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 **departmental change efforts**, and understanding how **students' intersecting identities** influence their experiences in science and mathematics departments and programs.

EMPLOYMENT

Visiting Assistant Professor 2023-present
Department of Mathematics, Denison University; Granville, OH

Graduate Research Assistant 2021-2023
Center for Science, Math, and Computer Education, University of Nebraska-Lincoln; Lincoln, NE

Graduate Teaching Assistant 2017-2023
Department of Mathematics, University of Nebraska-Lincoln; Lincoln, NE

EDUCATION

PhD in Mathematics August 2023
University of Nebraska-Lincoln; Lincoln, NE
Advisor: Xavier Pérez Giménez

MS in Mathematics May 2019
University of Nebraska-Lincoln; Lincoln, NE

BA in Mathematics May 2017
University of Southern California; Los Angeles, CA
Minor: Computer Science

TEACHING EXPERIENCE

Courses taught as **instructor of record**:

- Pre-calculus: College algebra, Trigonometry
- Calculus: Essentials of calculus, Integral calculus, Multivariable calculus (with an introduction to linear algebra)
- Introductory statistics
- Contemporary mathematics
- For pre-service teachers: Math modeling

Courses taught as **teaching assistant**:

- Integral calculus
- Discrete mathematics for computer science

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** — Fall semesters 2017-2022
  Provided guidance and homework help to undergraduates in first-year mathematics courses at UNL who visited the Math Resource Center.

PUBLICATIONS

Journal Articles – Education:

1. Hagman, J., Voigt, M., Bennett, A., Nicole, F., Bolick, M.A., **Pai, L.**, Kress, N., Quaisley, K., Tremaine, R., Funk, R., Wonch Hill, P. & Smith, W.M. (2024). Experiencing tensions of nepantla with inner-departmental change groups. *Frontiers in Education, 9*. https://doi.org/10.3389/feduc.2024.1454303

2. Quaisley, K., Funk, R., **Pai, L.**, Ahrens, S., Smith, W.M., & Thomas, A. (2024). Impacting primary grades STEM teacher leadership identities. *School Science and Mathematics* 1-13. https://doi.org/10.1111/ssm.18313
3. Bolick, M.A., **Pai, L.**, Funk, R., & Voigt, M. (Under review). Learning to engage students as partners in critically-oriented reform of tertiary mathematics.
4. Mei, M., Miller, A., & **Pai, L.** (Under review). Assessing a first-year calculus placement policy.

Conference Publications – Education:

1. Bolick, M.A., **Pai, L.**, Voigt, M., Funk, R., & Rader, B. (2024). Learning to engage students as partners in critically-oriented reform of tertiary mathematics. *15th International Congress on Mathematics Education*. Sydney, Australia.
2. Hagman, J., Voigt, M., Bolick, M.A., **Pai, L.**, Kress, N., Bennett, A., Tremaine, R., Wonch Hill, P., Quaisley, K., Funk, R., & Smith, W. (2024). Experiencing tensions of nepantla while working toward critical transformations from within. *15th International Congress on Mathematics Education.* Sydney, Australia.
3. Funk, R., **Pai, L.**, & Cristobal, J.B. (2024). Work in progress – Persistence in an S-STEM grant: Understanding the intersectional experiences of women in STEM. *American Society for Engineering Education.* Portland, OR. https://doi.org/10.18260/1-2--46410
4. Funk, R., Lewis, W.J., **Pai, L.**, Cristobal, J.B., & Rader, B. (2024). "Someone has invested in me to do this": Supporting low-income students to persist in STEM through an NSF S-STEM grant. *American Society for Engineering Education.* Portland, OR. https://doi.org/10.18260/1-2--46749
5. Bolick, M.A., **Pai, L.**, Funk, R., Voigt, M., & Rader, B. (2024). Learning to engage students as partners in critically-oriented reform of tertiary mathematics. *Conference of the International Network for Didactic Research in University Mathematics.* Barcelona, Spain.
6. Hagman, J., Voigt, M., Bolick, M.A., **Pai, L.**, Kress, N., Bennett, A., Tremaine, R., Wonch Hill, P., Quaisley, K., Funk, R., & Smith, W. (2024). Experiencing tensions of nepantla while working toward critical transformations from within. *Conference on Research in Undergraduate Mathematics Education*. Omaha, NE.

