California Girls in STEM Collaborative presents

Growing Together: The Future of Programs for Girls

Friday, October 15, 2021
12:00pm - 1:30pm PST
Online via Zoom

Featured Speakers
The Research Group at Lawrence Hall of Science, Corey Newhouse, Scott Burg
Goal of Webinar

- Help girl-serving organizations improve and sustain their programming
  - Continuous Program Improvement
  - Make Research-Based Decisions about New Strategies
  - Make the Case for Our Work
  - Increase Funding and Profile for Sector
Speakers

- Moderator: Carol Tang, Children’s Creativity Museum

- Panelists:
  - Kelly Grindstaff, Research Group, Lawrence Hall of Science, UC Berkeley
  - Scott Burg, Senior Researcher, Rockman et al.
  - Corey Newhouse, Founder and CEO, Public Profit
Research and Evaluation
For California Girls in STEM
Kelly Grindstaff, PhD
The Research Group
kelly.grindstaff@berkeley.edu
lawrencehallofscience.org

Thank you!
## Research and Evaluation

<table>
<thead>
<tr>
<th></th>
<th>Research…</th>
<th>Evaluation…</th>
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</thead>
<tbody>
<tr>
<td><strong>Purpose…</strong></td>
<td>test and produce generalizable findings</td>
<td>determine the effectiveness of a specific program or model</td>
</tr>
<tr>
<td><strong>Questions originate from…</strong></td>
<td>scholars in a discipline</td>
<td>key stakeholders and primary intended users of evaluation findings</td>
</tr>
<tr>
<td><strong>Quality and Importance determined by…</strong></td>
<td>peer review in a discipline</td>
<td>those who will use the findings to take actions and make decisions</td>
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<tr>
<td><strong>Ultimate test of Value..</strong></td>
<td>contribution to knowledge</td>
<td>usefulness to improve effectiveness</td>
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Research Example:
**Educational Pathways Into College and Career (EPICC)**

Research explored whether the EPICC program could support positive changes in underrepresented youth’s (including girls’) STEM attitudes and beliefs.

- **RQ1:** To what extent did EPICC provide a meaningful and engaging STEM-based service-learning experience for students?
- **RQ 2:** How did participation in EPICC influence students’ interest, knowledge, and skills related to STEM and STEM careers?
Data Collection

- Surveys from Science Learning Activation Lab + Career Interest
  - Fascination, Values Science, Career Interest, Background, Engagement
- Observations
  - Science and Engineering Practices; 21st Century Skills
- Knowledge and Skills
- Interviews
  - Students group interviews, Parent group interview, Individual interview with staff
## Increased Science Learning Activation

<table>
<thead>
<tr>
<th></th>
<th>Fascination</th>
<th></th>
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<th>Values Science</th>
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<tbody>
<tr>
<td></td>
<td>Pre or Retro-Pre*</td>
<td>Post</td>
<td>Effect Size</td>
<td>Pre or Retro-Pre*</td>
<td>Post</td>
<td>Effect Size</td>
</tr>
<tr>
<td>2015 EPICC</td>
<td>2.81</td>
<td>2.93</td>
<td>0.512</td>
<td>2.96</td>
<td>3.04</td>
<td>0.225</td>
</tr>
<tr>
<td>2016 EPICC*</td>
<td>2.27</td>
<td>2.99</td>
<td>1.291</td>
<td>2.53</td>
<td>3.26</td>
<td>1.444</td>
</tr>
<tr>
<td>Comparison*</td>
<td>2.34</td>
<td>2.50</td>
<td>0.351</td>
<td>2.38</td>
<td>2.59</td>
<td>0.614</td>
</tr>
</tbody>
</table>
Some New Career Interests

