

# ETHICS: HOW ITEST PROJECTS COULD PREPARE YOUTH TO WORK IN SPACES THAT MAY NOT WELCOME THEM

## Facilitators

**Wendy F. Smythe**  
**AAAS ST&P Fellow**

**Rebekah Hammack**  
**Einstein Educator Fellow**

National Science Foundation

Directorate of Research on Learning in Formal and Informal Settings

# Things to keep in mind

- Demographic considerations

  - *Indigenous, disability, Low SES, gender*

- Strategies for recruitment and retention

- Interventions to meet needs of participants

- Willing to be a lifelong learner!!

# Session Format

## **Presentations: 15 minutes**

- Karl Reid, Ph.D., Collaborative Research, National Society of Black Engineers,  
*SPrEaD: Scaling-up Summer Engineering Experiences for Kids (S2E2K)*
- Merredith Portsmouth, Ph.D., Tufts University,  
*Strategies: Role Models in Elementary Engineering Education.*
- Sunggye Hong, Ph.D. University of Arizona,  
*Project Poem, Project-Based Learning Opportunities and Exploration of Membership For Students with Visual Impairments in STEM.*
- Rita Karl, Ph.D., Twin Cities PBS,  
*SciGirls Strategies: Gender Equitable Teaching Practices in Career and Technical Education Pathways for High School Girls.*

## **Discussion and Wrap-up: 15 minutes**



**Strengthening the STEM Pipeline for  
Elementary School African Americans, Hispanics, and  
Girls by  
Scaling Up Summer Engineering Experiences**

NSF PI Meeting  
May 14-15, 2018

**Karl W. Reid, Ed.D.**

PI

Executive Director, National Society of Black Engineers



Awards  
#1615143,  
#1614739,  
#1614710



## SUMMER ENGINEERING EXPERIENCE FOR KIDS (SEEK) OVERVIEW

- A free, three-week, hands on engineering immersion program
- Exposes 3<sup>rd</sup> - 5<sup>th</sup> grade students to STEM concepts
- Uses team-based, competitive engineering design activities
- Fosters interest in engineering & proficiency in math and science
- Serves underrepresented communities in STEM education
- Guidance from collegiate mentor/instructors (members of NSBE+)



# SEEK OVERVIEW: IMPACT SINCE 2007

**20,000+**

**3rd-8th graders have participated**

**3,000+**

**Collegiate mentors employed**

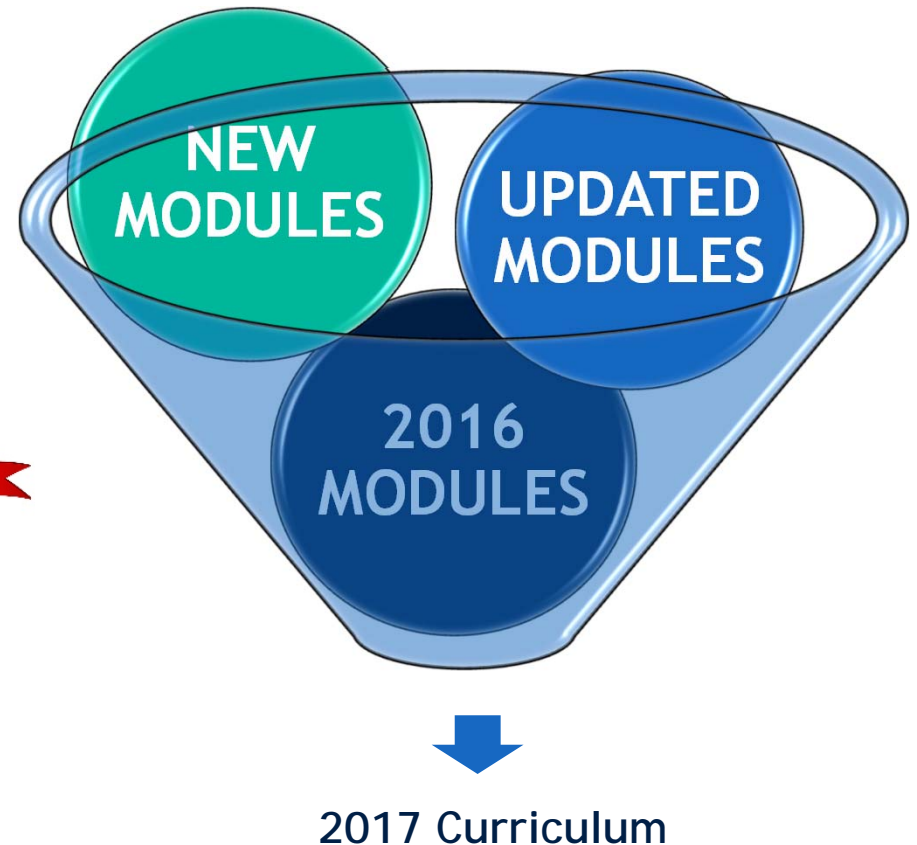
**25,000+**

**Parents involved & engaged**



## SEEK OVERVIEW: CURRICULA

- Catapult (Updated)
- Coding (Updated)
- Snap Rover (Updated)
- Wind Turbine (Updated)
- Remote Control Machine **NEW**
- Firmenich
- Fuel Cell
- Glider
- Gravity Cruiser



# 2017 SEEK Sites

## 16 Programs in 15 Cities

Students: 1,730

Mentors: 258



Atlanta, GA (All Girls)

Birmingham, AL

Chicago, IL

Detroit, MI

Houston, TX

Jackson, MS (All Girls)

Kansas City, MO

Los Angeles, CA

New Orleans, LA

Oakland, CA

Pittsburg, PA

Sacramento, CA (Twin Rivers)

Sacramento, CA (Sac City)

