GEMS Research Projects

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Abstract

Informal learning spaces offer leaders and learners opportunities to develop their STEM identities and practices (e.g., Shokeen et al., 2020; Simpson et al., 2017). GEMS (Girls Excelling in Math and Science) is an after-school program where girls have had opportunities to be themselves while engaging with STEM activities. We present preliminary results of three research projects. By studying GEMS as a case of informal learning, we are learning about the possible benefits of such environments to 1) broaden views of mathematics and 2) support the development of learners' STEM identities.

GEMS Founder's Life Story

Purpose
To explore the GEMS founder's lived experiences designing informal learning environments and facilitating girls' STEM learning.

Methods
Life story method.

Data
Life story interviews, journals, existing writing, newspapers information, GEMS curricula.

Analysis
Life story analysis (Lieblich et al., 1998).

Preliminary Findings
- Becoming a teacher revealed the founder's struggles and resilience as a woman and a first-generation college student.
- The significant events in founder's life story indicate that access is a key factor for girls and women to get into mathematics-related fields, traditionally viewed as male-dominated areas.
- The founder's life story suggested that getting good grades is not enough rather transforming social position is a way to open access.
- Informal STEM learning environments might be a site to guide girls to realize their full potential and decide their future.

The Original GEMS Girls' Experiences

Purpose
To retrospectively document a group of girls' experiences in informal learning spaces.

Methods
Oral history research methods (Garnica, 2019).

Data and Participants
Interviews, focus group, and survey.

Analysis
Analysis of narratives (Polkinghorne, 1995)

Preliminary Findings
Original girls remember having fun, enjoying the independence, and the friendly environment GEMS provided them. This study sheds light on how informal learning spaces enhance girls' STEM identities.

Testimony OGG1
"The hand on aspect helped me understand concepts better than in a traditional setting of books and tests. You could actually see how things worked for yourself and understand concepts while enjoying yourself."

Testimony OGG2
"It just felt like more of a space where we didn't have to worry if our answer was wrong, or something didn't quite work. Having a smaller group to try with to build confidence with was the best."

Testimony OGG3
"I remember enjoying the activities very much and being excited about learning because the activities made it fun!"

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GEMS Leaders' Views of Mathematics

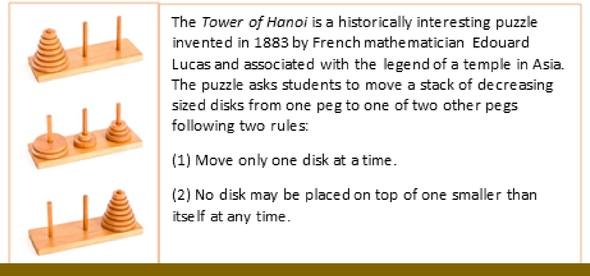
Purpose
To explore GEMS leaders' experiences teaching curriculum that broadens views of mathematics to non-Eurocentric male perspectives (Jaremus, 2020).

Methods
Qualitative research methods.

Data and Participants
GEMS leaders' conversations, photovoice, instructional materials, video recordings, and oral or written reflections.

Analysis
Photovoice analysis (Wang & Burris, 1997).
Leaders' learning analysis (Greeno, 2006).
Analysis of narratives (Polkinghorne, 1995).

Preliminary Findings
- A toolkit with curricular materials that promote broadened views of mathematics.
- Longitudinal documentation of leaders' views of mathematics.
- Mechanisms to create and nurture a community of practice.



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