Journal Articles – Discrete Mathematics:

1. 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
2. Bayer, M., Burcroff, A., McAllister, T.B., & **Pai, L.** (Under review). Quasiperiods of magic labeling polynomials. arXiv:2403.04129
3. Carr, M., Cho, E., Crawford, N., Iršič, V., **Pai, L.**, & Robinson, R. (Under review). On the interval coloring impropriety of graphs. arXiv:2312.14881

RESEARCH EXPERIENCE

Achieving Critical Transformations in Undergraduate Programs in Mathematics (ACT UP Math, NSF/ECR DUE-2201486) Summer 2023 - present

- *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.

STEM Career Opportunities in Nebraska: Networks, Experiential-learning and Computational Thinking (STEM CONNECT, NSF/S-STEM DUE-1930211) Summer 2023 - present

- *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.

Teacher Leadership: Investigating Trajectories and Persistence (T-Lead, NSF/Noyce Track 4 DUE-1758462) Summer 2021 - 2022

- *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 different Noyce Master Teaching Fellowship programs, I was also on a team that focused in on investigating the impact of one particular Noyce 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) Summer 2022

- *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 interviews with K-8 computer science teachers, and summarized the resulting qualitative data for use in future analyses.

TALKS AND PRESENTATIONS

Conferences and Invited Talks

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

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

Perfect matchings in random k-uniform hypergraphs

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

Improper interval colorings of graph products

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

Games, graphs, and managing our expectations

- Wayne State College Math Club, online — October 2020

Poster Presentations

Engaging students as partners in critically-oriented reform of postsecondary mathematics (with M.A. Bolick, R. Funk, M. Voigt, B. Rader, M. Smith, and S. Sisneros-Thiry)

- Conference on Research in Undergraduate Mathematics Education, Omaha, NE — Feb. 2024

Professional Development Facilitation

Using shared experiences to elicit covariational reasoning (with Y. Lai, C. Lizano, and F. Agyapong)

- NCTM Annual Meeting, Chicago, IL — Sept. 2024

"Who gets to graduate?"

- UNL Math Department Fall Orientation, Lincoln, NE — August 2022

Session on *equity* (with K. Quaisley and A. Wright)

- UNL Math Department Fall Orientation, Lincoln, NE — August 2021

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

- Session chair at the **Nebraska Conference for Undergraduate Women in Mathematics** — January 2024
  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.
- Co-organizer of the **Grad Student Teaching Table** at UNL — 2022 - 2023
  Established and co-organized a discussion-based seminar for Graduate students to explore ideas in teaching mathematics.
- Session moderator at the **Conference on Research in Undergraduate Mathematics Education** — Feb. 2023
- Volunteer at the **Nebraska Conference for Undergraduate Women in Mathematics** — 2018 - 2023
- **Graduate Student Mentor** — 2019 - 2022
  Served as a peer mentor to a first-year graduate student at UNL
- **Graduate Advisory Committee** Graduate Student Member — 2020 - 2021
- UNL **AMS Graduate Student Chapter** Secretary/Treasurer — 2019 - 2020
- **Great Plains Alliance** Supporting Student — Feb. 2020, April 2021
  Served in a support role to graduate students speaking at other colleges and universities in the Great Plains.
- Volunteer at **Nebraska Math Day** — 2017 - 2021
  Nebraska Math Day is an annual event for Nebraska high school students. About 1000 students attend Math Day each year.
- Referee for *School Science and Mathematics*

WORKSHOPS ATTENDED

Summer faculty reading group on **learning science and evidence-based instruction** — June 2024

Denison Readiness and Inclusion in Science Education MLK Day workshop on Addy et al.'s **Protocol for Advancing Inclusive Teaching Efforts** — January 2024

Graduate Research Workshop in Combinatorics — July 2022, June 2019

PROFESSIONAL MEMBERSHIPS

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