Saginaw, MI

Sorrento, LA

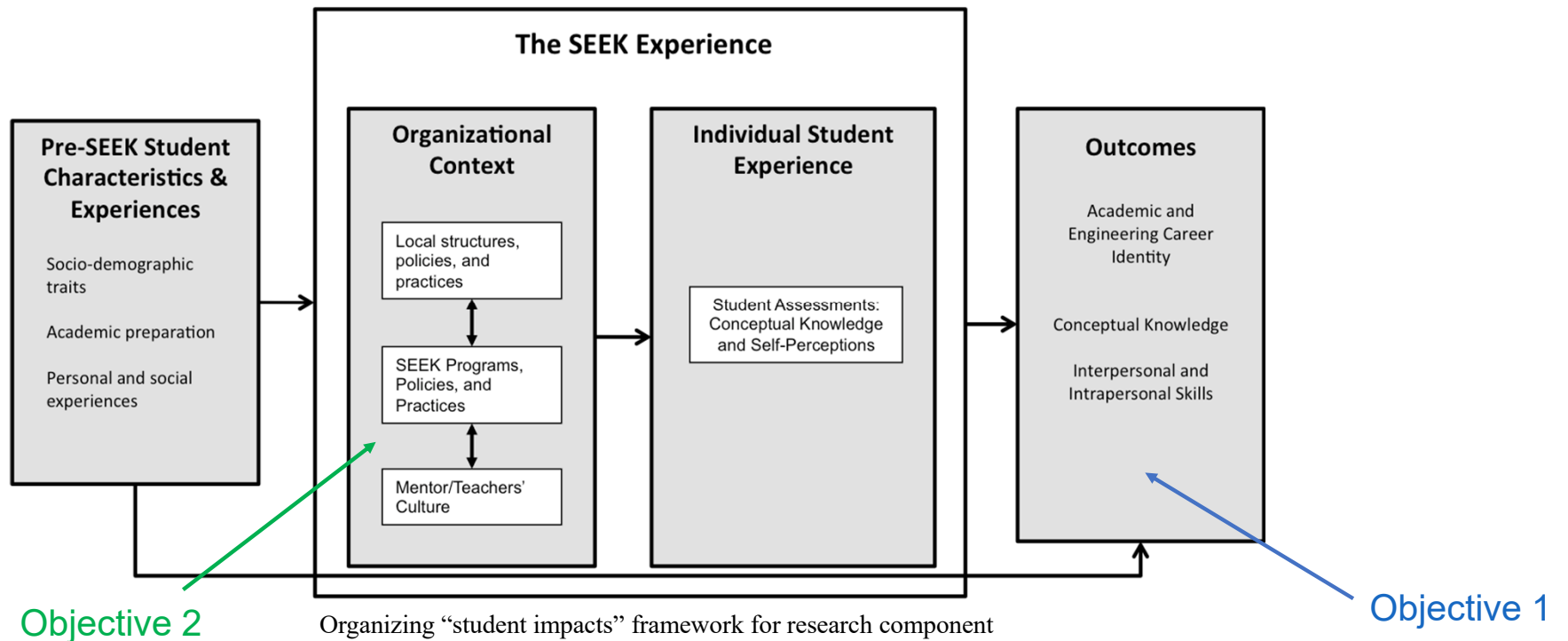
Washington, DC



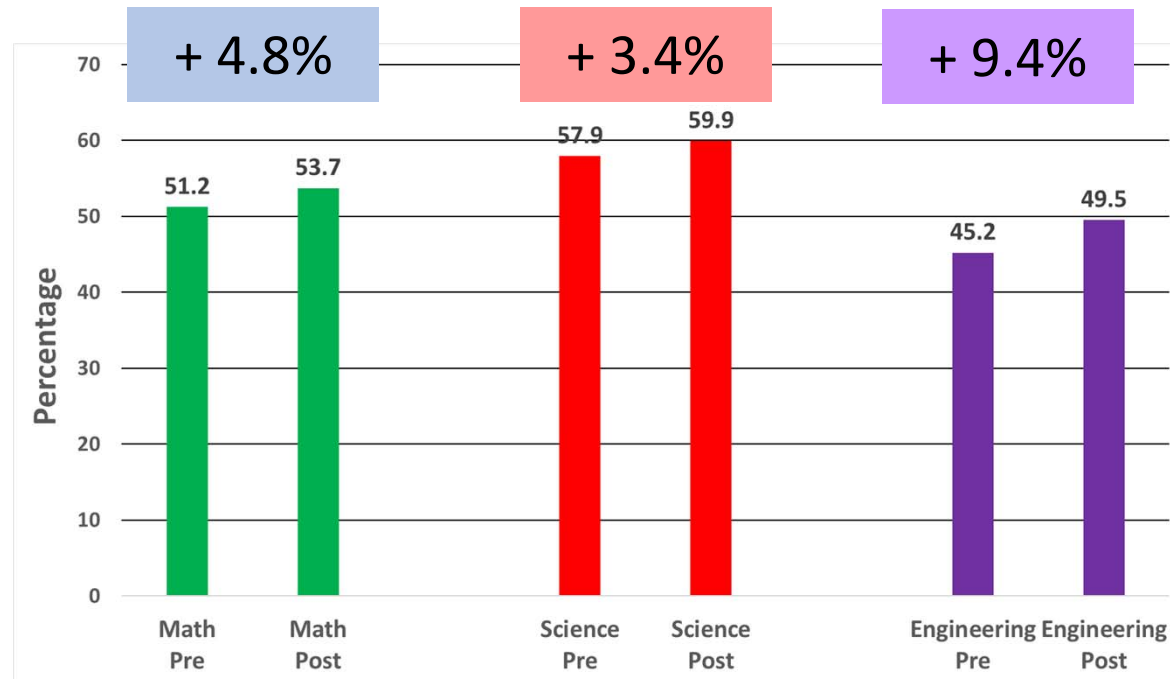
# RESEARCH OBJECTIVES

**Objective 1:** Evaluate the proposed program’s success at influencing STEM-related academic and career identity, conceptual knowledge, and interpersonal and intrapersonal skills

**Objective 2:** Generate evidence and a greater understanding of organizational context factors that operate to enhance, moderate, or constrain SEEK’s impact from site to site

