STEM Program Assessment and Evaluation Webcast

Moderated by:
Dr. Frank A. Gomez
Executive Director, STEM-NET
Office of the Chancellor

https://www2.calstate.edu/impact-of-the-csu/research/stem-net
<table>
<thead>
<tr>
<th>Speakers</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Dalton Marsh, CSUSB</td>
<td>Assessing Self-Perceptions and Habits of Mind in STEM</td>
</tr>
<tr>
<td>Jane Lehr, Cal Poly San Luis Obispo</td>
<td>Utilizing and Evaluating Network Improvement Communities (NIC) in CS4All Initiatives</td>
</tr>
<tr>
<td>Nada Rayyes, CSULB</td>
<td>Supporting Undergraduate Research: Evaluating the CSULB BUILD Program</td>
</tr>
</tbody>
</table>
The Golden Ticket: When, Why, and How to use a Mixed Methods Evaluation Plan

Heather Macias – California State University, Long Beach
Rachel Part – STEM-NET

Dr. Heather Macias, Assistant Professor
Cal State Long Beach, Teacher Education
Heather.Macias@csulb.edu

Dr. Rachel Part, Consultant,
STEM-NET Educational Research
rachelpart@gmail.com
Project Overview/Agenda

1. Introduction
2. What and Who: Evaluation Plans and Grant Work
3. What and When: Quantitative and Qualitative Data
4. Why and How: Fidelity and Student Outcomes
5. Key Takeaways

The Golden Ticket: When, Why, and How to use a Mixed Methods Evaluation Plan
The Golden Ticket: When, Why, and How to use a Mixed Methods Evaluation Plan

Introduction

- Collective expertise in educational research
  - Quantitative research methods
  - Qualitative research methods
- Grant work with various institutions throughout the CSU system and California
- STEM departments + Culturally Responsive Teaching and Pedagogy (Gay, 2018; Ladson-Billings, 1995)
- Our evaluation work = mixed methods
WHAT: Evaluation Plans and Grant Work

- **What is ‘assessment?’**
  - Assessment for student learning
    - NOT program assessment
  - Unit of analysis in an evaluation:
    - Student

The Golden Ticket: When, Why, and How to use a Mixed Methods Evaluation Plan
WHAT and WHO: Evaluation Plans and Grant Work

● **What do we do?**
  ○ **Mixed Methods**
    ■ NOT simply [qualitative] + [quantitative]
    ■ Requires integration in the research questions, data collection, and analysis

● **Who are we?**
  ○ **The evaluator(s)**
    ■ Bring us in at ideation - not after the fact
WHEN: Quantitative and Qualitative Data

● **When** to use mixed methods evaluation approaches in grant proposals?
  ○ **Quantitative methods**
    ■ Answers questions about how or to what extent change occurs over time
  ○ **Qualitative methods**
    ■ Answers why or in what ways changes occur
WHEN: Quantitative and Qualitative Data

- When to use mixed methods evaluation approaches in grant proposals?
  - Level One NSF grants
    - More qualitatively focused (but some quantitative work is required)
  - Level Two NSF grants
    - Equally qualitative and quantitative
WHY and HOW: Fidelity and Student Outcomes

**Why would you use mixed methods for an evaluation plan?**
- Mixed methods approaches leverage the complementary nature of both quantitative and qualitative methods

**How do you use mixed methods in an evaluation plan?**
- Focus on the ways in which you want to integrate your quantitative and qualitative data
  - Sequential exploratory design (qualitative data inform quantitative design)
  - Sequential explanatory design (quantitative data inform qualitative design)
  - Iterative mixed methods design (continual integration of qualitative and quantitative data)
Key Takeaways

- Bring evaluators into the process early!
  - We can be excellent collaborators on your research and data collection design

- Mixed Methods design for evaluation (and research) is the best of both worlds to answer both quantity and quality questions
Questions?

