference*, Orlando, FL. (Moved to virtual conference due to COVID-19)

32. Hawkman, A. M., Searle, K., Tofel-Grehl, C., **MacDonald, B.**, & Suárez, M. I. (2020, October). Reflections on preparing teachers to engage elementary students in discussions of complex social issues. [Individual paper]. *AESA Annual Conference*, San Antonio, TX. (Conference cancelled).

31. Suárez, M. I., Hawkman, A. M., **MacDonald, B.**, Searle, K., & Tofel-Grehl, C. (2020, October). Violence manifested through an informal STEM camp for queer youth in rural America. [Individual paper]. *AESA Annual Conference*, San Antonio, TX. (Conference cancelled).
30. Bertolone-Smith, C. M. Moss, D. L., & **MacDonald, B. L.** (2020, February). Dear Math... Examining Women's Self-Identified Critical Experiences in Mathematics, *24th Annual Association of Mathematics Teacher Educators (AMTE) Conference*, Phoenix, AZ.
29. **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.
28. **MacDonald, B. L.**, Boyce, S., Hunt, J. H., Byerley, C., Moss, D., & Bertolone-Smith, C. M. (2019, November). *Complex Connections: Reimagining Units Construction and Coordination*. Working Group Paper presented at the 41<sup>st</sup> Annual Meeting of the North American Chapter of the International Group of the Psychology of Mathematics Education (PME-NA), St. Louis, MO.
27. Moss, D., **MacDonald, B.**, Boyce, S., & Bertolone-Smith, C. (2019, November). *Using math manipulatives to conceptually make sense of fractions as measures*. Workshop presented at the Annual Convention of the School Science and Mathematics Association (SSMA), Salt Lake City, UT.
26. **MacDonald, B.**, Moss, D., Boyce, S., & Bertolone-Smith, C. (2019, November). *Supporting Fractions as Measures in an Online Mathematics Methods Course*. Research presented at the Annual Convention of the School Science and Mathematics Association (SSMA), Salt Lake City, UT.
25. **MacDonald, B. L.** & \*Roxburgh, A. (2019, April). *Differentiating Instruction in Mathematics Education*. Presentation within the symposium organized by A. J. Hackenberg at the Annual Research Conference of the National Council of Teachers of Mathematics (NCTM), San Diego, CA.
24. **MacDonald, B. L.**, Urbanek-Carney, S., & \*Roxburgh, A. (2019, April). *Supporting Students with Severe Special Education Needs in Early Number Development*. National Council of Teachers of Mathematics (NCTM) Annual Conference and Exposition, San Diego, CA.
23. Hunt, J. H., **MacDonald, B. L.**, Silva, J. & Lambert, R. (2019, April). *"Think Pair Show Share": UDLizing Talk Moves to Increase Classroom Discourse*. National Council of Teachers of Mathematics (NCTM) Annual Conference and Exposition, San Diego, CA.
22. **MacDonald, B. L.** (2018, November). *Relationships Between Units Coordination and Subitizing*. Paper presented at the 40<sup>th</sup> Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education (PME-NA). Greenville, SC.
21. Hunt, J. H., **MacDonald, B. L.**, & Silva, J. (2018, November). *Tacit, Trick, or "Teach": What is Gina's Mathematical Reality?* Paper presented at the 40<sup>th</sup> Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education (PME-NA). Greenville, SC.
20. **MacDonald, B. L.**, \*Ashby, J., Maahs-Fladung, C., \*Litster, K., & Di Stefano, M. (2018, April). Relationships Between Low-Achieving Students' Reversibility Development and Early Mathematics Achievement. *American Educational Research Association (AERA) 2018 Annual Meeting*, New York City, NY.
19. Moyer-Packenham, P. S., \*Lommatsch, C. M., \*Litster, K., \*Ashby, J., Bullock, E., Shumway, J. F., & **MacDonald, B.** (2018, April). Affordances of Digital Games for Mathematics Learning in Grades 3-6. *American Educational Research Association (AERA) 2018 Annual Meeting*, New York City, NY.
18. Bundock, K., Hunt, J. H., & **MacDonald B. L.** (2017, October). *Writing to learn mathematics: A strategy for promoting reflective abstraction for students with learning disabilities*. Paper presented at the 39<sup>th</sup> Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education (PME-NA). Indianapolis, IN.