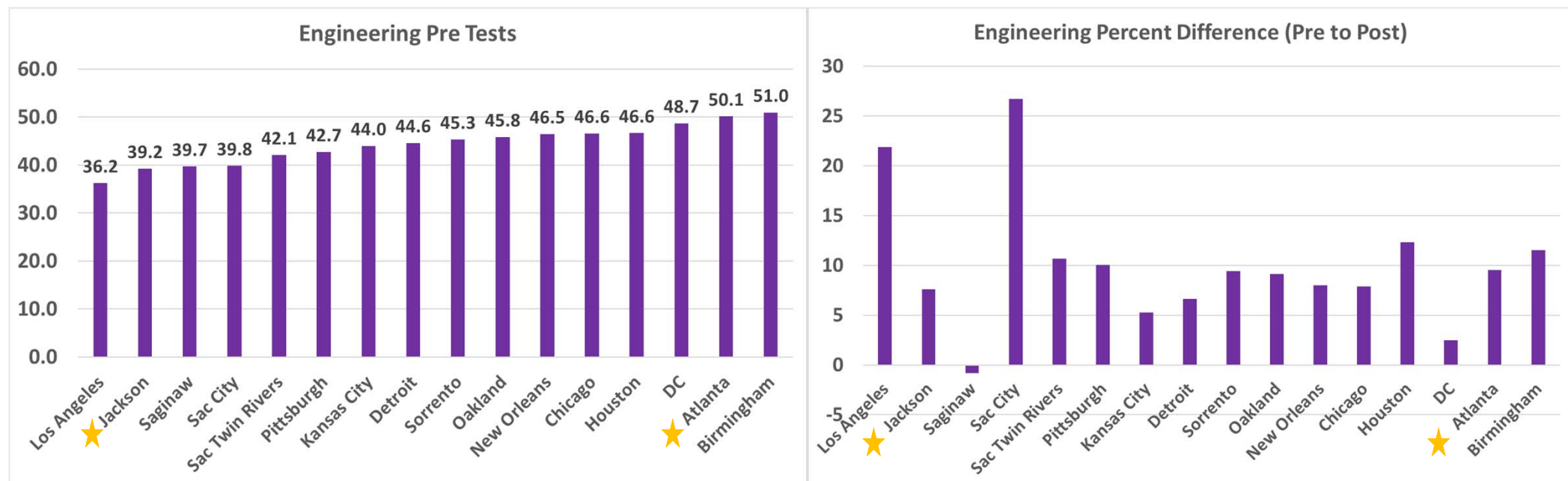


## PRELIMINARY RESULTS FOR OBJECTIVE 1: CONCEPTUAL KNOWLEDGE



We saw increases in each area, with largest increases in engineering, as anticipated. For Year 2, we are mapping assessments more tightly to curriculum and to each grade level

# PRELIMINARY RESULTS: ENGINEERING KNOWLEDGE



Despite these differences, our multi-level modeling showed much greater within-site differences than between-site differences.

★ Indicates all-female site

## PRELIMINARY RESULTS: ENGINEERING IDENTITY

- **Academic:** Self-beliefs in who they are as students
  - No change over the course of SEEK
- **Engineering Career:** Beliefs of what engineers do and who they want to become relative to engineering
  - Significant increase over the course of the program



We have built in mentor training to help ensure more consistent messaging happens across sites and classrooms

## PRELIMINARY RESULTS: MOTIVATION

Note: Scale is 1: No, 2: Maybe, 3: Yes, 4: Definitely, Yes!



We have built in mentor training to help ensure more consistent messaging happens across sites and classrooms

## FINDINGS FOR OBJECTIVE 2

- **More familiar with SEEK processes**
  - This is a fantastic model for bringing outreach programs to the right locations (utilizing the SEEK Potential Index, or SPI)
  - The size and scope of SEEK is incredibly impressive
- **Greater within-site variation than between-site variation**
  - We are working on ideas that can help tighten and standardize processes while allowing for site-level flexibility when appropriate
- **Mentors are a key aspect of the success of the SEEK program**
  - Mentors serve as role models for participants
  - SEEK is also a great professional development opportunity for mentors

## DISSEMINATION: CONFERENCE PAPERS & PRESENTATIONS

- **Frontiers in Education (FIE) 2017: Leveraging a Multi-Partner Approach to Develop Successful STEM Outreach Programs** (Glenda D. Young, David Knight, Walter C. Lee, Monica Cardella, Morgan Hynes, Karl Reid, Trina Fletcher)
- **Indiana STEM Education Conference 2018: Pushing the Limits with Engineering** (Kayla R. Maxey, Jessica Rush Leeker, Monica E. Cardella, Morgan M. Hynes)
- **Collaborative Network for Engineering and Computing Diversity (CoNECD) 2018**
  - **Maximizing Accessibility: Providing Summer Engineering Experiences for Racially, Ethnically, and Economically Underrepresented Youth** (Cherie Edwards, Walter Lee, David Knight, Karl Reid, Trina Fletcher, Greg Meerpool)
  - **Integrating Social Context in Engineering Experiences to Promote Interests of Diverse Learners** (Kayla R. Maxey, Jessica Rush Leeker, Monica E. Cardella, Morgan M. Hynes)

Best Paper  
Award!

# DISSEMINATION: TRANSLATING RESEARCH TO RESOURCES

## SEEK Mentor Guide

**Thank you** so much for your time and effort in making SEEK a powerful experience for the students we serve. You will have a profound impact on the students and we know you are here to contribute to their lives. As our partners in teaching and mentoring, we have some simple ideas for creating the best experience for the students AND you!



**Hands Off!**

Hands-on projects may require teachers & mentors to assist students. Avoid "taking over" the project. Encourage them, step in if the frustration level is becoming a problem.



**Listen**

Students will ask questions looking for "the answer." Avoid giving answers right away. Ask probing questions that help them get to the answer on their own. LISTEN FOR THE GOLD IN WHAT THEY SAY!



**Students as Consultants**

If some students move more quickly than others, encourage them to support others. Be sure to acknowledge and recognize them for their great work and for their assistance

**Mentorship** Students look up to you... look to contribute something positive in every interaction.

**Acknowledge and recognize!** Ask about their lives! **Empower their ideas!** Positive **Be patient!** Provide feedback and support! **Messaging!**

**ENGINEERING** There are no right answers!

Engineers work to make the world a better place. Their work is all around us!

**Teamwork!** **Iterate & Improve** **Combine ideas!**

**Fail often to succeed sooner - Tom Kelley**



2017 Review

## Engineering Gift Guide

Gift ideas that engage girls and boys in engineering thinking and design



To learn how these gifts support engineering thinking and design go to: [purdue.edu/INSPIRE/EngineeringGiftGuide](http://purdue.edu/INSPIRE/EngineeringGiftGuide)



A PARENT'S GUIDE TO

## Introducing Engineering AT HOME

Why help your kids learn about engineering?