<table>
<thead>
<tr>
<th></th>
<th>Pre</th>
<th>Retro-pre</th>
<th>Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>Science</td>
<td>2015 EPICC</td>
<td>3.05 (.72)</td>
<td>3.27 (.70)</td>
</tr>
<tr>
<td></td>
<td>2016 EPICC</td>
<td>2.68 (.89)</td>
<td>3.32 (.72)</td>
</tr>
<tr>
<td>Math</td>
<td>2015 EPICC</td>
<td>2.64 (.90)</td>
<td>2.77 (.69)</td>
</tr>
<tr>
<td></td>
<td>2016 EPICC</td>
<td>2.18 (.85)</td>
<td>2.59 (.91)</td>
</tr>
<tr>
<td>Engineering</td>
<td>2015 EPICC</td>
<td>3.00 (.80)</td>
<td>3.09 (.79)</td>
</tr>
<tr>
<td></td>
<td>2016 EPICC</td>
<td>2.14 (.83)</td>
<td>2.77 (.81)</td>
</tr>
<tr>
<td>Design Technology</td>
<td>2015 EPICC</td>
<td>2.83 (.89)</td>
<td>2.91 (.90)</td>
</tr>
<tr>
<td></td>
<td>2016 EPICC</td>
<td>2.36 (1.00)</td>
<td>3.09 (.75)</td>
</tr>
<tr>
<td>Program Computers</td>
<td>2015 EPICC</td>
<td>2.64 (.79)</td>
<td>2.55 (.86)</td>
</tr>
<tr>
<td></td>
<td>2016 EPICC</td>
<td>2.41 (.91)</td>
<td>2.86 (.99)</td>
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</table>

2015 EPICC participants showed increased interest in pursuing science jobs
2016 EPICC participants showed greater interest in all job types
Theory of Activation

Science learning activation =
A composition of *dispositions, skills, and knowledge* that enables success in proximal science learning experiences.
Understanding Activation

Service-Learning as a Lever to Support STEM Engagement for Underrepresented Youth
Melissa A. Collins, Joanna Totino, Ardice Hartry, Valeria F. Romero, Rosio Pedroso, and Rosalinda Nava

Journal of Experiential Education, pp 1–16 © 2019
DOI: 10.1177/1053825919887407
journals.sagepub.com/home/jee
Evaluation Example: Five Stars Pathway

Evaluation of the Five Stars Pathway Project was to learn:

- How does the program influence girls’ attitudes and interests in science?
- How does the program influence girls’ perceptions about women in science?
- In what ways does interacting with multiple-generations of females (scientists, undergraduates, graduates, and elementary girls) influence middle / high-school girls in Five Stars Pathway?
Influence on Girls’ Attitudes and Interests in Science

By the end of participating in “Five Stars,” students reported a statistically significant increase in Confidence in Science, and appeared to have slight gains in Sense of Efficacy, Interest and Engagement in Science.
Influence of Interacting with Girls & Women in Science

- exposure to a variety of women and thus a range of narratives and pathways
- gained a deeper understanding of who scientists are and what they do
- valued that Five Stars made science more accessible (through hands-on and real-world experiences, and female role models)

It was really cool being in a real lab ... you think they would work in these mass factories and have their microscopes ... and just take a bunch of notes, but it was cool see the work space and see what they do and how they do it.

I thought it was actually really interesting that they were all different in age, personality.... [the instructors] were really young... just out of college... and [professional scientist] was still going at it...

I thought it was actually really interesting that they were all different in age, personality.... [the instructors] were really young... just out of college... and [professional scientist] was still going at it...
How will you measure the construct of interest? (whether to add to knowledge or evaluate how well a program met its goals)

Methods have to match what you are trying to find out.

Most important is **construct validity** - is your measure a good proxy for the construct? (e.g. does the survey question really get at the attitude? Does the task or question really evaluate the knowledge or skill?)

**Internal validity** and **external validity** don’t mean much if you don’t have **construct validity**.
Research and Evaluation
For California Girls in STEM
Kelly Grindstaff, PhD
The Research Group
lawrencehallofscience.org
# About the project

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<th>Program</th>
<th>Participants</th>
<th>Context</th>
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| Two-week summer program held at Children’s Creativity Museum (July 2019) | 10 girls ages 10-12  
Facilitated by Dr. Shalini Agrawal, PhD (Critical Ethnic Studies, CCA)  
CCM Education staff | Lack of supportive STEM learning environments for women  
Gender bias in maker activities and leadership  
Can informal ed help to address gender bias in STEAM and maker ed? |
## About the evaluation

<table>
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<th>Design</th>
<th>Approach</th>
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<td>Consulted with CCM staff/Dr. Agrawal on methods, question, focus areas.</td>
<td>Inclusive/participatory focus</td>
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<td>Observed onsite camp</td>
<td>Introduced myself to participants.</td>
<td>Ensure that participants felt safe, heard and</td>
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<td>activities over two weeks</td>
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<td>Conducted interviews</td>
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<td>Flexibility - align with activities and</td>
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<td>facilitators and</td>
<td></td>
<td>facilitation approach</td>
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<td>participants, CCM staff</td>
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- **Methods**: Qualitative focus
- **Observed onsite camp activities over two weeks**
- **Conducted interviews facilitators and participants, CCM staff**
- **Design**: Consulted with CCM staff/Dr. Agrawal on methods, question, focus areas.
  - Introduced myself to participants.
- **Approach**: Inclusive/participatory focus
  - Ensure that participants felt safe, heard and respected
  - Flexibility - align with activities and facilitation approach
Setting the stage