Contact Information:

Heather Macias  
CSULB, Teacher Education  
heather.macias@csulb.edu

Rachel Part  
STEM-Net, Educational Research  
rachelpart@gmail.com
Assessing Self-Perceptions and Habits of Mind in STEM

Dalton Marsh – CSU San Bernardino

Collaborators: Susan Addington (CSUSB) and Steve Balady (CSUSB)
Project Overview

• “Building College-Level Number Sense” - supplemental learning material for GE mathematics courses.

• The focus is on “learning how to learn” mathematics by developing productive problem-solving skills and dispositions.

• The material is administered online through myOpenMath with ~10 different modules, for example:
  • Multiplicative and additive reasoning
  • Fractions, proportions, rates, percent
  • Estimating, dimensional analysis

• The material could form a full concurrent support course or parts could be used as needed (i.e., “just in time” teaching model)

• Sponsored by the California Learning Lab - “Improving Equity, Accessibility and Outcomes for STEM Gateway Courses”
Activities

- Assessment of the Number Sense materials and student outcomes:
  - Instructor opinions
  - Instructor use
  - Student use
  - Concurrent and future math course grades
  - Retention in STEM
  - "Growth in problem-solving dispositions – "expert-like views and dispositions about mathematics" (MAPS; Code et al., 2016)
Assessing Self-Perceptions and Habits of Mind in STEM

Results

Mean Change in Math Attitude

- Growth Mindset
- Real World
- Confidence
- Interest
- Persistence
- Sense Making
- Answers
- Identity

Wave

Pre
Post

% Expert Aligned

0.60

0.40

0.20

0.00
Lessons Learned

• Response rates were around 25%
• Results are only representative of the students who consented and stuck with the course.
Assessing Self-Perceptions and Habits of Mind in STEM

Next Steps/Long-Term Plans

- Dropout survey and analysis.
- Disaggregate results by gender, race/ethnicity, college-generational status, socioeconomic status, and other indicators.
- Track success in later math courses and retention in STEM.
Summary

• **Problem-Solving Skills**: Adaptive reasoning, strategic competence, conceptual understanding, procedural fluency.

• **Problem-Solving Dispositions**: Inclination to see mathematics as sensible, useful, and worthwhile, belief in diligence and one’s own efficacy. (*Adding It Up*, National Research Council, 2001)

• We have tended to focus on skills without being mindful of how this impacts students’ dispositions. The literature shows they are both important, but we are still in the early stages of studying how to best build both in tandem.
Assessing Self-Perceptions and Habits of Mind in STEM

Questions?

Contact Information:
Dalton Marsh
CSUSB Department of Mathematics
https://sites.google.com/csusb.edu/dalton-d-marsh
Dalton.Marsh@csusb.edu
Utilizing and Evaluating Network Improvement Communities (NIC) in CS4All Initiatives

Jane Lehr (she/they) – Cal Poly, San Luis Obispo

NSF DUE 1935108 “CUE Ethics: Collaborative Research: An Inclusive and In-Depth Computing Curriculum to help Non-Majors Learn Small Patterns to Solve Big Problems”

Zoë Wood¹, Aaron Keen¹, John Clements¹, Jane Lehr¹, Zachary Rentz¹, Bruce DeBruhl¹, RoxAnn Stalvey², Tim Chamillard³, Emily Coyle⁴

¹Cal Poly SLO; ²College of Charleston; ³University of Colorado, Colorado Springs, ⁴Saint Martin’s University

Jane Lehr, Professor, Cal Poly SLO
Departments of Ethnic Studies | Women’s, Gender & Queer Studies
Center for Engineering, Science & Mathematics Education (CESAME)

jlehr@calpoly.edu | @calpolystudentresearch
The project is structured around two goals:

- increasing exposure to computing and computational thinking among all students, and better preparing these students for professional careers in fields requiring a certain level of computing, and
- diversifying the population of students enrolled in computer science courses.

The project reframes computer science around human-centric learning goals in 15 modules that will be implemented across the collaborating institutions.

