

Having Trouble Evaluating the Effectiveness of your Grant-Sponsored Program?

We Offer a Practical, Data-driven Methodology for Evaluating Small
to Medium Size Student Support Programs


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Outline

- About Cañada College
 - Four-Levels of Comprehensive Program Effectiveness (PDCA)
 - Creating Institutional Capacity for Continuous Program Improvement
 - Case Study: Cañada College's EPIC Tutoring Program
 - Using Evidence Gathered Through the Evaluation Process for Program Institutionalization
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Cañada College

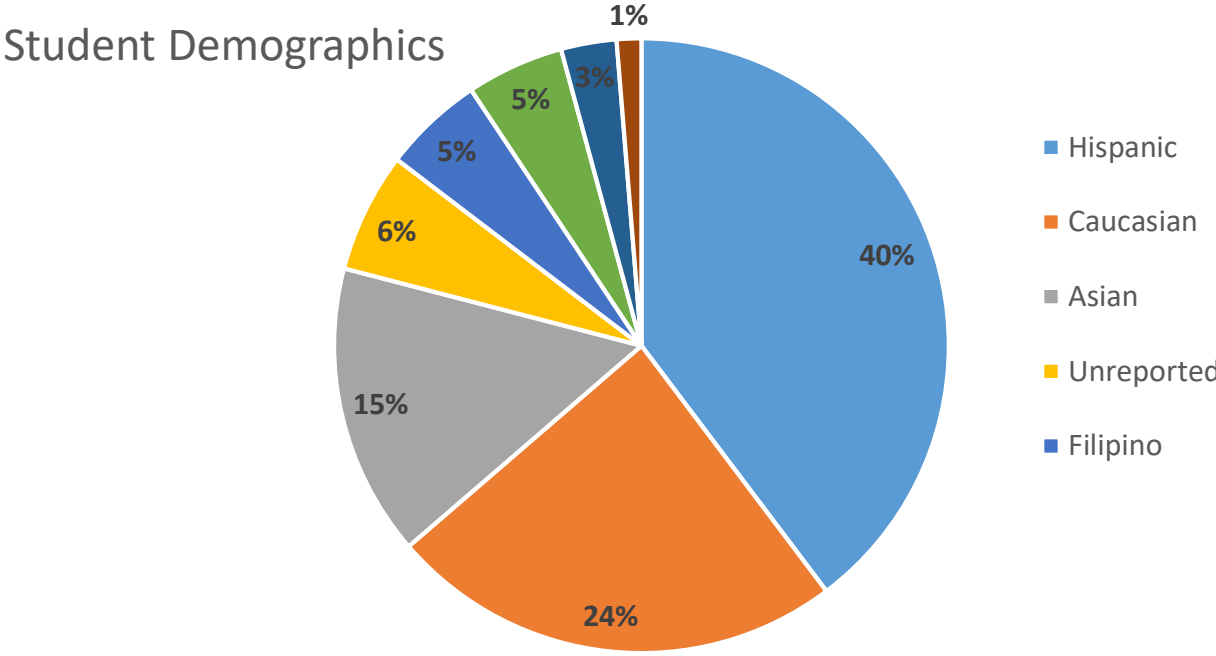
Redwood City, CA



**Climate Best
by Government Test**

About Cañada College

- One of 112 California community colleges
- One of three colleges in the San Mateo Community College District



2018-2019
Unique Headcount: 10,582


California Community College STEM Pipeline

- General pipeline to 4-year schools:
 - 31% of UC, 52% of CSU grads are CC transfers

- STEM Pipeline:
 - 48% of UC STEM grads are CC transfers

GANAS: Generating Access to Navigate and Achieve in STEM

Project Goals:

- A) Increase the success rate for underrepresented students in foundational courses that are key to STEM pathways. (Student)
 - B) Decrease the time to transfer by increasing the success in STEM pre-requisite courses with pre-semester and in-semester academic and study-skill assistance for students (Student)
 - C) Improve STEM faculty effectiveness in the classroom through pedagogies and strategies that promote student engagement and improve learning.(Faculty)
 - D) Strengthen relationships and articulation with 4-year universities. (Institution)
- 

Shewhart Cycle

Plan-Do-Check-Act (PDCA)



<http://iso9001-2008awareness.blogspot.com/2014/04/pdca-cycle.html>

Plan-Do-Check-Act

- **Plan**: Define the problem to be solved, gather data and identify the root cause of the problem
- **Do**: Develop and implement a solution, determine how you will measure the effectiveness of the solution
- **Check**: Confirm the results through before-and-after data comparisons
- **Act**: Document the results, inform others about the process changes to be made, make recommendations about the problem to be solved in the next PDCA cycle