17. †DiStefano, M., \*Litster, K., & **MacDonald, B. L.** (2017, August) The Interdependence of Language and Math: K-2 ELs Solving Inversion and Compensation Tasks. *1<sup>st</sup> Annual Build Math Minds Virtual Summit, International Conference*.
16. **MacDonald, B. L.**, Hunt, J. H., & Bundock, K. (2017, June). Children with Learning Disability's Composite Unit and Subitizing Activity Development. Paper presented at the *47<sup>th</sup> Annual Meeting of the Jean Piaget Society*. San Francisco, CA.
15. **MacDonald, B. L.**, \*Ashby, M. J., & \*Litster, K. (2017, April). *Early elementary algebraic reasoning development for students receiving intervention support*, National Council of Teachers of Mathematics (NCTM) Annual Conference and Exposition, San Antonio, Texas.
14. Di Stefano, M., \*Litster, K., & **MacDonald, B. L.** (2017, April). *Language effects in K-2 ESL students receiving mathematics intervention support*, National Council of Teachers of Mathematics (NCTM) Annual Conference and Exposition, San Antonio, Texas.
13. **MacDonald, B. L.**, Maahs-Fladung, C., \*Litster, K., & \*Ashby, M. J. (2017, February). Measuring elementary preservice teachers' beliefs as related to their pedagogy, *21<sup>st</sup> Annual Association of Mathematics Teacher Educators (AMTE) Conference*, Orlando, FL.
12. **MacDonald, B. L.**, \*Ashby, M. J., \*Litster, K. (2016, November). *Preliminary findings of first grade students' development of reversibility*. Paper presented at the Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education (PME-NA). Tuscan, AZ.
11. †**MacDonald, B. L.** (2016, November). How to utilize subitizing games as a form of assessment when understanding children's number acquisition. *International Webinar for "Recovering Traditionalist."*
10. **MacDonald, B. L.** (2016, May). *Seven Types of Subitizing Activity Characterizing Young Children's Mental Activity*. In S. Marx (Ed.) Introduction to the Possibilities of Qualitative Research in STEM. Panel Presentation at the 12<sup>th</sup> Annual 12<sup>th</sup> International Congress of Qualitative Inquiry (ICQI), Urbana-Champaign, Illinois.
9. **MacDonald, B. L.**, Boyce, S., \*Xu, C. Z. & Wilkins, J. L. M. (2015, November). *Frank's perceptual subitizing activity relative to number understanding and orientation: A teaching experiment*. Paper presented at the Annual Psychology of Mathematics Education Conference, North American Chapter. (PME-NA). Lansing, MI.
8. \*Bullock, E., Moyer-Packenham, P. S., \*Shumway, J. F., **MacDonald, B.**, & \*Watts, C. (2015, March). Effective Teaching with Technology: Managing Affordances in iPad Apps to Promote Young Children's Mathematics Learning. *Proceedings of the Society for Information Technology and Teacher Education International Conference*. Las Vegas, NV.
7. Moyer-Packenham, P. S., \*Shumway, J. F., \*Bullock, E., \*Tucker, S. I., \*Anderson-Pence, K., Westenskow, A., \*Boyer-Thurgood, J., Maahs-Fladung, C., Symanzik, J., \*Mahamane, S., **MacDonald, B.**, & Jordan, K., The Virtual Manipulatives Research Group at Utah State University. (2014, April). *Young children's learning performance and efficiency when using virtual manipulative mathematics iPad apps*. Paper presented at the Annual National Council of Teachers of Mathematics Research Conference (NCTM), New Orleans, Louisiana.
6. Creamer, E. G., **MacDonald, B. L.**, & \*Fowlin, J. (2014, February). Using Mixed Methods Research Designs to Conduct Research in Teaching and Learning. *6<sup>th</sup> Annual Conference on Higher Education Pedagogy*, Blacksburg, VA.
5. Bhandari, T., Martin, J., **MacDonald, B. L.**, & Turner, W. (2013, February). Professional Seminar: Conducting Research in a Collaborative Culture. Poster Session. *5<sup>th</sup> Annual Conference on Higher Education Pedagogy*, Blacksburg, VA.
4. Bhandari, T., Martin, J., **MacDonald, B. L.**, & Turner, W. (2013, February). Valuing a One-Credit Course through the Lens of Doctoral Students. Poster Session. *5<sup>th</sup> Annual Conference on Higher Education Pedagogy*, Blacksburg,

VA.