The NIC will create a series of modules, each targeting a specific aspect or a group of related aspects of computational thinking, tightly coupled with multiple domain examples. Each module will include an ethics perspective on the material.
Evaluation Activities

1. Curriculum Design & Student learning
   - Is the curriculum (modules, sequencing, etc.) achieving the intended learning objectives in computational thinking for its intended students?
   - Is the curriculum (modules, sequencing, etc.) achieving the intended learning objectives in ethical thinking for its intended students?
   - How integrated are computational thinking and ethical thinking in the curriculum?

2. Is the curriculum achieving its intended impacts in fostering inclusivity & diversity?
   - Does the integration of ethics components enhance the intended impacts in fostering inclusivity & diversity?

3. Is the Network Improvement Community functioning to support design & learning of team members? (~Formative Evaluation)
What is a NIC?

- Per the CUE IUSE solicitation through which the Small for Big/CS4All project is funded:
  - “Curricular reforms undertaken by a single IHE often have limited impact on the larger academic community. This solicitation intends to build community around efforts that are robust and operate across a range of IHEs. With that in mind, IUSE: CUE will fund collaborations of 3 to 5 IHEs working together, structured and functioning (formally or informally) as a Networked Improvement Community (NIC).
  - NICs are design communities in which partners share a common goal, develop a common understanding of what it will take to reach that goal, employ common metrics, and meet often to share activities and progress.
  - Individual implementations may vary across partners, but the researchers and practitioners together engage in rapid cycles of Plan, Do, Study, Act (PDSA) in order to “learn fast, fail fast, and improve quickly.” In this way, they develop, test, and refine interventions that can be effectively adapted across a variety of educational contexts.
  - Proposers are encouraged to include faculty from different disciplines and departments, as well as administrators. In addition, they should include the researchers and evaluators who will be needed to provide the “Study” aspect of the PDSA cycles. The effort should be generally organized according to best practices for NICs.”
What is a NIC? (cont’d)

• Getting Ideas into Action: Building Networked Improvement Communities in Education (Bryk, Gomez & Grunow 2011 | Carnegie Foundation)
  • Networks as design communities
    • Networks enable individuals from many different contexts to participate according to their interests and expertise while sustaining collective attention on progress toward common goals.
    • A network organizational approach can surface and test new insights and enable more fluid exchanges across contexts and traditional institutional boundaries—thus holding potential to enhance designing for scale.
  • Networks as learning communities
    • A networked improvement community is a distinct network form that arranges human and technical resources so that the community is capable of getting better at getting better (Engelbart 2003).
    • A case of “learning through doing”
NIC Evaluation Methods

American Journal of Preventive Medicine
ELSEVIER Volume 35, Issue 2, Supplement, August 2008, Pages S161-S172

Methodologic contribution
The Collaboration Readiness of Transdisciplinary Research Teams and Centers: Findings from the National Cancer Institute's TREC Year-One Evaluation Study

Kara L. Hall PhD, Daniel Stokols PhD, Richard P. Moser PhD, Brandie K. Taylor MA, Mark D. Thornquist PhD, Linda C. Nebeling PhD, Carolyn C. Ehret MS, RD, Matthew J. Barnett MS, Anne McTiernan MD, PhD, Nathan A. Berger MD, Michael I. Goran PhD, Robert W. Jeffery PhD

NICs/CS4All

• CUE Ethics CS4All NIC Evaluation
  • Modified segment of the National Cancer Institute's Transdisciplinary Research on Energetics and Cancer (TREC) Year 1 Evaluation Study

Collaborative Processes

CPS-A11. Please evaluate the collaboration within your TREC center.