GANAS: Generating Access to Navigate and Achieve in STEM

Project Goals:

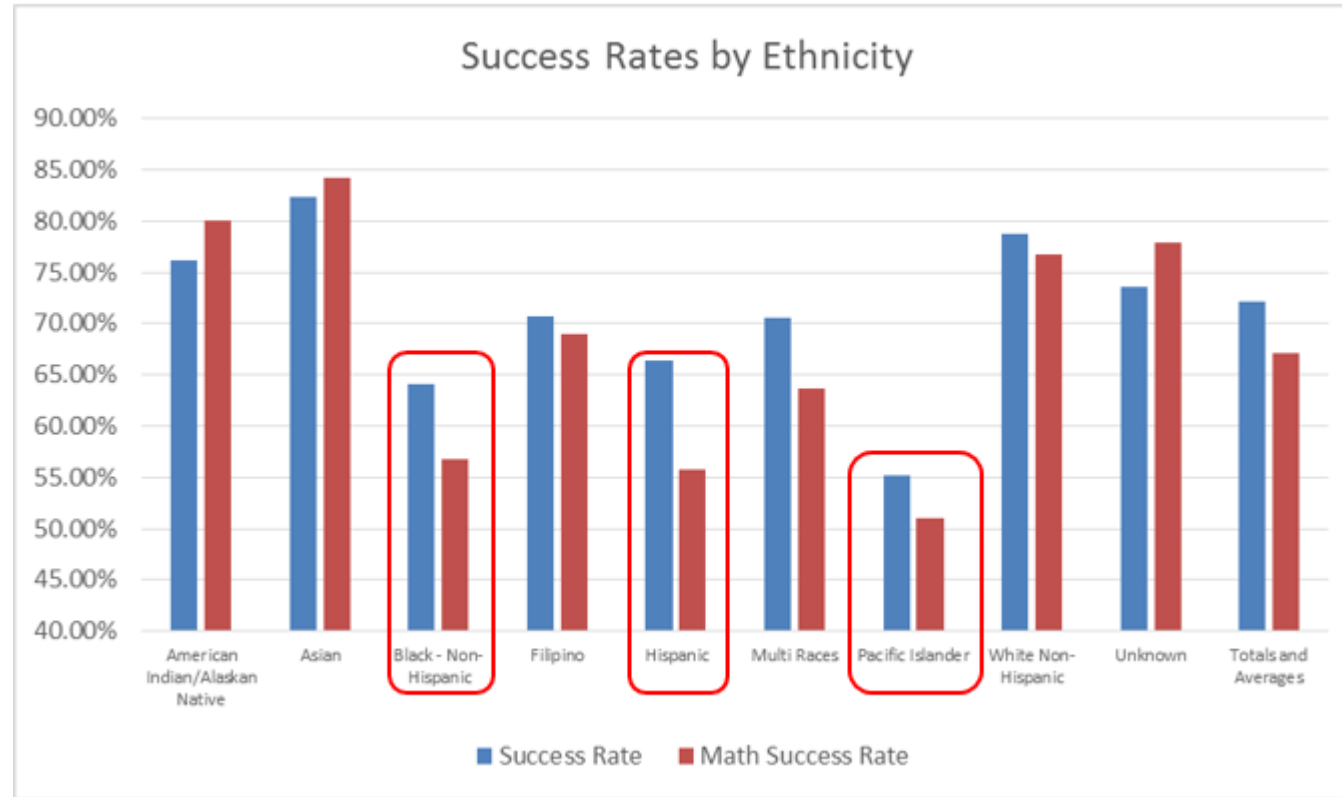
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Plan: Define the Problem to Be Solved



Comparison of student success rates in all college courses and math courses for different ethnicities. Data are from CC Instructional Program Review Data Packets 2016-2017.

Plan: Identify the Root Cause of the Problem

Over 50% of Cañada College Minority Students Place Into Pre-algebra or Beginning Algebra

Ethnic Group	Pre-Algebra	Algebra	College Algebra	Trigonometry
African American	19.95%	34.70%	29.23%	16.12%
Asian American	7.96%	24.34%	39.78%	27.92%
Caucasian	13.58%	24.41%	38.03%	23.98%
Latino	22.85%	29.89%	27.04%	20.21%
Other	16.02%	30.78%	36.09%	17.12%
All Ethnicities	16.20%	28.31%	34.57%	20.91%

Case Study: EPIC Tutoring

Activity B.1. Develop a Modified Supplemental Instruction program, Embedded Peer Instruction Cohort (EPIC), to offer in-semester academic and study skill assistance to students.

