Improving Girls’ Math Identity through Problem-solving and Mentorship

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Study Design
The Study Design team revised and edited the past two years of pre and post surveys given to GEM participants to create a DPS district wide 2021 survey, as well as a specific version to past workshop attendees. These surveys were designed to identify how boys and girls varied in their approach, confidence, and perspective with regards to math. The team also created a pre-testing round utilizing the mentors network to ensure the survey was appropriate for middle schoolers.

Applet Design
The applet team focused on creating a digital applet accessible to middle-school girls in the GEM program that:
1. Helps develop spatial reasoning and mental rotation skills
2. Provides puzzles to work on basic algebra, geometry, and fractions problems
3. Is available during Covid-19
4. Is age-appropriate and user-friendly
5. Builds confidence and resilience in math
After researching on various skills that are helpful when learning and understanding math, the team decided on designing a tangram-based game, with reinforcement and helpful tips throughout the puzzles to ensure girls would be motivated, not discouraged as they completed the levels.

Literature Review
The Literature Review team produced a public database full of published papers and research about the gender gap, STEM inequality, stereotype threat, female representation in STEM, and spatial reasoning skills, among others. With over 50 papers analyzed, they provided a brief description of each paper, key words, and specific notes on how it could help the other GEM research teams with their projects.

Background: The Need for GEM
Women are still underrepresented in upper levels of educational and professional attainment in STEM.
In primary and secondary education:
- Girls and boys score equally on standardized math tests in 4th grade.
- Girls take fewer AP exams in STEM subjects such as calculus, physics, computer science, and chemistry than boys in high school.
- Overall, 24% of people in STEM careers are women.

How COVID-19 Changed GEM

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Lesson Plan Archive
The Lesson Plan Archive Team worked on reviewing six lessons from 2019 and streamlining the STEM-content to be pedagogically coherent. Through focusing on making the planning constructivist, clearly sequenced, hands-on, and with clear real-world applications, these workshops could become more effective for middle school girls to attend.

A typical lesson plan template included:
1. Title
2. Materials
3. Estimated Time
4. Learning Standards (pulled from N.C. Education System)
5. Introduction of main concept/problem
6. Data Collection Time to explore concept/problem
7. Closing reflections
8. Take home activities