<table>
<thead>
<tr>
<th>Process</th>
<th>Very Poor</th>
<th>Poor</th>
<th>Fair</th>
<th>Good</th>
<th>Excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Communication among collaborators.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Ability to capitalize on the strengths of different researchers.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Resolution of conflicts among collaborators.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. Productivity of collaboration meetings.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e. Overall productivity of collaboration.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Please rate “communication amongst collaborators” (to date) (1-Very Poor; 2-Poor; 3-Fair; 4-Good; 5-Excellent)

July 2020

8 respondents

August 2021

4 respondents

Please rate “ability to capitalize on the strengths of different collaborators” (to date) (1-Very Poor; 2-Poor; 3-Fair; 4-Good; 5-Excellent)
### Results

#### August 2021

<table>
<thead>
<tr>
<th></th>
<th>During the last year:</th>
<th>Cal Poly</th>
<th>Cal Poly AVG</th>
<th>Other Campuses</th>
<th>Other Campus AVG</th>
<th>Diff. in AVG</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Please rate &quot;communication among collaborators&quot; (to date)</td>
<td>3, 3</td>
<td>3</td>
<td>4, 5</td>
<td>4.5</td>
<td>1.5 (30%)</td>
</tr>
<tr>
<td>2.</td>
<td>Please rate &quot;ability to capitalize on the strengths of different collaborators&quot; (to date)</td>
<td>1, 2</td>
<td>1.5</td>
<td>4, 4</td>
<td>4</td>
<td>2.5 (50%)</td>
</tr>
<tr>
<td>3.</td>
<td>Please rate &quot;ability to capitalize on the strengths of different campuses&quot; (to date)</td>
<td>1, 2</td>
<td>1.5</td>
<td>4, 4</td>
<td>4</td>
<td>2.5 (50%)</td>
</tr>
<tr>
<td>4.</td>
<td>Please rate &quot;involvement of different campuses&quot; (to date)</td>
<td>1, 2</td>
<td>1.5</td>
<td>3, 5</td>
<td>4</td>
<td>2.5 (50%)</td>
</tr>
<tr>
<td>5.</td>
<td>Please rate &quot;resolution of conflicts among collaborators&quot;</td>
<td>3, 3</td>
<td>3</td>
<td>5, 5</td>
<td>5</td>
<td>2 (40%)</td>
</tr>
<tr>
<td>6.</td>
<td>Please rate &quot;productivity of collaboration meetings&quot; (to date)</td>
<td>3, 3</td>
<td>3</td>
<td>5, 5</td>
<td>5</td>
<td>2 (40%)</td>
</tr>
<tr>
<td>7.</td>
<td>Please rate &quot;overall productivity of collaboration&quot; (to date)</td>
<td>2, 2</td>
<td>2</td>
<td>4, 5</td>
<td>4.5</td>
<td>2.5 (50%)</td>
</tr>
</tbody>
</table>
Lessons Learned

The Three-Level Nested Model of Improvement Networks - Carnegie Foundation

<table>
<thead>
<tr>
<th></th>
<th>Improvement networks seek to ...</th>
<th>So they need help ...</th>
</tr>
</thead>
<tbody>
<tr>
<td>WORKING THEORY OF IMPROVEMENT</td>
<td>Explore new practices, iterate on early change ideas, and develop reliably effective interventions in their context.</td>
<td>Analyzing their efforts through a developmental, formative, and summative lens.</td>
</tr>
<tr>
<td></td>
<td>Avoid solutionitis by deeply studying their problem and the system factors that produce it.</td>
<td>Understanding the true needs of their users and taking a systems view of the problem.</td>
</tr>
<tr>
<td></td>
<td>Systematically study and iterate on their interventions through disciplined inquiry.</td>
<td>Building their own capacity to use improvement science and developing an infrastructure that allows them to efficiently analyze data.</td>
</tr>
<tr>
<td>IMPROVEMENT ENTERPRISE</td>
<td>Manage social dynamics across network members in different contexts.</td>
<td>Understanding the nature of participation, engagement, and social learning occurring across the network.</td>
</tr>
<tr>
<td></td>
<td>Accelerate social learning across the network.</td>
<td>Resourcing technical research expertise, consolidating learning within the network, and creating mechanisms for more rapid diffusion of emergent knowledge network-wide.</td>
</tr>
<tr>
<td>ENVIRONMENTAL CONTEXTS</td>
<td>Operate in complex environments.</td>
<td>Sensing salient dynamics within their communities, their policy environment, relevant fields of academic research, and the funding environment.</td>
</tr>
<tr>
<td></td>
<td>Learn from variation in the adaptations and performance of the intervention across contexts.</td>
<td>Analyzing local adaptations made to interventions, understanding why these are occurring, and analyzing effects of the interventions across different settings.</td>
</tr>
</tbody>
</table>
Small for Big: An Inclusive and In-Depth Computing Curriculum to help Non-Majors Learn Small Patterns to Solve Big Problems