3. **MacDonald, B. L.**, Xu, C. Z., & Wilkins, J. L. M. (2012, November). *Relating children's topological understandings with number understanding through subitizing*. Paper presented at the Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education (PME-NA), Kalamazoo, MI.

2. Boyce, S., Wilkins, J. L. M., & **MacDonald, B. L.** (2011, November). *Teaching students to estimate probabilities: The frequentist approach and its relationship with statistical understanding*. Paper presented at the Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education (PME-NA), Reno, NV.

1. Schulz, J., **MacDonald, B. L.**, Pappas, N. & Schulz, S. (2010, November). An instructional coaching approach to response to intervention in elementary mathematics. *National Council of Teachers of Mathematics*, Baltimore, MD.

#### State & Regional Presentations

12. **MacDonald, B. L.**, Litster, K., & Roxburgh, A. (2019, October). *Students' Actions with Early Number to Guide Educators' Instruction*. National Council of Teachers of Mathematics (NCTM) Regional Conference and Exposition, Salt Lake City, UT.

11. **MacDonald, B. L.**, Urbanek-Carney, S., & \*Roxburgh, A. (2019, October). *Supporting Students with Severe Special Education Needs in Early Number Development*. National Council of Teachers of Mathematics (NCTM) Regional Conference and Exposition, Salt Lake City, UT.

10. **MacDonald, B. L.**, Silva, J., & Hunt, J. H. (2019, October). *"Think Pair Show Share": UDLizing Talk Moves to Increase Classroom Discourse*. National Council of Teachers of Mathematics (NCTM) Regional Conference and Exposition, Salt Lake City, UT.

9. **MacDonald, B. L.**, Roxburgh, A., & Jenson, A. (2019, October). *Tasks Which Leverage Conceptual Number Understanding for Students Identified as Low-Achieving*. National Council of Teachers of Mathematics (NCTM) Regional Conference and Exposition, Salt Lake City, UT.

8. Moss, D., & **MacDonald, B.** (2019, August). *A constructivist approach to online course pedagogy*. Presentation conducted at the Empowering Teaching Excellence Conference, Logan, UT.

7. **MacDonald, B. L.** & Urbanek-Carney, S. (2018, October). Learning Communities that Support Students with Severe Special Education Needs in Early Number Development. *Annual Utah Council of Teachers of Mathematics (UCTM) Conference*, Draper, UT.

6. **MacDonald, B. L.** & Hunt, J. H. (2017, August). Linking number cognition research to practice for students with learning differences in mathematics. *Maximize Mathematics Learning for All Students: 2017 Annual Utah Council of Mathematics of Teachers (UCTM) Conference*, Ogden, UT.

5. † **MacDonald, B. L.**, \*Litster, K., & \*Ashby, M. J. (2017, March). Measuring elementary preservice teachers' beliefs as related to their pedagogy, *Annual Utah Association of Mathematics Teacher Educators (UAMTE) Conference*, Provo, UT.

4. † **MacDonald, B. L.** (2016, March). How to utilize subitizing games as a form of assessment when understanding children's number acquisition. *Logan City School District*, Logan, UT.

3. Bhandari, T., Turner, W., **MacDonald, B. L.**, & Martin, J. (2013, April). Teaching Collaboration: Matching Teachers' and Researchers' Views on Collaborative Practices to Enhance Pre-service Programs. Poster Session. *35<sup>th</sup> Annual Teacher Education Division Conference*, Grand Rapids, MI.

2. **MacDonald, B. L.** (2012, March). Children's construction of number: Building new ideas about computational fluency. *Virginia Council of Teachers of Mathematics*, Roanoke, VA.

1. **MacDonald, B. L.** (2011, September). Children’s construction of number. *Blue Ridge Council of Teachers of Mathematics*, Roanoke, VA.