- **Many schools are now teaching engineering.** Most states are adopting standards that specify engineering topics that should be taught at each grade level. Elementary, middle and high school teachers are learning how to teach engineering to all students.
- **Engineering motivates mathematics and science learning.** One reason that some states have decided to include engineering in K-12 schools is because research has shown that engineering contexts can motivate K-12 students to learn mathematics and science.
- **Engineering promotes learning in general.** Engineering design challenges often incorporate:
  - Reading and writing skills, as engineers need to gather information related to the projects they are working on and need to communicate their work to others.
  - Social studies skills as K-12 students are prompted to consider the person (or group) that they are designing for, which means that they may need to understand cultures and other countries (if the design challenge prompts the student to think about how the design is used in another country).
  - The opportunity to build and create things which can be motivating for some students.
- **Allow students to fail in a productive way.** Engineers test their ideas out, learn from the tests, and make improvements to their work. It is okay if an idea fails at first, because there is opportunity to learn from the failure and revise the idea. Engineers rarely get it right the first time.
- **Allow students to consider engineering as a career.** Many adults realize later in life they would have enjoyed engineering, but didn't understand what it was when they were choosing a major. If every child learns enough about what engineering is and what engineers do, they can make a choice about whether they are interested in a career in engineering.

Engineers apply science and mathematics knowledge and skills and use their creativity to solve problems or meet the needs/wants of people, animals, the community, the environment, etc.



View this resource and others at: [inspire-purdue.org/parent-materials](http://inspire-purdue.org/parent-materials)





# CHOOSING LOCATIONS: SEEK POTENTIAL INDEX & OTHER FACTORS

## The SEEK Potential Index (SPI)

- Assists NSBE in making informed decisions about proposed sites
- Helps determine whether a site aligns with NSBE's mission and targeted population
- Not conclusive; serves as a guide for programmatic decision making

### The SPI data points include:

- ✓ African American population
- ✓ Income inequality (Gini coefficient)
- ✓ Median income
- ✓ NSBE infrastructure (NSBE Jr., Collegiate & Professional chapters in a 50 mile radius)
- ✓ STEM city ranking
- ✓ % of Bachelors degree holders
- ✓ % of students qualifying for free or reduced lunch

## Site Funding (\$140K-\$300K per site)

## Local District/School Support in Target Neighborhood(s)

	Site	Total Score
	<b>Sample MAX Score</b>	<b>100</b>
1.	Detroit, MI	88.75
2.	Memphis, TN	80.00
3.	New Orleans, LA	75.00
4.	Montgomery, AL	75.00
5.	Baltimore, MD	75.00
6.	Flint, MI	75.00
7.	Houston, TX	73.75
8.	Philadelphia, PA	73.75
9.	Cleveland, OH	70.00
10.	Atlanta, GA	67.50
11.	Savannah, GA	65.00
12.	Meridian, MS	65.00
13.	Washington, D.C.	62.50
14.	Birmingham, AL	60.00
15.	Los Angeles, CA	58.75
16.	Harrisburg, PA	58.75
17.	Chicago, IL	57.50
18.	Jackson, MS	55.00
19.	Pittsburgh, PA	55.00
20.	Kansas City, MO	53.75

# 2018 SEEK Sites

## 16 Programs in 14 Cities

Projected Students: 2000+  
Mentors: 275+



Atlanta, GA (All Girls)

Birmingham, AL

Chicago, IL

Detroit, MI

Houston, TX (YWCPA)

**Houston, TX** (Ripley Charter)

Los Angeles, CA

**Minneapolis, MN**

New Orleans, LA

Oakland, CA

Pittsburg, PA

Sacramento, CA (TBD)

Saginaw, MI

**San Diego, CA**

Washington, DC (KIPP-Shaw)

**Washington, DC** (DCPS-Payne  
All Girls)

# ACKNOWLEDGEMENTS



**Program Officer: Julio Lopez-Ferrao, Ph.D.**  
Program Director, Division of Research on Learning in Formal and Informal Settings



**PI: Karl W. Reid, Ed.D.**  
Executive Director, NSBE  
The NSBE SEEK Team (All of them!!)



**Co-PI: David Knight, Ph.D.**  
Assistant Professor  
Assistant Department Head for Graduate Programs  
Director of International Engagement  
Department of Engineering Education

**Co-PI: Walter Lee, Ph.D.**  
Assistant Professor, Department of Engineering Education  
Assistant Director for Research, Center for the Enhancement of Engineering Diversity (CEED)



**Co-PI: Monica Cardella, Ph.D.**  
Associate Professor  
Director, INSPiRE Research Institute for Pre-College Engineering



Awards #1615143, #1614739, #1614710

# Q&A

KARL W. REID, Ed.D.

EXECUTIVE DIRECTOR

KREID@NSBE.ORG

TWITTER: @EDUCATOR2US

INSTAGRAM: KARLWREID



## TOPICS OF DISCUSSION

- Summer Engineering Experience for Kids (SEEK) Overview
- Research Plan and Findings
- Dissemination
- Challenges and Next Steps

# Strengthening the STEM Pipeline for Elementary School African Americans, Hispanics, and Girls by Scaling Up Summer Engineering Experiences Research Update

## VT Team

David Knight  
Walter Lee  
Cherie Edwards  
Glenda Young  
Sreyoshi Bhaduri  
Racheida Lewis  
Desen Ozkan



## Purdue Team


Monica Cardella  
Morgan Hynes  
Tikyna Dandridge  
Jessica Leeker  
Kayla Maxey

## DATA COLLECTION: OBJECTIVE 1

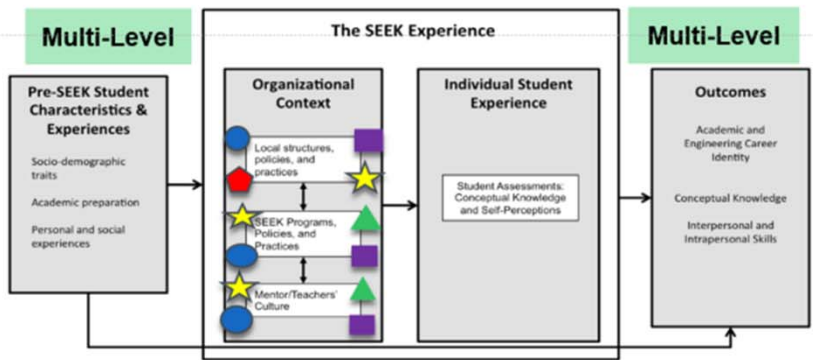
Matched Sample	~1,375
Overall Sample	Pre: ~1,650; Post: ~1,400
Consented Sample	842

This is a very large sample already. We have further streamlined consenting and matching processes for Year 2 and already have a larger consented sample.