The logo for EPIC Tutoring is displayed in a stylized, bold, black font. The letters 'E', 'P', 'I', and 'C' are large and blocky. The word 'Embedded' is written in a smaller, white, sans-serif font at the bottom left of the 'E'. The word 'Peer' is written vertically in a smaller, white, sans-serif font inside the vertical stroke of the 'P'. The word 'Instruction' is written vertically in a smaller, white, sans-serif font inside the vertical stroke of the 'I'. The word 'Cohort' is written vertically in a smaller, white, sans-serif font inside the curve of the 'C'.

EPIC
Embedded Peer Instruction Cohort

Case Study: EPIC (Embedded Peer Instruction Cohort)

EPIC Leaders:

- Advanced students who participate in class sessions
- Lead study sessions with classmates
- Trained in Reading Apprenticeship strategies and problem solving skills


EPIC Faculty:

- Collaborate with EPIC leaders on study session content

EPIC Coordinator:


- Recruit, train and coach EPIC leaders
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Do: Determine How To Measure Success

- Evaluation for accountability
 - Evaluation for program improvement
- 

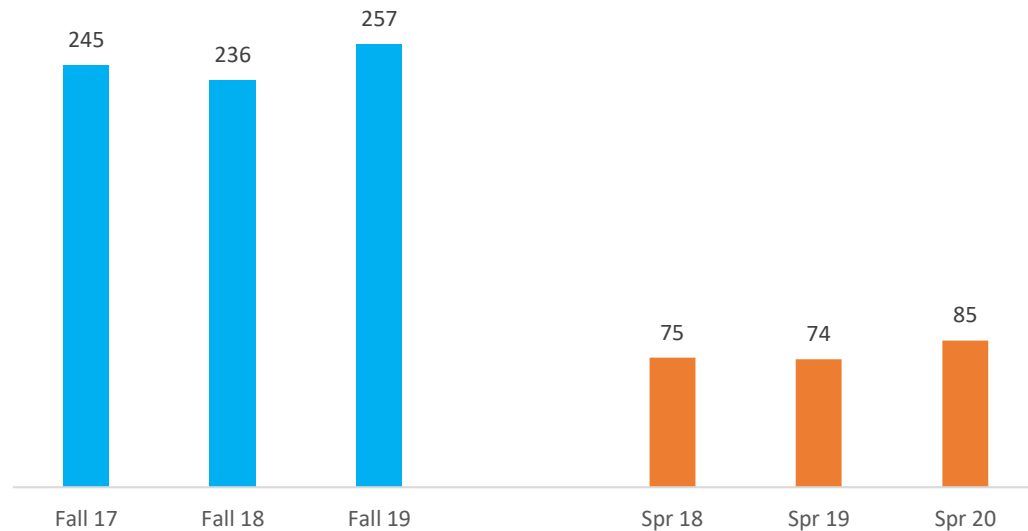
Do: Determine How to Measure Success

Formative Evaluation for Program Improvement

- Reaction of the participants to the program
 - Utilization of the knowledge and skills acquired
 - Outcomes (success, retention)
 - Return of investment
- 

Small Size Interventions Need Special Evaluation Methods!

Small Sample Sized: Math 251 Headcounts



*Control and treatment groups will have smaller sizes because many students will not match on the prescribed set of covariates and thus will be excluded from the statistical analysis.