## NATIONAL SERVICE

### **Board of Director**

*United States Math Recovery Council (USMRC)* - Board of Director – July 2020 to present  
<https://www.mathrecovery.org/board>

### **Editorial Review Board and Editing Duties**

Invited Guest Editor - *Education Sciences* – Special Issue “STEM Curricula in Early Childhood Education”  
[https://www.mdpi.com/journal/education/special\\_issues/STEM\\_in\\_Early](https://www.mdpi.com/journal/education/special_issues/STEM_in_Early) - December 2020 to present

### **Book Reviewer**

*Cambridge Publishing Corporation* – book reviewer – May 2021 to present

*SAGE Publishing* – book proposal reviewer – March 2018 to April 2018

*Pearson Education Corporation* – book reviewer – August 2016 to October 2016

### **Grant Proposal Reviewer**

NSF DRK-12 (DRL) Proposal Reviewer – November 2020

### **Journal Reviewer**

*Journal of Educational Research* – journal reviewer – May 2016 to present

*School Science and Mathematics* – journal reviewer – November 2018 to present

*Early Education and Development* – journal reviewer – February 2018 to present

*Journal of Education Sciences* – journal reviewer – February 2017 to present

*Journal of Mathematical Thinking and Learning* – journal reviewer – August 2016 to present

*Journal of Educational Psychology* – journal reviewer – November 2014 to present

NCTM’s *Journal for Research in Mathematics Education* - journal reviewer – January 2015 to present

NCTM’s *Teaching Children Mathematics* – journal reviewer – July 2015 to present

*Journal of Mathematics Teacher Education* – journal reviewer – June 2015 to present

## STATE SERVICE

### **Utah**

**USOE Elementary Mathematics Education (EME) Redevelopment and Elementary Mathematics Specialist (EMS) Certification Committee** to redevelop EME course frameworks for state certification requirements and develop EMS course frameworks state certification requirements to align with Association of Mathematics Teacher Education recommendations. May 2018 – May 2019.

**UAMTE Secretary** for the 2016-2017 Calendar Years.

**USOE Kindergarten Readiness Committee Member** to make recommendations for what mathematics assessment tools would be appropriate when assessing kindergarten children's readiness and mathematical growth. Salt Lake City, UT, August 2015 – September 2017.

**UAMTE Committee Member** to make recommendations for elementary education mathematics courses. Salt Lake City, UT, May 2014 – October 2014.

**First Lego League Utah State University Tournament Volunteer** – I volunteered as a “Head Core Values Judge” during a regional tournament, and recruited Logan High School students to volunteer from the local key club. January 2015-2017.

**UCTM meeting volunteer** – I brought two undergraduate students to the UCTM where we all volunteered to work with mathematics teachers involved in the GEAR-UP grant during a breakout session. October 2014.

### **Virginia**

Washington County Public Schools, Virginia. *Consultant work and co-planning with elementary mathematics teachers.* (2012 - 2013). Worked with a four different schools' teachers and elementary school administrators to examine standardized test data, observe classroom instructional practices, and determine instructional strategies for student success.

Southwest Higher Education Center, Abingdon, Virginia. *Professional development workshops with elementary and middle school mathematics teachers.* (2011 – 2013). Planned and presented half day workshops to engage elementary and middle school teachers in inquiry based tasks which support discussions around well designed questions to elicit a school-wide focus on student use of strategies in mathematics. Workshops were presented to multiple schools in the southwest portion of the state of Virginia.

Virginia Department of Education Committee Member/Presenter, Mathematics, Richmond, VA, April 2007 – October 2010

- Designed and presented to superintendents and specialist across the state of Virginia the cross-section of “Patterns, Functions, and Algebra” in grades 3-5.
- Analyzed statistical data in which to infer a variety of rigor in predesigned standardized tests across the state of Virginia. Equity and appropriateness were another component of this analysis.
- Designed and presented the Fifth grade Mathematics Curriculum Framework across the state of Virginia.
- Designed and presented the Fifth grade Mathematics Standards of Learning objectives across the state of Virginia.
- Designed Third grade Mathematics Vocabulary appropriate for students across the state of Virginia.