# DATA COLLECTION: OBJECTIVE 2

	Parent Surveys	Pre: 1,004 Post: 275
	Mentor Surveys	161
	Site Leaders Surveys	25

	Site Visits	7
	NSBE Interviews	8
	Mentor Interviews	30
	Site Leader Interviews	13



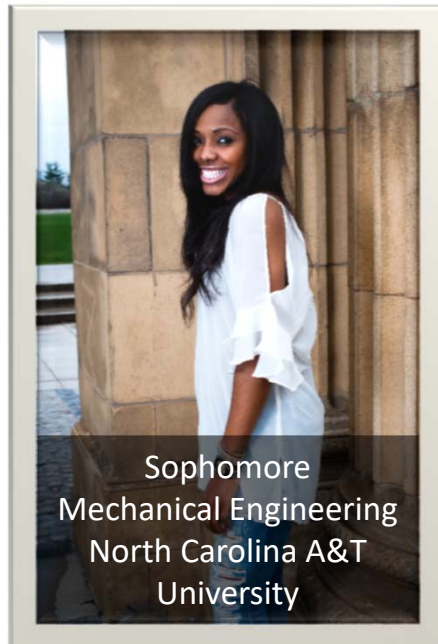
 **Parents**    
  **Mentors**    
  **Site Leaders**    
  **NSBE HQ**    
  **Observations**



## THE SEEK EFFECT

Simone Douglas

SEEK 2008 - Columbus, OH

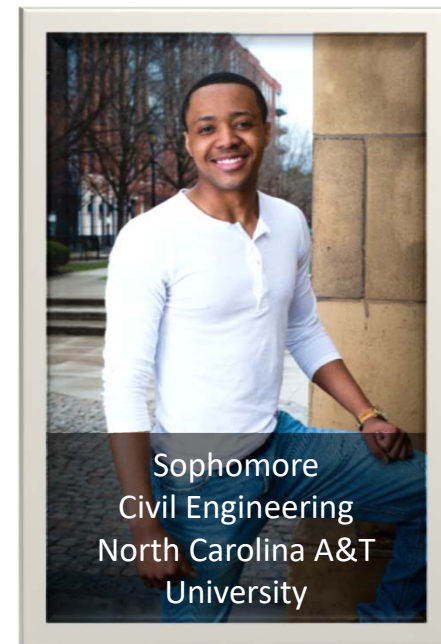


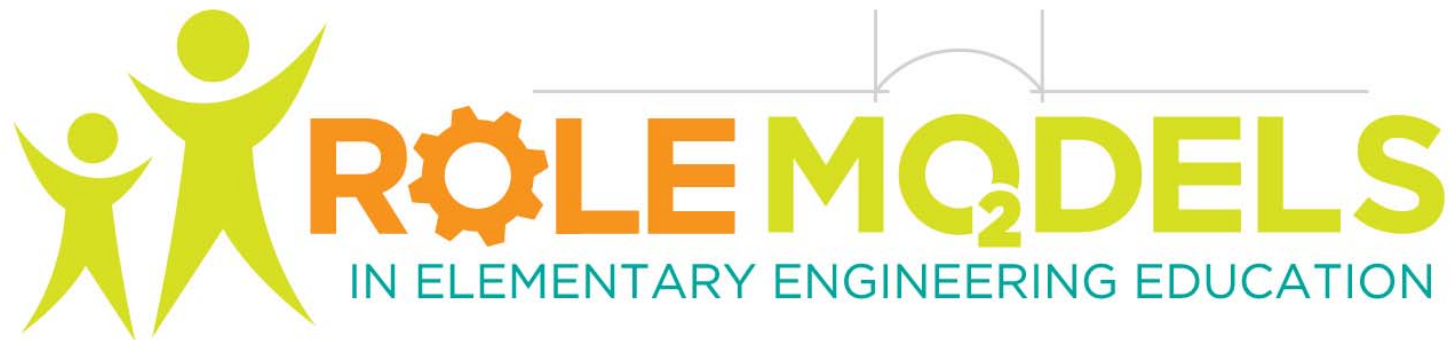
*“The most valuable thing that I took away (from SEEK) is that **there are many different ways to solve a problem**, and the steps we take to solve the problems are critical to the final solution.” –*

Simone Douglas

Stephan Douglas

SEEK 2008 - Columbus, OH





Merredith Portsmore

Director, Tufts Center for Engineering Education and Outreach

Research Assistant Professor

*Project Team: Adam Maltese (PI, IU), Karen Miel, Kelli Paul*



School of Engineering  
Center for Engineering  
Education and Outreach



INDIANA UNIVERSITY

NSF DRL-1657519





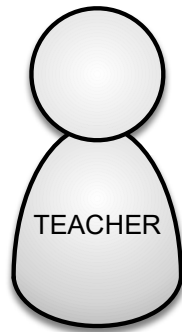
School of Engineering  
Center for Engineering  
Education and Outreach

2001 – Massachusetts  
creates the Science &  
Engineering/Technology  
Frameworks for K-12



