

LEILANI PAI

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RESEARCH INTERESTS

My current research focuses on **undergraduate mathematics education** and STEM education more broadly, with an emphasis on understanding how **students' various and intersecting identities** influence their **experiences in mathematics** departments and programs.

EMPLOYMENT

Visiting Assistant Professor Department of Mathematics, Denison University	2023-present
Graduate Research Assistant Center for Science, Math, and Computer Education, University of Nebraska-Lincoln	2021-2023
Graduate Teaching Assistant Department of Mathematics, University of Nebraska-Lincoln	2017-2023

EDUCATION

PhD in Mathematics University of Nebraska-Lincoln; Lincoln, NE Advisor: Xavier Pérez Giménez	August 2023
MS in Mathematics University of Nebraska-Lincoln; Lincoln, NE	May 2019
BA in Mathematics University of Southern California; Los Angeles, CA Minor in Computer Science	May 2017

PUBLICATIONS

In STEM education:

- Hagman, J., Voigt, M., Bolick, M.A., **Pai, L.**, Kress, N., Bennett, A., Tremaine, R., Wonch Hill, P., Quaisley, K., Funk, R., & Smith, W. (Under review). Experiencing tensions of nepantla while working toward critical transformations from within. *Conference on Research in Undergraduate Mathematics Education*. Omaha, NE.
- Bolick, M.A., **Pai, L.**, Voigt, M., Funk, R., & Rader, B. (Under review). Learning to engage students as partners in critically-oriented reform of tertiary mathematics. *15th International Congress on Mathematics Education*. Sydney, Australia.

- Hagman, J., Voigt, M., Bolick, M.A., **Pai, L.**, Kress, N., Bennett, A., Tremaine, R., Wonch Hill, P., Quaisley, K., Funk, R., & Smith, W. (Under review). Experiencing tensions of nepantla while working toward critical transformations from within. *15th International Congress on Mathematics Education*. Sydney, Australia.
- Quaisley, K., Funk, R., **Pai, L.**, Ahrens, S., Smith, W.M., & Thomas, A. (Under review). Impacting primary grades STEM teacher leadership identities. *International Journal of Educational Research Open*.

In discrete mathematics:

- MacRury, C., Masařík, T., **Pai, L.**, & Pérez-Giménez, X. (2023). The phase transition for discrepancy in random hypergraphs. *SIAM Journal on Discrete Mathematics*, 37(3), 1818-1841. arXiv:2102.07342

RESEARCH EXPERIENCE

Achieving Critical Transformations in Undergraduate Programs in Mathematics (ACT UP Math, NSF/ECR DUE-2201486)

- *PI: Wendy Smith; Co-PIs: Kadian Callahan, Jessica Hagman, Matthew Voigt*
- *This project is a partnership between six universities studying and enacting changes to improve diversity, equity, and inclusion in mathematics departments. ACT UP Math supports three math departments in using data to inform local change efforts, and funds research to build understanding of how those efforts come to light.*
- As a member of the ACT UP Math research team, I participate remotely in one university's Networked Improvement Community (NIC), helping support the local NIC members in their collection and usage of **data to improve inclusion and equity** in their introductory math courses. I also work with other members of the research team to collect and analyze qualitative data from the project as a whole, drawing on journal entries, interviews, and meeting observations to study **critical change efforts** within and across math departments. This work is ongoing.

STEM Career Opportunities in Nebraska: Networks, Experiential-learning and Computational Thinking (STEM CONNECT, NSF/S-STEM DUE-1930211)

- *PI: Jim Lewis; Co-PIs: Petronela Radu, Wendy Smith, Brittany Duncan, Amy Goodburn*
- *This project provides scholarships, academic support, and career development opportunities to STEM majors with financial need at three Nebraska colleges (UNL and two community colleges). The research component of this project is focused on students' experiences in the STEM CONNECT scholarship program.*
- My role in this project is as part of a research team studying the experiences of Scholars in the STEM CONNECT program. In particular, I focus on qualitative analyses of how program activities influence Scholars' continued **participation in STEM**, and how students' identities interact with their participation in both STEM CONNECT and STEM more generally. We are especially interested in the experiences of transfer students, first-generation college students, and women STEM students. This work is ongoing.

Teacher Leadership: Investigating Trajectories and Persistence (T-Lead, NSF/Noyce Track 4 DUE-1758462)

- *PI: Wendy Smith*
- *This project uses data from eight different Noyce Master Teaching Fellowship programs to investigate the career and leadership trajectories of primary and secondary STEM Noyce Master Teaching Fellows.*
- *In this project I worked on analyzing qualitative data from interviews with STEM teacher leaders. Analysis focused on teachers' professional identity and leadership identity. In addition to analyzing collective data from eight different Noyce Master Teaching Fellowship programs, I was also on a team that focused in on investigating the impact of one particular Noyce Master Teaching Fellowship program in Nebraska on Master Teaching Fellows' identities as **STEM teacher leaders**.*

Computer Science for All: Adapt, Implement and Research at Nebraska (AIR@NE, NSF/CSforAll DUE-1837476)

