Community Partnerships, STEM, Socio-Emotional Learning, and Mentorship: Promoting Interest, Goals, and Connections in Teaching and Learning Engineering

INTRO

Model

- The K-12 STEM pipeline needs to encourage underrepresented students to participate in STEM career pathways
- Mentors who intentionally position socio-emotional goals in STEM enrichment programs show promise for helping youth persist in STEM fields
- Teachers who use a cultural humility approach develop openness to diverse lived experiences and motivations of students, and foster a social-justice approach to teaching and learning
- There is a significant gap in understanding how undergraduate mentors of color in service-learning opportunities can support teacher development

METHODS

- Design-based research with two cycles of design, implementation, and retrospective analysis (Summer 2021/2022)
- Data collected: pre and post Stem Career Interest Survey, engagement surveys, interviews, focus groups, field notes, and student work



RESULTS

 Middle school students reported positive perceptions of the learning activities and support from mentors

ENGINEERING DESIGN CHALLENGES

Design a community to mitigate sea level rise



Design a car that uses alternative energy

- Research-practice partnership with Newport New Public Schools teachers (n=15), undergraduate mentors of color (n=15), preservice teachers (n=29), and middle and high school students (n=320).
- Interest-driven and culturally relevant engineering design challenges
- Socio-emotional support for mentors and youth

RESEARCH QUESTIONS

- How does participating in Camp EAGER influence students' engagement and goal development in STEM?
- 2. What are the mentors' perceptions of STEM teaching and socio-emotional learning in Camp Eager? How do they describe their personal and professional growth?
- 3. How do preservice teachers perceive their early field experiences in Camp EAGER as influential to

- Mentors provided critical feedback about educating diverse youth in community partnerships and summer enrichment programs
- Preservice teachers described the influence that Camp EAGER had on developing positive relationships with diverse students



Use drones to illustrate biomimicry



Design a passion project

Publications

Johnson, L.L., Kier, M.W. Parker, J.C., Gallagher, E.J. (2022, accepted). Reimagining Summer School: Science



and Engineering Enrichment for Middle School Students in the Wake of COVD-19. Middle School Journal.

Kier, M. W., & Johnson, L. L. (2021). Middle school teachers and undergraduate mentors collaborating for culturally relevant STEM education. *Urban Education*, 00420859211058412.

Kier, M.W. & Johnson, L.L. (2022). Exploring how secondary STEM teachers and undergraduate mentors adapt digital technologies to promote culturally relevant education during Covid-19. Education Sciences, 12(48), 1-25.

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