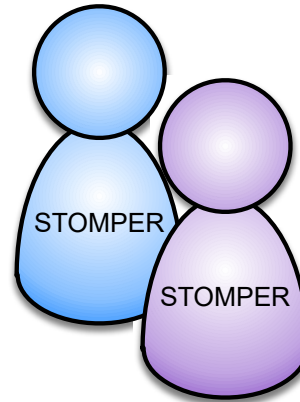


School of Engineering  
Center for Engineering  
Education and Outreach



3<sup>rd</sup> to 5<sup>th</sup> Grade

+



Undergraduate Engineering Students

=

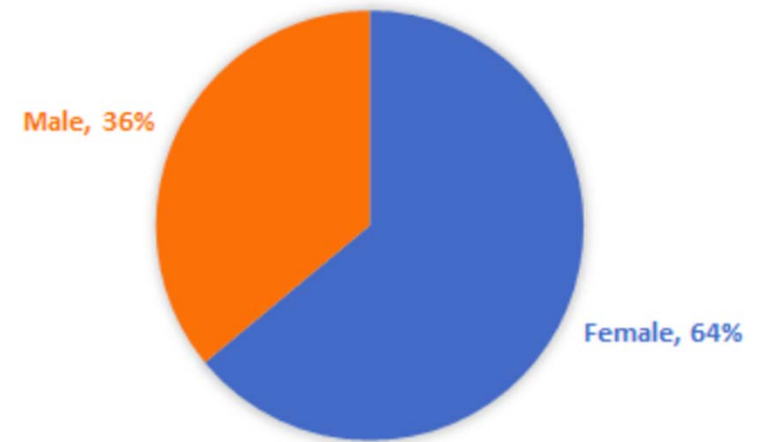
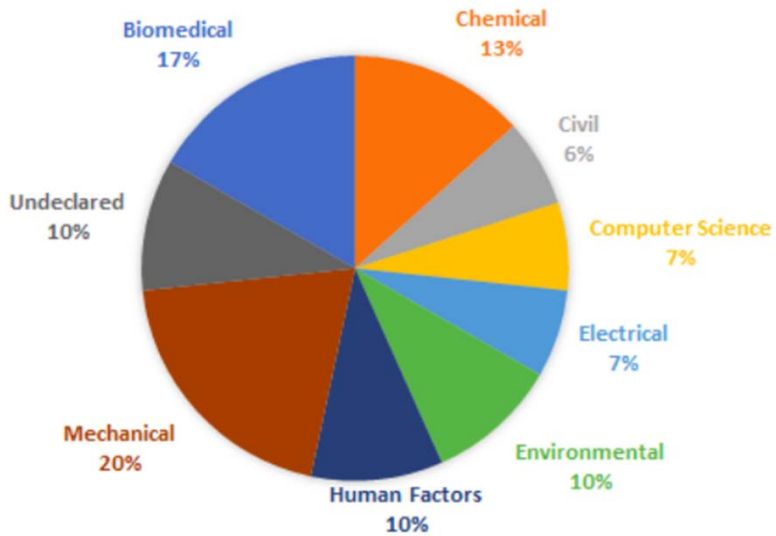
Hands-on  
Engineering  
**Design** Activities

- Robotics
- Community-based Engineering
- Novel Engineering
- *Super Hero Engineering*



**STOMP ENGINEERING STUDENTS**

**2017-2018 STOMP GENDER BREAKDOWN**



# Engineering Outreach Questions

- In the United States, an estimated 600,000 K-12 students participate in university-led engineering outreach annually [1]
  - RQ1: **Dynamics of role models & students** - How do STOMP Fellows and female elementary students interact in a classroom outreach setting?
  - RQ2: **The impact of role models on students** - How does female students' response to STOMP Fellows impact their understanding of engineering and interest in engineering careers?
  - RQ3: **Programmatic design** - How do programmatic changes to role model preparation in an outreach setting impact elementary students and the undergraduate role models?

# R1 - Dynamics



**Clark: "Whatcha guys building?"**

Student: "I'm making a palace."

**Clark: "Solid! I like it! I like the dome idea...it's actually very structurally sound. It's the engineer side of me. Are you thinking you can maybe add anything to the...design?"**

Student: "We're gonna add a fence around the barn..."

**Clark: "That's a good idea! ...Think about what you want to do for the fence."**

"I'm somebody who likes to invent stuff and they're similar like me."

"[STOMPERS] "were very nice and kind to us"

# R2: Impact & Factors of Impact

## QUANTITATIVE (EIDS) [2]

	1	2	3
10. Engineers solve problems that help people.	1	2	3
11. Engineers work in teams.	1	2	3
12. Engineers design everything around us.	1	2	3
13. There is more than one type of engineer.	1	2	3
14. Engineers use mathematics.	1	2	3
15. Engineers use science.	1	2	3
16. Engineers are creative.	1	2	3
17. When I grow up I want to be an engineer.	1	2	3
18. When I grow up I want to solve problems that help people.	1	2	3
19. When I grow up I want to design different things.	1	2	3
20. When I grow up I want to work on a team with engineers.	1	2	3

## QUALITATIVE (INTERVIEWS)

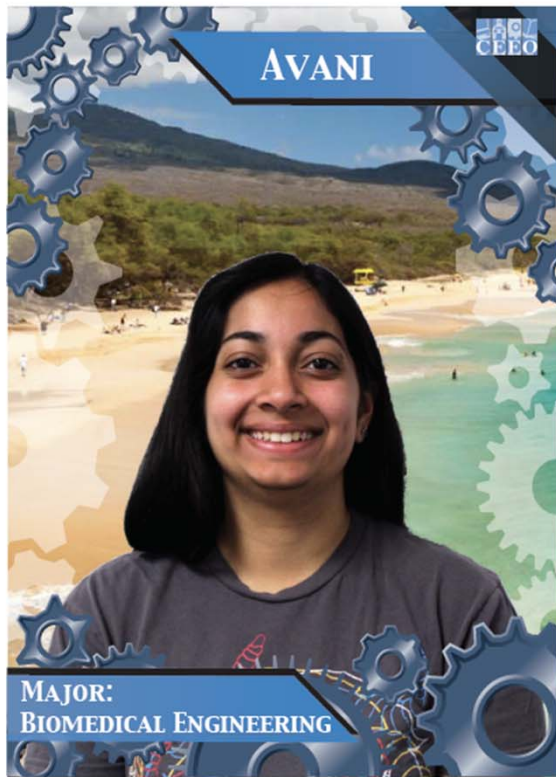
### CAREER CHOICES

- Personal Passions
  - Artist
  - Dancer
- Parents' Professions
  - Police Officer
  - Nurse
  - Teacher

### ROLE MODEL SELECTIONS

- Parents!!!!
- Family Members (Cousins)
- Teachers
- STOMP Fellows





Name: Avani Favorite Place: Maui  
 Super Powers: Designing Water Filters, Making Pancakes Into Cool Shapes  
 Siblings & Pets: Older Sister, Younger Sister, 2 Chihuahuas (Jorge and Lipton)  
 Something I am learning: Learning How to Code  
 Favorite Things To Do: Sailing Reading Researching Movies  
 Favorite Class: Calculus and Sociology of Law  
 Hardest Class: Physics  
 Favorite Part of Engineering: Working with My Friends to Build and Design Products

## R3: Programmatic Changes

Leveraging role model theory to build connections.

Role Models & Role Aspirants[3]

-Goal Embodiment

-Attainable

-Shared Group Membership

-Theories of Ability



Name: Chris Favorite Place: Adirondacks  
 Super Powers: Designing and Building Models, Helping Friends with Their Homework, Watching Netflix  
 Siblings & Pets: 2 Older Sisters and a dog named Millie  
 Something I am learning: How to Code in MATLAB  
 Favorite Things To Do: Running, Swimming, Playing Music, Dancing  
 Favorite Class: Chemistry  
 Hardest Class: Coding  
 Favorite Part of Engineering: Brainstorming Solutions to Problems

# Stay CONNECTED



[blog.tuftsceeo.org](http://blog.tuftsceeo.org)

CEEO has a blog to keep you up to date on the latest happenings. Email [ceeo@tufts.edu](mailto:ceeo@tufts.edu) to receive the blog posts as an email newsletter.