- *PI: Leen-Kiat Soh; Co-PIs: Gwen Nugent, Wendy Smith, Kent Steen, Guy Trainin*
- *AIR@NE supports Nebraska K-8 teachers in teaching computer science, through professional development and funding for local projects. The research component of this project is centered around understanding how to prepare teachers to teach computer science in elementary and middle schools.*
- *My roles in this project included both data collection and analysis: I conducted and transcribed (virtual) interviews with K-8 computer science teachers, and summarized the resulting qualitative data for use in future analyses.*

TEACHING EXPERIENCE

Courses taught as **instructor of record**:

- Pre-calculus: College algebra and College trigonometry
- Calculus: Essentials of calculus, Integral calculus, Multi-variable calculus (with an introduction to linear algebra)
- Contemporary mathematics and Contemporary mathematics for Journalism
- For pre-service teachers: Math modeling

Courses taught as **teaching assistant**:

- Integral calculus

Selected teaching and leadership roles:

- Graduate Student Instructor **Fall Orientation Facilitator** Fall 2022
Worked with a faculty member to organize presenters and session topics, and facilitated professional development sessions, for the UNL math department's new-semester orientation for graduate students teaching precalculus courses. The orientation especially emphasizes supporting graduate students who are first-time instructors of record.
- **Instructor for the William H. Thompson Scholars Program** Spring 2022,
Fall 2022
In Spring 2022, I was selected to teach a small section of integral calculus to students who were all members of the William H. Thompson (WHT) Scholars Learning Community at UNL. In Fall 2022, I taught a section of

contemporary mathematics (covering basic statistics, math modeling, voting theory, and applications of graph theory) to WHT Scholars and TRIO Scholars. Both groups are learning communities of students with documented financial need, first-generation students, and disabled students.

- **College Trigonometry Associate Course Convener** Fall 2020 – Spring 2021
Coordinated between four and six sections of a trigonometry course, including managing instructor meetings and writing common exams in WeBWork.

Additional teaching experience:

- **Curriculum Development** for Contemporary Math Summer 2020
Created interactive videos for instructor use in online, flipped, and hybrid courses.
- **Trigonometry Content Specialist** Fall 2020
Organized and led meetings to discuss math- and trigonometry-specific content with undergraduate Learning Assistants
- **Math Resource Center Counselor** at UNL Fall semesters 2017 – 2022
Provided guidance and homework help to undergraduates in first-year mathematics courses at UNL who visited the Math Resource Center.

TALKS AND PRESENTATIONS

Conferences and Invited Talks

Entry points to mathematics (and STEM), in two acts

- March 2023 – New Mexico State University Mathematics Department colloquium, Las Cruces, NM

Perfect matchings in random k -uniform hypergraphs

- March 2023 – St. Mary's College, Notre Dame, IN
- February 2023 – University of Wisconsin-Whitewater, Whitewater, WI; University of North Carolina-Asheville, Asheville, NC; Eastern Kentucky University, Richmond, KY; Iona University, New Rochelle, NY
- March 2022 – Graduate Student Combinatorics Conference, online

Improper interval colorings of graph products

- January 2023 – AMS Special Session on Research from the Graduate Research Workshop in Combinatorics (GRWC), Boston, MA

Games, graphs, and managing our expectations

- October 2020 – Wayne State College Math Club, online

Local Seminar Talks

- UNL Discrete Math Seminar: *Perfect matchings in random k -uniform hypergraphs; Group testing: now with more hypergraphs; Partial coloring for hypergraph discrepancy; Random graphs for fun and profit; Quantum computing amateur hour!; A vertex Maker-Breaker game; Bounds on some size-Ramsey numbers*
- Matemáticas en español (UNL): *Introducción a las martingalas; Hipergrafos dirigidos; Representando las redes con grafos aleatorios*
- UNL Graduate Student Seminar: *Bounds on some size-Ramsey numbers*

SERVICE AND OUTREACH

- Co-organizer of the **Grad Student Teaching Table** at UNL
Established and co-organized a discussion-based seminar for graduate students to explore ideas in teaching mathematics. Spring 2022 – 2023
- Session moderator at the **Conference on Research in Undergraduate Mathematics Education** February 2023
- Volunteer at the **Nebraska Conference for Undergraduate Women in Mathematics** Spring semesters
NCUWM is an annual event designed to promote the success of women in mathematics graduate programs and math-related careers. About 275 students attend NCUWM each year. 2018 – 2023
- **Graduate Student Mentor** Fall 2019 – Spring 2022
Served as a peer mentor to a first-year graduate student at UNL.
- **Graduate Advisory Committee** Graduate Student Member Fall 2020 – Spring 2021
- **UNL AMS Graduate Student Chapter** Secretary/Treasurer Fall 2019 – Spring 2020
- **Great Plains Alliance** Supporting Student Spring 2020,
Served in a support role to graduate students speaking at other colleges and universities in the Great Plains. Spring 2021
- Volunteer at **Nebraska Math Day** Fall semesters
Nebraska Math Day is an annual event for Nebraska high school students. About 1000 students attend Math Day each year. 2017 – 2021

PROFESSIONAL MEMBERSHIPS

- American Mathematical Society
- Mathematical Association of America
- SIGMAA on Research in Undergraduate Mathematics Education
- SIGMAA on Mathematical Knowledge for Teaching