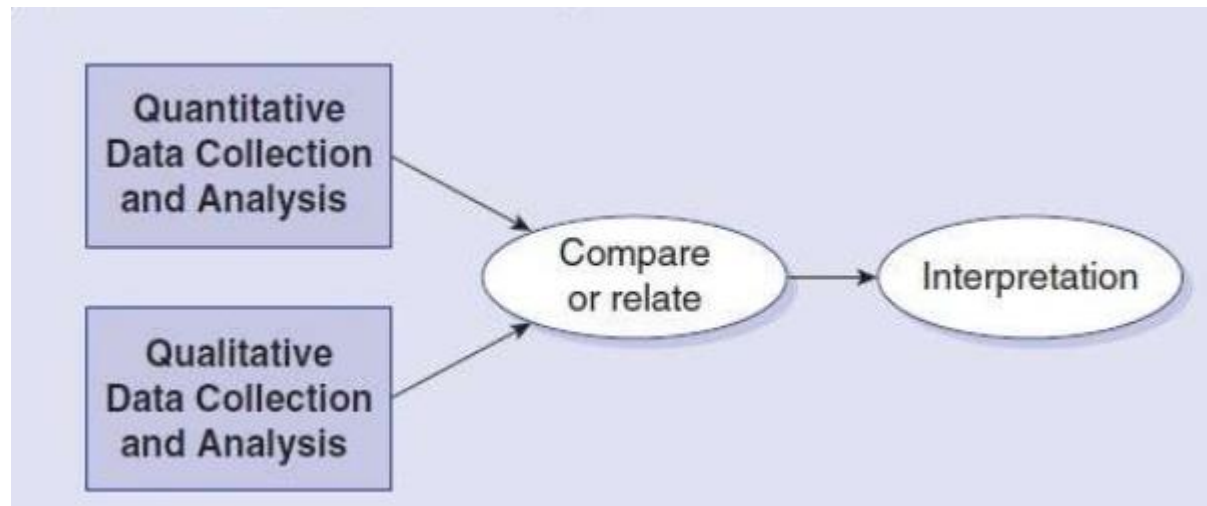
- Most Statistical Methods do not produce valid and reliable results for sample sizes $N < 50$.
- Most Statistical Methods do not produce valid and reliable results for outcomes that have non-normal distributions (small samples tend to have non-normal distributions).
- **Thus, Small Size Interventions need Special Evaluation Methods!**

Program Evaluation Methodology

➤ Convergent Parallel Mixed Methods Study

Qualitative Data (EPIC tutors, faculty interviews and focus groups)

Quantitative Data (Institutional data for course retention, success and GPA)



Program Evaluation Methodology Count.

➤ Evaluation Questions

Evaluation Questions	Hypothesis	Evidence/Data Sources	Method of Analysis
Does the <i>EPIC</i> program lead to an increase in student academic success (i.e., student retention, success and course GPA) and metacognition awareness? (B1)	The EPIC program leads to an increase in student retention, success and course GPA.	Institutional data on student retention, success and course GPA.	QED with PSM for matching control and treatment groups; Effect size estimation using Cohen's f^2 and related effect size conventions.
	The EPIC program leads to increase in students' metacognition awareness.	Student interviews and surveys.	Open coding process** Before–after intervention analysis using non-parametric Wilcoxon signed-rank test; Effect size estimation using Cohen's D method.

Program Evaluation Methodology Count.

➤ Qualitative Study

Sample: 8-10 students focus group
3 faculty interviews

Analysis: Theme coding



Program Evaluation Methodology Count.

➤ Quantitative Study : Quasi-Experimental Design (QED)

Sample: Math 251 Fall 2018 (N=80)

Treatment Group: Math 251 students participating in EPIC tutoring

Control Group: Math 251 students not-participating in EPIC tutoring

Matching: Propensity Score Matching (PSM)

- Gender, ethnicity, GPA, student-type (first-time/continuing), Full-time/Part-time, first-generation, income status

Analysis: SPSS

- Independent Samples T-test (Normal distributions)

- Mann-Whitney U test (Non-normal distributions, or small sample sizes $N < 50$)

Program Impact:

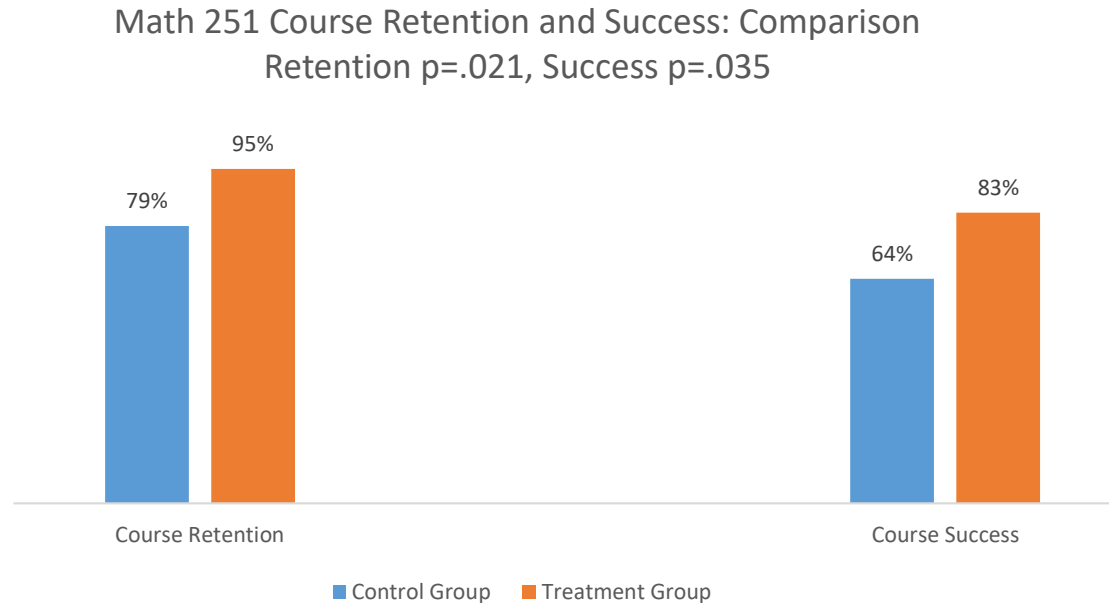
- Effect size calculations (Partial Eta Squared η^2)