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Tufts University  
Center for Engineering Education  
and Outreach



[/CEEOTufts](https://www.youtube.com/CEEOTufts)



[@Merredith\\_CEO](https://twitter.com/Merredith_CEO)

# References

- [1] E. Iversen, "Engineering Outreach on Campus," Washington, DC, 2015
- [2] B. M. Capobianco, B. F. French, and H. A. Diefes-Dux, "Engineering identity development among pre-adolescent learners," *J. Eng. Educ.*, 2012.
- [3] Morgenroth, T., Ryan, M. K., & Peters, K. (2015, November 23). The Motivational Theory of Role Modeling: How Role Models Influence Role Aspirants' Goals. *Review of General Psychology*.

# PROJECT POEM

SUNGGYE HONG

UNIVERSITY OF ARIZONA

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# What is Project POEM?

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**P**roject-Based Learning

**O**pportunities and

**E**xploration of

**M**entorship for Students with Visual Impairments in STEM

# What is the purpose of Project POEM?

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To better understand and further advance the awareness, persistence, and resilience of STEM-related careers of middle and high school students with visual impairments.

The project will build their capacity to pursue these careers through the use of project-based learning and mentorship.

# Project POEM Goals

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1

Create a set of activities based on the Next Generation Science Standards, which will increase STEM awareness and capacity of students with visual impairments (VI).

2

Connect students with VI with industry mentors with VI to learn about their preparation and work in STEM related careers.

3

Pair students with VI with university STEM mentors to complete a project, which will enhance persistence and resilience towards STEM and career exploration.

# Mentors

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## INDUSTRY MENTORS

Recruit industry mentors with VI employed in STEM-related industries.

Train industry mentors with VI to participate in Exploration Activities.

Facilitate industry mentors with VI and students with VI in Exploration Activities through e-mentoring on the project based website.

## UNIVERSITY MENTORS

Recruit university mentors in STEM related majors.

Train university mentors to participate in Exploration Activities.

Facilitate university mentors in guiding students with VI as they complete a project.



# Project POEM

(Next Generation Science Standards, OER and STEM)

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Readiness  
Academy

Exploration  
Activities

Enrichment  
Institute


Students with VI will take part in a 14 month intervention



# Readiness Academy

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Sky School: Week long, hands on, place based, inquiry based, outdoor science education

- **Day 1:** Students will learn to collect data (types of rocks, hoodoo formations, and dendrochronology ).
  - **Day 2:** Hypothesis testing and scientific research (design a hypothesis, collect, and analyze data).
  - **Day 3 and 4:** Student group planning and presentations (hypothesis, data collection, and data analysis).
  - **Day 5:** Students and UA university mentors will visit the UA Lunar and Planetary Laboratory (tour, discuss LPL goals, topic introduction and selection, meet industry mentors via Kubi robots).
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# Exploration Activities

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Mentoring activities will be conducted through the accessible, secured project website during the academic year (September-May).

The project will be completed under the guidance of the university mentor.

All project-related work will be housed on the project website and available to the student with VI, their university mentor, TVI, and parents/guardian.

Topics: Martian Gullies, Martian Dunes, Martian Polar Caps, Martian Geochronology, and Martian Atmosphere.

For each topic, students will utilize publically available images and data from the HiRISE camera currently operating on NASA's Mars Reconnaissance Orbiter (MRO).

A professor in VI will:


- provide detailed feedback on each step of the students' projects
- will meet virtually with each student and university mentor every two months to check student progress on the project, answer questions, and provide guidance to the dyad.

# Enrichment Institute

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In the following summer, participating students with VI will return to Tucson for one week to stay in a UA dorm and experience college life.

During the day they will visit labs, job sites in STEM-related fields, and UA resources.

- the Arizona Materials Laboratory (UA Department of Materials Science and Engineering)
  - San Xavier Underground Mining Lab (UA Department of Mining and Geological Engineering)
  - UA BIO5 Institute
  - UA Disability Resource Center
  - and meet with a panel of college students with VI who will share their experiences.
- 

# Enrichment Institute

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- In the late afternoon for four consecutive days students will:
  - Meet in small groups based on the Exploration Activities project topic they selected.
  - Work in groups which will be co-facilitated by a senior project personnel member and a doctoral student from LPL.
  - Work as a group to prepare a 15-20 minute presentation for the Project POEM Symposium.

# POEM Symposium

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- The POEM Symposium will be held on the last morning in the College of Education Telepresence Room.
- Industry mentors, university mentors, parents/guardians, and TVIs will be invited to join the Symposium either in person or virtually through a Zoom meeting connection, a bidirectional internet-based video conferencing system.
- The multiple cameras in the Telepresence Room will allow those with vision to see both the presenters and the material.
- A panel of 4-5 community judges will evaluate each presentation for clarity, thoroughness of data analysis, presentation style, and presentation quality of materials used.
- Each student in the group with the highest score will receive an Orion TI-36X, a fully functional talking scientific calculator.

# Outcome

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- The intervention outcome will end with students with VI gaining skills and knowledge that will better position them to determine if they wish to pursue further education in a STEM-related field after completing high school.



# *SciGirls Strategies: Gender Equitable Teaching Practices in Career and Technical Pathways for High School Girls*

*Rita Karl, PI  
Twin Cities PBS*

Produced By:



Made Possible By:



Additional Funding Provided By:



PPG  
Industries  
Foundation

Cargill

NXP  
Semiconductors

The  
Schulze Family  
Foundation

The  
Donaldson  
Foundation



# Project Overview

***SciGirls Strategies* is a three-year professional development initiative designed to help career and technical education (CTE) educators and guidance counselors recruit and retain more girls in science, technology, engineering, and math (STEM) pathways, specifically in technology and engineering.**

The project acknowledges the need to address specific barriers preventing high school-aged girls' participation in CTE-STEM career tracks, including;

- Limited exposure to female STEM role models
- Stereotypes about girls' lack STEM ability and interest
- Commonly held misperceptions about STEM fields being “unfeminine”
- Low STEM self-esteem
- Lack of knowledge of STEM fields
- A disproportionate number of male students and educators in CTE

# Project Goals

- 1) To increase the number of high school girls, including racial and ethnic minorities, recruited and retained in traditionally male CTE-STEM pathways;
- 2) To enhance the teaching and coaching practices of CTE educators and guidance counselors to include gender equitable and culturally responsive strategies;
- 3) To research the impacts of these strategies and role model experiences on girls' interest in STEM careers;
- 4) To evaluate the effectiveness of training in these strategies for educators, counselors and role models; and
- 5) To develop a hybrid course that can be easily placed online and scaled up to reach a broader audience.