An honest reflection about the challenge of CS for all, given college curriculum demands and requirements

Zoë Wood¹, Aaron Keen¹, John Clements¹, Jane Lehr¹, Zachary Rentz¹, Bruce DeBruhl¹, RoxAnn Stalvey², Tim Chamillard³, Emily Coyle⁴

¹California Polytechnic State University, San Luis Obispo, CA, ²College of Charleston, Charleston, SC, ³University of Colorado, Colorado Springs, CO, ⁴Saint Martin’s University, Lacey, WA
Summary

• Network Improvement Communities (NICs) can be a useful framework for project implementation and evaluation

• Opportunity to utilize NIC resources intentionally and explicitly as part of the "work" of the project team
Questions?

Contact Information:

Jane Lehr, CPSLO

jlehr@calpoly.edu

@calpolystudentresearch
@ccc.undocu
@janelehr
Supporting Undergraduate Research: Evaluating the CSULB BUILD Program

Nada Rayyes, Ph.D. – California State University, Long Beach

Nada Rayyes, Project Director
CSULB, Center for Evaluation and Educational Effectiveness (CEEE)
Nada.rayyes@csulb.edu
Overview

• About the Center for Evaluation and Educational Effectiveness
• Evaluation Approach – working with clients
• BUILD Program
• BUILD Evaluation Methods
• Dissemination
Mission of CEEE

CEEE promotes effective educational programs and services for students at all educational levels, in both formal and informal settings. We accomplish this through using an interdisciplinary, capacity-building, PK20 perspective to:

• Examine the effectiveness of practices, programs, and services for advancing equity, access, and achievement in educational settings;

• Support the application of data-based, high-impact practices, programs, and services;

• Encourage innovation and effectiveness in organizational, instructional, and programmatic practice;

• Work with partners to develop effective practices for urban education.
CEEE Projects

<table>
<thead>
<tr>
<th>CEEE Projects Focus Areas</th>
<th>CURRENT</th>
<th>COMPLETED</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Undergraduates</td>
<td>7</td>
<td>10</td>
<td>17</td>
</tr>
<tr>
<td>Graduate Students</td>
<td>3</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>Teacher Prep</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Comm. College/Transfer</td>
<td>1</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>STEM</td>
<td>7</td>
<td>6</td>
<td>13</td>
</tr>
<tr>
<td>URM/Low-income/1st gen</td>
<td>8</td>
<td>7</td>
<td>15</td>
</tr>
<tr>
<td>Psychosocial/Soft Skills</td>
<td>4</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Academics</td>
<td>6</td>
<td>5</td>
<td>11</td>
</tr>
<tr>
<td>Data analytics/Research/Survey</td>
<td>2</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Development</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Systems &amp; Partnerships</td>
<td>5</td>
<td>7</td>
<td>12</td>
</tr>
</tbody>
</table>

Sampling of Current Projects

- CSULB HSI-Teacher Preparation Caminos Project (HSI Teacher Prep – U.S. Department of Education) (2017-Present)
- CSU HSISTEM Partnership Project with 10 other CSU Campuses (U.S. Department of Education (2016-Present)
- CSU Center to Close the Opportunity Gap (CCOG) (2020-Present)
BUILD Program

- **BUilding Infrastructure Leading to Diversity**
- NIH grant 2014 - 2024
- Goals:
  - To engage and retain URS in biomedical and behavioral health research
  - To promote enhanced and improved mentorship among faculty
  - To enhance and expand research culture institution-wide
- Four colleges: Natural Sciences & Math, Engineering, Liberal Arts, Health & Human Services
CSULB BUILD Evaluation

