

Problem-Based Learning to Improve Girls' Math Identity

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Background

- While the number of girls and women studying and pursuing STEM careers has increased over the past few decades, women are still under-represented **particularly at the upper levels of educational and professional attainment.**
- In North Carolina, women earn 58% of total college degrees, but only 42% of STEM degrees.
- Overall, **24% of people in STEM careers are women.**
- In the absence of any meaningful biological or innate gender difference, **cultural factors** account for the difference in representation.

Methods

- GEM encourages young women to explore math at 90 minute, twice monthly workshops from January-April, plus two summer sessions.
- Girls participate in problem based math activities guided by 2-3 mentors.
- Mentors discuss cultural factors known to influence students' identities including stereotypes and stereotype threat, gender norms, beliefs about intelligence (fixed vs. growth mindset), and self-standards.
- Difference in math ability and mindset following the intervention is assessed through a pre- and post-test.

What Makes GEM Different?

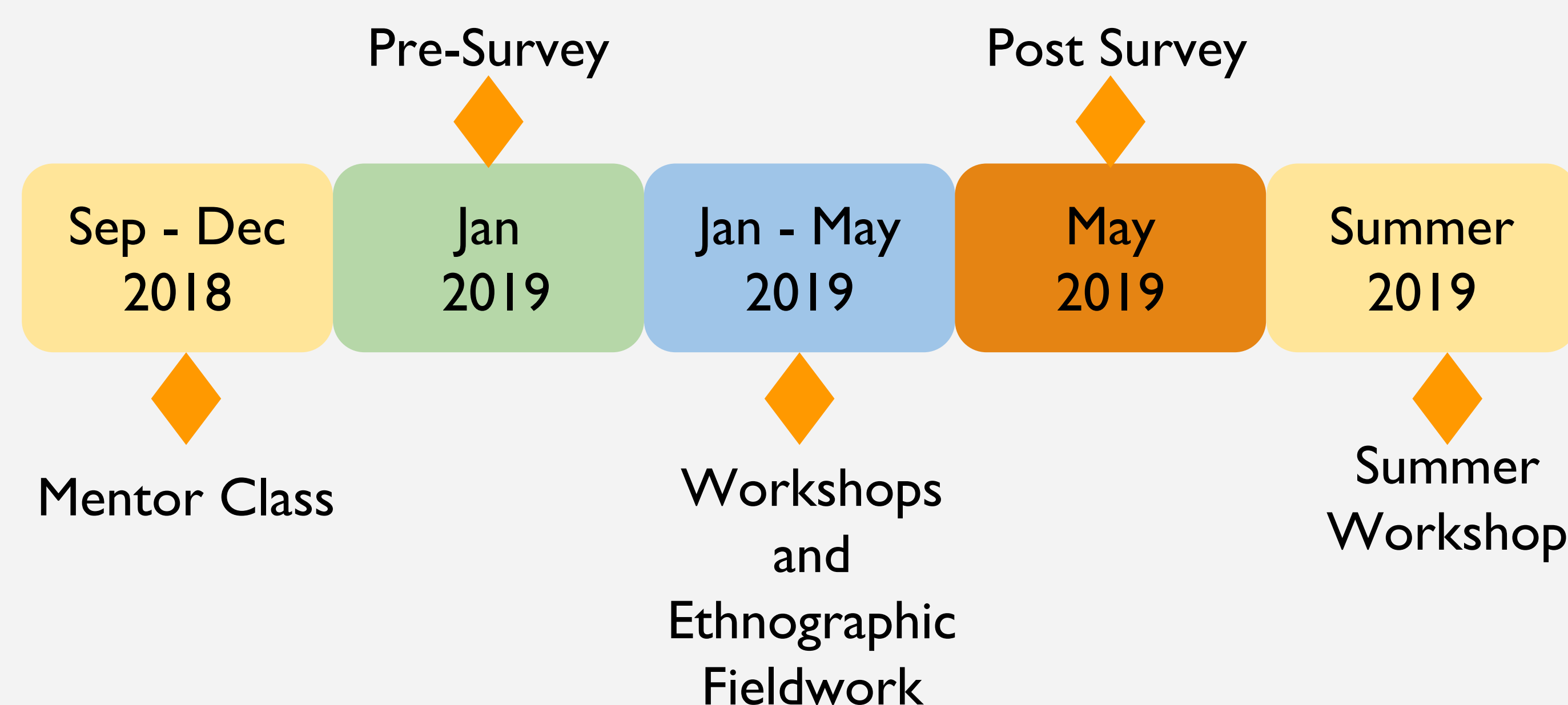
- **Problem-based learning:** girls work on challenging puzzles in groups to build problem-solving skills and explore math outside of standard school curriculum
- Direct discussion of gender, stereotypes, and identity through **Girl Talk! sessions**
- **Only female mentors:** research has shown that having female mentors is essential for girls to continue on a STEM education or career path
- GEM also addresses two important **leak points** in girls' STEM paths: **middle school and college.** In middle school, girls often start losing interest in STEM subjects. In college, women often don't pursue a STEM degree, and those that do often don't pursue a STEM career.

Participants and Assessment



- 57 Initial Enrollees - 25% 8th Grade, 39% 7th Grade, 36% 6th Grade
- 52% Lakewood Montessori, 16% Borgden Middle, 16% Durham School of the Arts, 8% Carrington Middle, 4% James E. Shepard IB Magnet School, 4% Central Park Middle

Research Timeline



Future Directions

- Focus workshops on improving **spatial reasoning** skills as it is the only measurable gender disparity
- Develop a **scalable workshop model** to implement program in other universities, particularly in rural areas