# Professional Development


- A six-session short-course for CTE teachers and guidance counselors on the use of gender equitable and culturally responsive teaching and coaching strategies.
- Role model training for female CTE-STEM professionals.
- 12 role model video profiles featuring diverse female technology and engineering professionals, *Real Women, Real Jobs*
- Five short equity films for educators, *SciGirls Snapshots*



# SciGirls Profiles: WOMEN IN STEM

Role Model Video Collection  
available at

[tpt.org/scigirls-profiles](http://tpt.org/scigirls-profiles)



**SciGirls Profiles:**  
**WOMEN IN STEM**

These women are the innovators, problem-solvers and dreamers who live right next door. They're passionate about their work, hobbies, families and helping to make the world a better place. They share their strategies for overcoming challenges and finding success and joy in jobs where women are underrepresented, and inspire girls to pursue all kinds of interests and career paths.

[tpt.org/scigirls-profiles](http://tpt.org/scigirls-profiles)

**SciGirls: Changing the way millions of girls think about STEM!**

The graphic features a dark green background with a pattern of sunflowers. It includes three small inset photos: a woman in a lab coat working in a laboratory, a woman in a field with a boat, and a woman wearing a space helmet. The text is in white and yellow, and the URL is in blue.



# SciGirls

## SNAPSHOTS

**SciGirls Snapshots**, short videos to introduce educators to research-based strategies to engage girls in STEM studies and career paths. *SciGirls Snapshots* include four topics:

- Explicit Gender Equity
- Student Centered and Personally Relevant Learning
- Designing Groupwork and Promoting Respectful Conversations
- Role Models
- Culturally Responsive Teaching

**[LINK TO SNAPSHOTS](#)**

# Research Study

The external research study being conducted by The University of Colorado-Boulder is testing the hypothesis that ***girls will develop more positive STEM identities and interests when their educators employ research-based, gender equitable and culturally responsive teaching practices enhanced with female STEM role models.***



# Summative Evaluation Questions

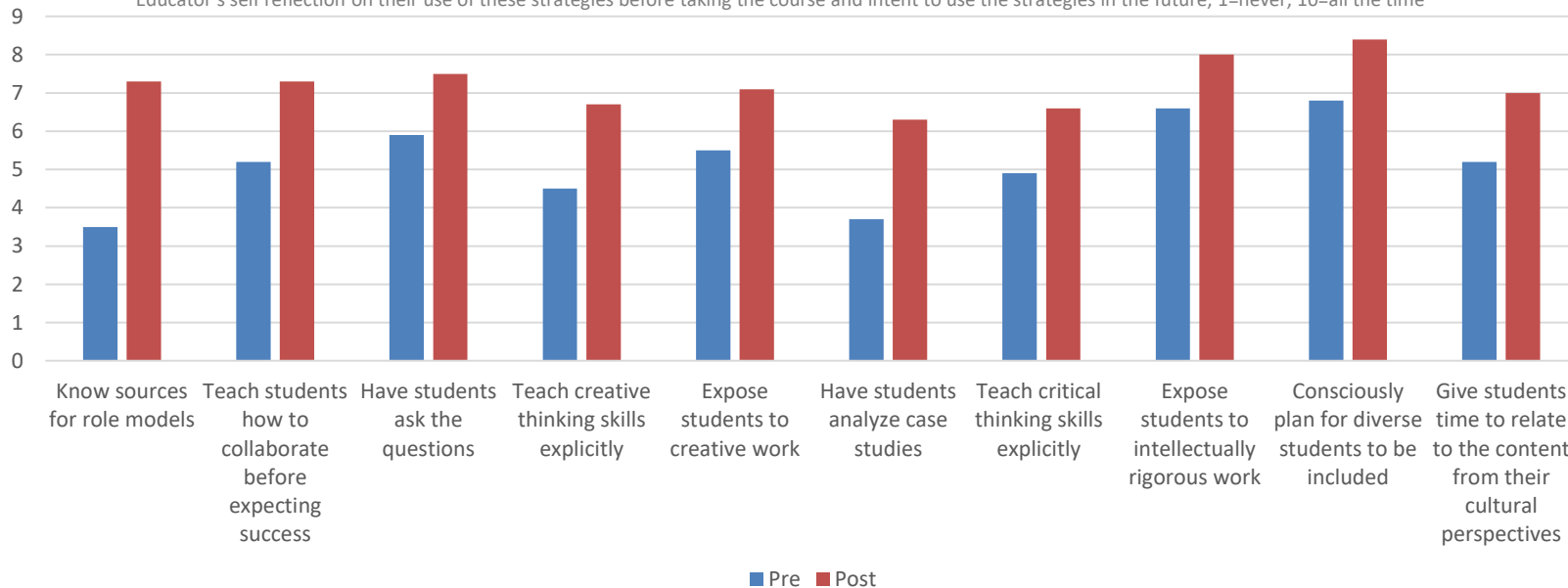
- 1) What is the result of the course on the CTE educators, guidance counselors and role models understanding confidence and intent to use gender equitable and culturally responsive strategies with students?;
- 2) To what extent and under what conditions do CTE educators, guidance counselors and role models implement what they learned about how to support girls in STEM? and;
- 3) How do CTE educators, guidance counselors and role models' perceptions of the needs of girls and racial and ethnic group?



# Findings

## Educator Professional Development Impact

Educator's self reflection on their use of these strategies before taking the course and intent to use the strategies in the future; 1=never, 10=all the time





# Dissemination

Project resources will be disseminated by our key national partners PBS LearningMedia and the National Girls Collaborative, reaching thousands more educators and will also be shared with out 85 certified *SciGirls* CONNECT Trainers who train hundreds of educators each year nationwide.



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**Thank you!**

**For questions or information:  
[rkarl@tpt.org](mailto:rkarl@tpt.org)**

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