- BUILD Phase I (2014-2019)
  - Summative evaluation conducted year 5
- BUILD Phase II (2019-2024) Overall Eval Plan
  - Refining effective components for institutionalization/ sustainability
  - Dissemination of products/ scholarship
- Annual Evaluation Plans
  - Developed each year
  - Modifications made as needed/ relevant
  - Specify:
    - Evaluation Questions
    - Data Sources/Methods
    - Indicators
    - Timeline
Supporting Undergraduate Research: Evaluating the CSULB BUILD Program

Evaluation Questions

**Student**
How does BUILD influence:
- student psycho-social outcomes?
- professional development, and career preparation?
- family support and awareness of trainees’ career goals?

**Faculty**
To what extent does BUILD
- Provide faculty with supports to enhance research capacity?
- Influence competitiveness for faculty to obtain external funding?

**Institution**
- How are BUILD efforts enhancing faculty diversity at CSULB and throughout the CSU?
- How does Week of RSCA influence campus research culture? Does WOR increase students’ awareness of research activities and opportunities?
Evaluation Questions

**Student**
- What are trainees’ perceptions of the BUILD program this year?
- What are the characteristics of mentoring experiences for trainees?

**Faculty**
- How do faculty view their mentoring experiences? How has current societal context affected this?

**Institution**
- To what extent is the institutionalization plan being implemented?
- What progress is being made regarding dissemination of program components and research/evaluation findings?
# Methods

## Student psycho-social constructs
- Sense of belonging
- Science Identity

**Surveys**

## Trainee perceptions of program

**Focus Groups**

## Faculty views of mentoring

**Focus Groups & Surveys**

## Influence on faculty research productivity

**Institutional Data (e.g., grant awards)**

## Influence of Week of RSCA on campus culture

**Surveys; Program Data (e.g., participation)**
Dissemination

- Annual Evaluation Reports, including recommendations
- Ongoing discussions with client (BUILD PIs)
- Evaluation data used for reports to funder (NIH)
- Support for publications and presentations
- Presentations to various bodies (e.g., funder, leadership team, advisory boards)
In Years 9 & 10 (2022-2024):

- Evaluation will shift from formative to summative/outcomes
- Focus will be on student outcomes and institutional impact
- Quasi-experimental impact study will examine effect of BUILD program participation on student outcomes:
  - Retention in major/related discipline
  - Matriculation to Ph.D. programs
  - Research careers
  - Data sources: Institutional Research, National Student Clearinghouse
Questions?

Contact Information:
Name: Nada Rayyes
Campus/Department: CSULB/CEEE
https://www.csulb.edu/college-of-education/center-for-evaluation-and-educational-effectiveness
Phone #: 562.985.8868
Email: nada.rayyes@csulb.edu
Assessing Beyond Knowledge and Skills
Measuring and Evaluating Self-Efficacy, Engagement, Identity, and Sense of Belonging in Summer Research Programs

FADI CASTRONOVO PhD EIT
SENIOR LECTURER AT THE UNIVERSITY OF BRIGHTON
EVALUATION AND ASSESSMENT CONSULTANT
fadi@castronovoevaluations.com
What I do

• External Program Evaluations for Federal and State Grants
• Each evaluation is developed with your programmatic goals and questions in mind to assure success and significant impact.
• Technology Adoptions Consultations.
• Assess impacts of psychological factors, such as STEM Identity, Self-Efficacy, Engagement, and Sense of Belonging.
• Assess learning impacts of technology in the classroom, such as VR, AR, Educational Gaming.
### Summer Program Evaluation and Instruments

<table>
<thead>
<tr>
<th>Evaluation Questions</th>
<th>Metrics</th>
</tr>
</thead>
<tbody>
<tr>
<td>How many students were from under-represented groups (women, minorities, disabilities, etc.)? Or from institutions with limited research opportunities?</td>
<td>Recruitment of diverse student population</td>
</tr>
<tr>
<td>Did students find the program to stimulate their scientific identity, sense of belonging, engagement, and self-efficacy?</td>
<td>Student’s STEM identity, sense of belonging, engagement, and self-efficacy</td>
</tr>
</tbody>
</table>