- Camp guidelines - behavioral/attitudinal
- Importance of being respectful and supportive
- Being open to new experiences. Agency.
- Building relationships
- Strengthening identity
Site visits

- Critical look at makerspaces
- Applying a personal lens
- Inclusion, equity, comfort
- Emotional response and connectedness to space
Design thinking

- Design process linked to personal identity
- Less about maker activity/more about ‘space’
- Facilitator as guide - less prescriptive
- Incorporation of earlier themes
Designing the space

- Collaborative w/in and between group
- Built consensus
- Supportive - non judgemental
- Assumed risk
- Experientially themed
Key takeaways

- Challenged traditional design-thinking narrative
- Shifted maker design methodology (inclusion/safety)
- Foster independent learning, problem solving and critical thinking
Key takeaways

- Diversity honored and respected
- Attributes and identities tied to design of makerspaces
- Compromise and constructive dialogue
- Co-creation/co-research
Thoughts about evaluation

- Check your assumptions at the door
- Inclusivity is more than just a concept
- Safety is paramount
- Be flexible with methods and implementation
- Partnership between all parties
Thank you

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Evaluation and Learning Resources for Informal STEM Programs

California Girls in STEM Network

October 2021
QUALITY PRACTICES - What you can see happening in a program. Sometimes called point-of-service quality, this is about measuring what can be observed during a youth program.

PROGRAM EXPERIENCES What young people think and feel about their experience is important. This data is based on the firsthand reports of people participating in the learning.

Consistent Participation + High Quality + Positive Experiences = Positive Youth Outcomes

YOUTH OUTCOMES At the end of the day, this is about making a positive difference. What difference did you intentionally design your program to make? Always start there. It might be learning new skills, changing behaviors, or building competencies. It might include success in formal education.

PARTICIPATION & ATTENDANCE Who shows up, how often, and for how long reveals a lot. The more often young people participate in high-quality afterschool, the better the outcomes.
Dimensions of Success, YPQA - STEM, ASQ

Cityspan, KidTrax, EZ Reports, Salesforce, spreadsheets

Parent and youth satisfaction surveys, focus groups, Photostory, SAYO-Y, Hello Insight

Internal experience evaluation or surveys, SAYO-Y, Holistic Student Assessment, Common Instrument Suite
The goal is to collect all four, but starting with two or three will capture a wider and deeper range of perspectives than just one.

As you build capacity and systems to support CPI, add in additional areas of data.

Choose a Tool
What to collect

How to collect it

What does it mean?
Use other people’s stuff!

- Assessment Tools in Informal Science (ASTIS)
- InformalScience.org
  - Links to multiple STEM related tools
- Partnerships in Education and Resilience (PEAR)
  - Dimensions of Success
  - Common Instrument Suite
And if you are tired of surveys...
Four Corners

- Gauge attitudes or values for a group as people vote with their feet
- Bonus! Qualitative and quantitative data
Feedback Wall

- Helpful for gathering many participant's feedback over time.

- Can incorporate visual elements from the community or complement exhibit spaces.
Selfie Station

- Great for getting short answer feedback to 1-2 questions
- Can connect to social media and hashtags
Selfie Station
Reflection

Because of this session, I plan to...

Tag us on Twitter! @public_profit
What to collect

How to collect it

What does it mean?
Three Steps to Success!

SCAN  DIAGNOSE  PRIORITIZE
Stay in Touch!

School’s Out Washington Bridge Conference - Oct 26-29

Join our mailing list for more updates!

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corey@publicprofit.net
@public_profit
Q&A:
Please type questions in chat
Contact Information

- Kelly Grindstaff: Kelly.grindstaff@Berkeley.edu
- Scott Burg: scott@rockman.com
- Corey Newhouse: corey@publicprofit.net

- National Girls Collaborative Project
  - Kelly Reina: kreina@ngcproject.org
  - https://ngcproject.org/resources/webinararchive
California Girls in STEM Network

Focus on Girls in Making, Design, STEAM, and Engineering

- Carol Tang: carol@creativity.org
- https://aimscenter.org/events/2021-10-25-colloquium

Part of the MakerEd Making Spaces Program, supported in part by Cognizant.