CAREER: Expanding Latinxs' Opportunities to Develop Complex Thinking in Secondary Science Classrooms through a Research-Practice Partnership

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Purpose

This project explores ways to expand the possibilities of meaning-making and actions of minoritized youth (Latinx, multilingual learners) in science classrooms by building a sustainable research-practice partnership project.

Aim 1: To design a year-long professional development program that: (a) facilitates collaboration among science teachers, teacher educators, teacher leaders, and scientists at the University of California, Irvine (UCI); (b) produces sets of equity-centered curricula and assessments that promote complex thinking in youth; and (c) supports the principled implementation of the co-designed curricula in classrooms.

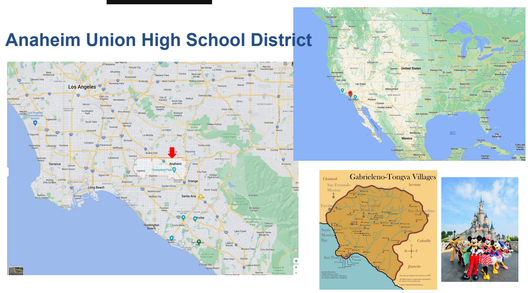
Aim 2: To study the impact of the professional development on: (a) teachers' enhanced pedagogical design capacity (PDC) (i.e., teachers' participation in designing, critiquing, adapting, and enacting curriculum with students in a principled way), (b) youths' enhanced opportunities to engage in complex thinking.

Context

Year 1 2019-2020 → Year 2 (COVID) 2020-2021 → Year 3 2022-2023 → Year 4 2023-2024 → Year 5 2024-2025

We are here!

Anaheim Union High School District

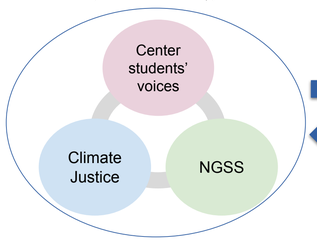


A progressive, well-functioning urban district

- a total of 17 schools (9 high schools, 8 junior high schools
- 68% Hispanic, 13.4% Asian, 8.7% White, 2.1% Black, 1.9% multiracial, 0.5% Native Hawaiian or pacific islander, 0.1% American Indian
- 21.3% multilingual learners, 76.6% free/reduced lunch
- School garden to address food desert

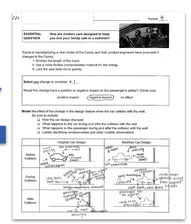
The Focus of the Partnership

Co-designing a unit
(October to February)



A unit storyline + assessments + activity sequence (Capstone Project)

Implementing the unit
(April/May)

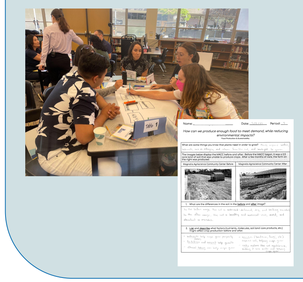


Learning from students

Transforming Science Learning at Schools toward a More Just & Sustainable Future

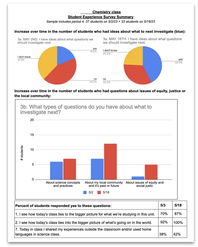
Experiencing a model unit as science learners, October, 2022
"How can composting food waste support climate justice?" (*Link*)

Co-designing a set of curriculum & assessment for one unit, (rubric)
Nov. 2022 to March 2023



Implementing
April to May in 2023
initial, final assessments
Capstone project

Reflecting sharing the lesson, analyzing data
May 30-31



Five Co-designed Units

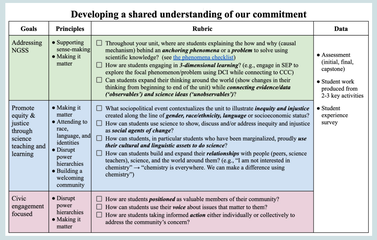
HS Chemistry, Chemical equilibrium
How can we produce enough ***food*** to meet demand, while reducing ***environmental*** impact?

HS Living earth Biodiversity
How have the various ***histories of use of our land*** contributed to the ***changing climate*** of Orange County?

7th grade, Living Earth Biodiversity
Evaluate the change of the design in ***one city*** in terms of biodiversity

HS Chemistry, Chemical equilibrium
How are we able to produce enough ***food*** to feed 8 billion people?

8th grade Biology genetic engineering
How can we responsibly use ***new genetic advancements*** to improve the future of our global community?

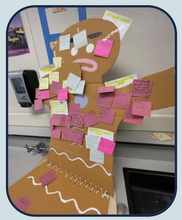


"It's not just like trapped in the science classroom": Using school garden as a place for learning chemistry

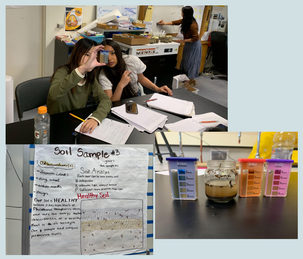
How can we produce enough ***food*** to meet demand, while reducing ***environmental*** impact?

Launching the unit at the garden: making observation of soils

Anchor the entire unit in students' concerns
Students took actions to address *their* concerns

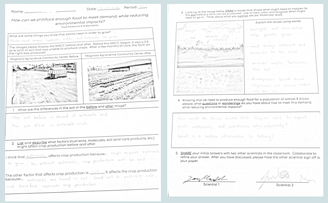


Conducting soil lab to evaluate its quality

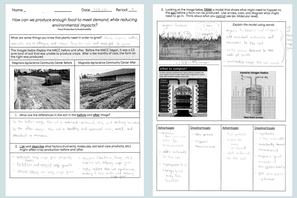


Interact with farmers & family members to learn about composting

Initial assessment

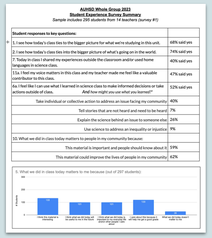


Final assessment



Capstone: civic engagement

Student experience survey



Successes & Challenges

Successes

- Show a possibility of expanding new forms of science learning by leveraging culture, stories, histories, and place
- Higher level of satisfaction, collaboration
- Powerful example of translanguaging in science classroom
- Special ed teacher paring with a chemistry teacher to provide 'real science' experiences for special ed students

Challenges

- Supporting students' use of disciplinary ideas in contextualized problem/phenomena (e.g., civic engagement)

Research Questions

Design-related

1. How were the assessment tasks designed in a way of addressing multiple goals and commitments?
2. How did the design, practice, and context of classroom assessment facilitate minoritized students' activism and civic engagement?

Professional learning-related

1. What are the features of professional learning community that productively facilitate teachers' collaborations toward expanding the new possibilities of science learning at schools?
2. How were the professional interactions mediated?

Student learning related

1. How were minoritized youth's sense-making and civic engagement facilitated in the context of learning sciences?
2. What were the tensions or dilemma emerging from the processes?

Data

Design-related

- Assessment artifacts (initial, final, capstone)
- PD videorecording
- Interviews

Professional learning related

- PD video recordings
- Individual interviews with teachers
- Planning/teaching artifacts

Student learning related

- Classroom video recordings from five focus teachers
- Student learning artifacts, student experience survey
- Interviews with a few focus students

Conjectures

1. Facilitating minoritized students' activism and civic engagement via assessments require the fundamental changes in the classroom assessment system, including its practices and cultures.
2. Productive professional interactions that facilitate the transformation can happen in various forms depending on the contexts; facilitators play an important roles in developing shared vision, commitments, and openness.

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