- “Undergraduate Research Student Self-Assessment (URSSA)” by the National Science Foundation
- “Measure of Engineering Identity Survey developed” by Godwin (2016)
- “The development of a measure of engineering identity” by Godwin (2016)
- “General Self-Efficacy Scale” by Schwarzer and Jerusalem (1995)
- “Sense of Belonging Scale” by Butcher and Conroy (2002)
- “Student Response to Instructional Practices Survey” by Nguyen et al. (2016)
Program Diversity

- How many students were from under-represented groups (women, minorities, disabilities, etc.)? Or from institutions with limited research opportunities?

What is your gender?

- Female: 4 (44.4%)
- Male: 5 (55.6%)

Which of the following describes your racial/ethnic background?

- White, Black or African American: 2 (22.2%)
- Hispanic/Latino: 3 (33.3%)
- White: 3 (33.3%)
- White, Indian: 1 (11.1%)
- White, Hispanic/Latino: 1 (11.1%)
- Black or African American: 1 (11.1%)
- Hispanic/Latino: 1 (11.1%)
Program Diversity

- How many students were from under-represented groups (women, minorities, disabilities, etc.)? Or from institutions with limited research opportunities?
STEM Identity

- Did students find the program to stimulate their STEM identity, sense of belonging, engagement, and self-efficacy?

Please rate your agreement with the following statements.

- My parents see me as a scientist or engineer.
- My instructors see me as a scientist or engineer.
- My peers see me as a scientist or engineer.
- I have had experiences in which I was recognized as a scientist or engineer.
- I am confident that I can understand scientific or engineering concepts outside of class.
- I am confident that I can understand scientific or engineering concepts in class.
- I understand concepts I have studied in scientific or engineering concepts.
- I enjoy learning scientific or engineering concepts.

Assessing Beyond Knowledge and Skills
Self Efficacy

- Did students find the program to stimulate their STEM identity, sense of belonging, engagement, and self-efficacy?

I feel that I can:

- Handle whatever comes my way
- Stick to my aims and accomplish my goals
- Deal efficiently with unexpected events
- Handle unforeseen situations
- Solve difficult problems if I try hard enough
- Perform experiments independently
- Analyze data resulting from experiments
- Communicate results of experiments
- Communicate results of experiments in written form
- Solve real world problems

Assessing Beyond Knowledge and Skills
Sense of Belonging

Did students find the program to stimulate their STEM identity, sense of belonging, engagement, and self-efficacy?

Please evaluate your experience: Avg. 3.79
Engagement

- Did students find the program to stimulate their STEM identity, sense of belonging, engagement, and self-efficacy?

In this program, when the coordinators or lecturer asked you to participate in an activity/workshop/event, how often did you react in the...

- I liked the activities/workshops/events: 3.78
- I did actively participate in the activities/workshops/events: 3.11
- I gave the activities/workshops/events maximal effort: 3.78
- I did not pretend to participate in the activities/workshops/events: 3.67
- I felt the effort it took to do the activities/workshops/events was worthwhile: 3.78
- I participated actively (or attempted to) in the activities/workshops/events: 3.44
- I saw the value in the activities/workshops/events: 3.67
- I enjoyed the activities/workshops/events: 3.78
- I felt the coordinator/presenter had my best interests in mind: 3.89
- I felt the time used for the activities/workshops/events was beneficial: 3.89
The Center aims to support collaborative, interdisciplinary research efforts in the area of scientific research.

The Center is structured with one executive committee, two research groups (RGs), two outreach groups, and three teams composed of graduate and postdoctoral students.

The duration of the program is six years it is funded by the National Science Foundation.

Fragmented understanding of the Center’s identity, values, opportunities, objectives, goals, and impact for students.