$\eta^2 < .01$ small effect

$\eta^2 < .06$ moderate effect

$\eta^2 < .14$ large effect

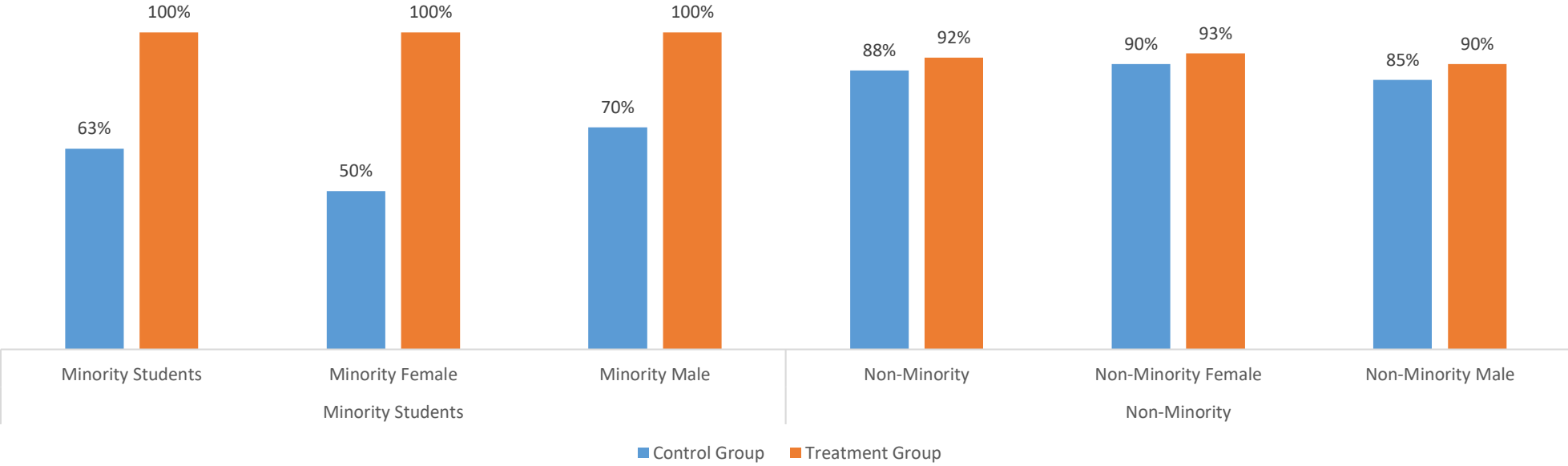
EPIC Program Evaluation: Outcomes



Method: QED with PSM, control N=29, treatment N=51 Fall 17- to Fall 18
PSM [treatment and control groups matched on: gender, ethnicity, student type(first-time/continuing), GPA, number of units, income status, first-generation status]

EPIC Program Evaluation: Outcomes Count.

Math 251 Course Retention: Comparison by Subgroups



Check: Results

Student Quotes from End-of-Semester Survey




Assessment Planning

Your Turn!



Act: Analyze data with team and make recommendations


- Recruiting
 - Scheduling
 - Training
 - Faculty Coordination
- 

Act: Document the Results

Resources to promote culture of assessment:

- Annual Reports
 - Dissemination Videos
 - Presentations: School and Community Stakeholders
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Ultimate Goal: Institutionalization

- Identify Key Stakeholders
 - Determine Which Data Points will Resonate with Stakeholders
 - Create a Timeline for Data Collection Based on School Position
Justification Schedule
 - Present Data to Key Stakeholders with a Feasible Institutionalization
Plan
- 



THE STEM
CENTER

at
Cañada
COLLEGE



Thank You!

Special Recognition



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Honor the Past. Transform the Future.

CanadaCollege.edu/50