## **UNIVERSITY SERVICE**

### **Utah State University**

**Ombudsperson: Emma Eccles College of Education and Human Services** - I served in this capacity to essentially oversee and ensure policy was followed during promotion and tenure committee meetings. (October 2020-Present)

**Committee Member: Dean Search for the Emma Eccles College of Education and Human Services** - I served on this search committee. My duties included: helping lead a college-wide townhall, developing a job position and advertisement, soliciting potential candidates, screening candidates, ranking potential candidates, conducting phone interviews, checking references, and being a part of the candidate virtual campus visit activities/interviews. (September 2020-March 2021)

**Committee Member: Tenure Advisory Committee for Katherine Vela** - I served as a committee member on this Assistant Professor's TAC. My duties included: reading this faculty member's dossier each year, providing feedback during the TAC meeting, and assist in the TAC letter for this faculty member's files. (September 2020-Present)

**Committee Member: Tenure Advisory Committee for Amanda Taggart** - I served as a committee member on this Assistant Professor's TAC. My duties included: reading this faculty member's dossier each year, providing feedback during the TAC meeting, and assist in the TAC letter for this faculty member's files. (September 2020-Present)

**Committee Member: Tenure Advisory Committee for Marla Robertson** - I served as a committee member on this Assistant Professor's TAC. My duties included: reading this faculty member's dossier each year, providing feedback during the TAC meeting, and assist in the TAC letter for this faculty member's files. (September 2020-Present)

**Committee Member: TEAL Awards** - I served as a member for our department awards committee. This committee met about 2-3 times during the year to establish criteria, timeframes, and decisions regarding which award nominee met criteria for particular department level awards (October 2018-Present).

**Discussant and Mentor: Women Leadership Initiative** - Mentored an undergraduate student and led monthly discussions around research that focused on Women's Leadership in professional societal sectors. (October 2018-May 2019).

**Committee Member: Ad Hoc Search (Co-Chair with Cultural Studies Search Committee)** - I served as a committee member for this ad-hoc search committee. My duties included: ranking of potential candidates, conducting phone interviews, checking references, and being a part of the candidate campus visit activities/interviews. (October 2018-December 2018).

**Committee Member: Professional Anchor Task Force** - I served on this committee with the goal to establish particular graduate courses that could be taken by undergraduate students and graduate students simultaneously (October 2017 – December 2017).

**Mentor: Graduate Training Series (GRTS)** – I was invited to participate in the Utah State University Graduate Training Series to serve as a mentor and share expertise in College-level teaching. (September 2017).

**Committee Member: Content Task Force** - I served as a committee member with the goal to determine how content methods courses and student practicum experiences will be structured to meet students' learning needs, school schedules, college expectations, and course expectations (April 2017 – February 2018).

**Committee Chair: Mathematics Education and Leadership Tooele Assistant Professor Faculty Search** - I chaired this search committee. My duties included recruitment, scheduling and leading meetings where members ranked potential candidates, conducted phone interviews, checked references, and leading candidate campus visit activities/interviews. (October 2016 – December 2017)

**Committee Member: Arts Bridge Literacy Project** – I am working with the Arts Bridge Director to provide resources and review of the construction and implementation of the Arts Bridge project. My expertise in early childhood students' cognition and learning in mathematics is informing how the mathematical literacy portion of this project will be designed and implemented by the Arts Bridge students. (September 2015 – May 2016)

**Committee Member: Mathematics Education and Leadership Open Ranked Faculty Search** – I served on this search committee as a member. My duties included: ranking of potential candidates, conducting phone interviews, checking references, and being a part of the three candidate campus visit activities/interviews. (October 2014 – February 2016)

**Committee Member: Elementary Education Program Committee** – My role in this committee was as a leader. I led committee meetings between three departments (Communication and Deaf Education, Special Education, and Teacher Education and Leadership (TEAL)) where our objective was to provide to the TEAL faculty suggestions on how all 12 elementary education programs could be changed to allow for an extra mathematics methods course (3 credits). (September 2014 – April 2015)

## **PROFESSIONAL AND ACADEMIC ASSOCIATION MEMBERSHIPS**

Research Council of Mathematics Learning

National Council of Teachers of Mathematics

Utah Council of Teachers of Mathematics

Society for Informational Technology and Teacher Education

School Science and Mathematics Association

The Association of Mathematics Teacher Educators

The Utah Association of Mathematics Teacher Educators

International Group for the Psychology of Mathematics Education – North American Chapter

U.S. Math Recovery Council (Board of Directors)