Missed opportunities of collaborations, attending events, and supporting students.
Project Phases

Phase 1
• Project Kickoff

Phase 2
• Generate Collective Understanding

Phase 3
• Assessment Survey Development & Deployment

Phase 4
• Data Analysis & Presentation

Assessing Beyond Knowledge and Skills
Knowledge

A total number of 33 out of 34 students responded for a total of 97%.

Based on the knowledge survey the following results were highlighted to show areas of potential growth:

- 6% of the respondents did not know what the Center was, and
- 18% of the respondents did not know what an RGs was.

Based on these highlighted findings, the external evaluator recommends to:

- Improve onboarding of and communication with the Center participants regarding their membership to the center.

Assessing Beyond Knowledge and Skills
Joining the Program

I was asked provided with an orientation or onboarding

- 1 - Strongly Disagree: 15.6%
- 2 - Disagree: 9.4%
- 3 - Neutral: 34.0%
- 4 - Agree: 18.9%
- 5 - Strongly Agree: 27.1%

A short seminar was hosted by the RG leader and team

- 1 - Strongly Disagree: 9.4%
- 2 - Disagree: 9.3%
- 3 - Neutral: 31.2%
- 4 - Agree: 31.3%
- 5 - Strongly Agree: 28.1%

I was asked to present my research topic or project

- 1 - Strongly Disagree: 2.3%
- 2 - Disagree: 13.6%
- 3 - Neutral: 15.0%
- 4 - Agree: 19.8%
- 5 - Strongly Agree: 55.4%

I was provided with an orientation regarding what are the goals of the Center and RG

- 1 - Strongly Disagree: 9.4%
- 2 - Disagree: 19.0%
- 3 - Neutral: 21.5%
- 4 - Agree: 27.1%
- 5 - Strongly Agree: 31.3%

This arrow indicates to focus on the orange and red results.

Assessing Beyond Knowledge and Skills
Assessing Beyond Knowledge and Skills

Strengths of the Program

A strong sense of community

The community is diverse and inclusive

Engaged mentorship and supervision

Hosting social events to build a sense of community
Evaluation is key for continuous improvement

- Supports program directors put students at the center by providing them a feedback platform.
- Helps in developing a program that goes beyond knowledge and skills.
- Informs the effectiveness of the onboarding process.
- Offers a way to create a shared knowledge base of the program.
- Provides a bird’s eye view of the program and identify areas where efforts are fragmented.
- Identifies opportunities for improvements and secure future funding.
Assessing Beyond Knowledge and Skills

Questions?

Contact Information:
FADI CASTRONOVO PhD EIT
Castronovo Educational Assessment and Evaluations LLC
www.castronovoevaluations.com
fadi@castronovoevaluations.com
Speaker Contacts

Heather Macias & Rachel Part, CSULB & Meta
Heather.Macias@csulb.edu, rachel.part@unlv.edu

Dalton Marsh, CSUSB
Dalton.Marsh@csusb.edu

Jane Lehr, Cal Poly SLO
jlehr@calpoly.edu

Nada Rayyes, CSULB
Nada.Rayyes@csulb.edu

Fadi Castronovo, Castronovo LLC
fadi@castronovoevaluations.com
Next Steps/Closing Remarks

Dr. Frank A. Gomez
Executive Director, STEM-NET
Office of the Chancellor

https://www2.calstate.edu/impact-of-the-csu/research/stem-net
Webcast Feedback Survey

Please take a few moments to tell us about your webcast experience.

Use the QR Scan Code to download it
STEM-NET July Webcast
Topic: STEM Program Assessment and Evaluation
Date: Wednesday, July 20, 2022
Time: 10am- 11:30am

Virtual Research Café 10.0
Date: Wednesday, July 13th, 2022
Time: 11am-12pm
Join our CSU STEM-NET Community listserv
csustemnet@lists.calstate.edu

Begin a Conversation with Colleagues and Join our Private CSU STEM-NET Facebook Group
https://www.facebook.com/groups/2629611737269292
THANK YOU FOR JOINING US TODAY!
For more information about STEM-NET visit our website:

Frank A. Gomez
CSU Office of the Chancellor
fgomez@calstate.edu