

Author - 2025 AIChE Annual Meeting Abstract #723671 "Combining Research, Teaching, and Mentorship in a STEM Bridge Programs: The 3 Pasos Undergrad Student Experience"

 Summarize



aiche@confex.com

To:  Mario Oyanader



Mon 9/29/2025 10:14 AM

Caution: This message was sent from outside the university. Do not click on links or open attachments unless you recognize the source of this email and know the content is safe.

You are now listed as an author for a paper being submitted to the 2025 AIChE Annual Meeting:

Title: Combining Research, Teaching, and Mentorship in a STEM Bridge Programs: The 3 Pasos Undergrad Student Experience

ID: 723671

You may review your submission until 2025-10-14 by logging in using the same email address and password associated with your AIChE profile:

<https://aiche.confex.com/aiche/2025/gateway.cgi>

Thank you for using the AIChE Online Abstract Submission System.

The AIChE Abstract System Support Team

Combining Research, Teaching, and Mentorship in STEM Bridge Programs: The 3 Pasos Undergrad Student Experience

Krystal Marroquin, Michael Sill, Elisabeth S. Murillo and Mario A. Oyanader,
Chemical Engineering Department, California Baptist University, 8432 Magnolia Ave. Riverside,
CA 92504, E-mail: moyanader@calbaptist.edu

I joined the 3 Pasos Program at California Baptist University as an undergraduate teaching assistant, first by working on a research project about the geometry of beehive cells and later by helping with the *Primer Paso* summer bridge program for high school students. The 3 Pasos program is built around a Familia-Cohort mentorship model that emphasizes community, belonging, and hands-on STEM experiences for underrepresented students. Our project asked a simple but fascinating question: why do bees build hexagonal hives? Exploring this led me to study ideas such as surface-area-to-volume ratios and isoperimetric properties and then share those ideas with younger students.

During the summer bridge, I helped design and run activities where students used indirect measurement to estimate the height of buildings, applied dimensional analysis to physical problems, and explored how natural designs like hives connect to mathematical efficiency. My role was to guide students through the problem-solving process, encourage them when they were stuck, and help them present their findings at the end of the program. Pre- and Post-Program Surveys were administered at the beginning and end of the bridge program to measure changes in

non-cognitive factors such as academic self-efficacy, sense of belonging, motivation, academic hope, and knowledge of campus resources. Also, Learning Assessments were conducted using standardized or program-specific tests to measure gains in academic knowledge and skills taught during the bridge curriculum.

The results were encouraging. High school participants reported feeling more confident about tackling STEM problems and were excited to see math come alive in everyday contexts. For me, the experience showed how research can be translated into teaching, and how near-peer mentoring can make a difference. From a stochastic point of view, a combination of qualitative and quantitative parameters validates whether the program meets the stated goals, which revolve around improving student academic readiness, social integration, and ultimately, potential success in college.

In conclusion, the beehive project and summer bridge activities demonstrate that combining research, teaching, and mentorship creates meaningful learning for both high school students and undergraduate mentors. By connecting mathematics to nature and supporting students through a cohort model, the 3 Pasos program fosters a sense of belonging that is essential for persistence in STEM.