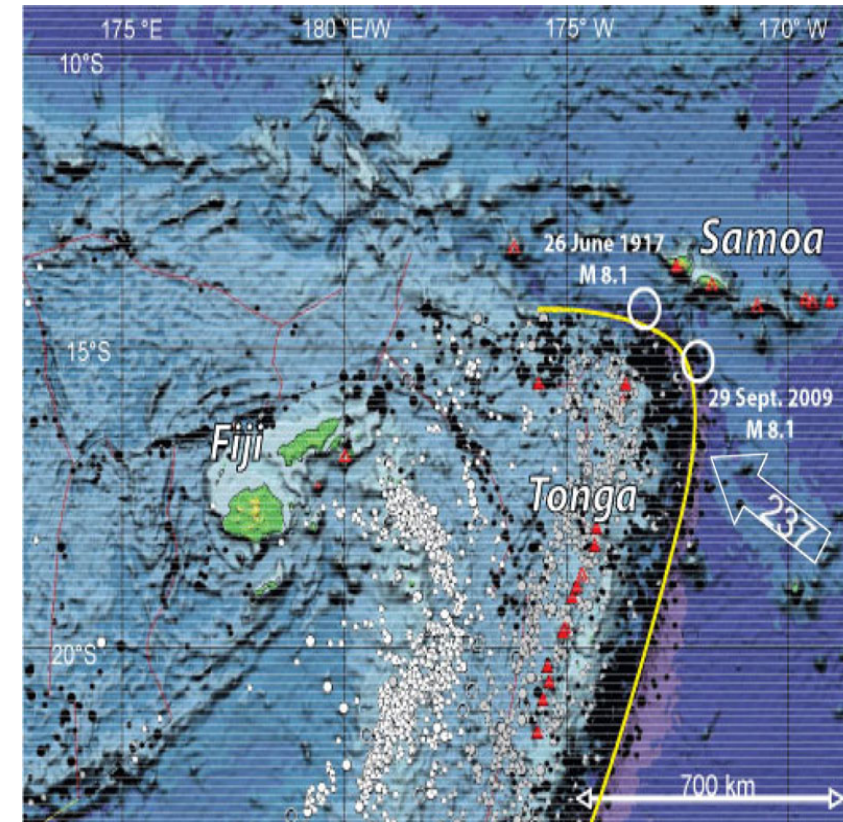


# INSTRUCTIONAL OBSERVATIONS IN EDUCATION RESEARCH: Rethinking Observations from Place-based, Culturally Responsive Perspectives in Hawai'i and American Samoa



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**University of Hawai'i at Manoa**  
CADRE Learning Series Webinar  
28 September 2023



# **INSTRUCTIONAL DESIGN: TAKING EDUCATIONAL ECOSYSTEMS INTO ACCOUNT**

## **NSF No.1721356 Transforming Scientific Practices to Promote Students Interest and Motivation in the Life Sciences: A Teacher Leadership Development Intervention**

**Goal: Prepare teachers of underrepresented Native Hawaiian and Pacific Islander students as curriculum leaders and researchers**

- A‘o, teach and learn in place- and culture-based communities of learners (Wenger n.d.);
- Situate NGSS/NCTM lessons in students’ communities and cultures;
- Teachers and students engage and learn through personally meaningful issues.

**Instructional design and observation guided by place-based, culturally responsive perspectives**

- Case study Devin Takahashi, Native Hawaiian math teacher/football coach, rural O‘ahu,
- Case study Iutita Savali and Sarah Sua-Pritchard, Leone, American Samoa.

# Why place-based, culturally and linguistically sustaining STEM PD in Hawai'i and American Samoa?

## Shared places are cultural spaces

Hawaiian sources of place-based knowledge:

- Ancestral stories
- Chants
- Hula
- Place names
- 'Ōlelo no'eau: proverbs
- 125,000 pages of Hawaiian language newspapers.

Cultural practices update knowledge and behavior:

- *Kilo (tilo Samoan)*, to watch closely, examine, forecast
- Continuous updates to knowledge
- Behavior adjusts to observed changes
- Purposeful learning for sustainable, resilient social ecosystems (Chinn 2012, 2007).

Ahupua'a, mountain-to-sea resource unit: illustration courtesy of Kamehameha Schools-Bishop Estate.





# PD Strategies Develop Teachers' Place-based Knowledge (PBK) and Agency in STEM: Intersect Three Knowledge Domains

## 3 PD strategies:

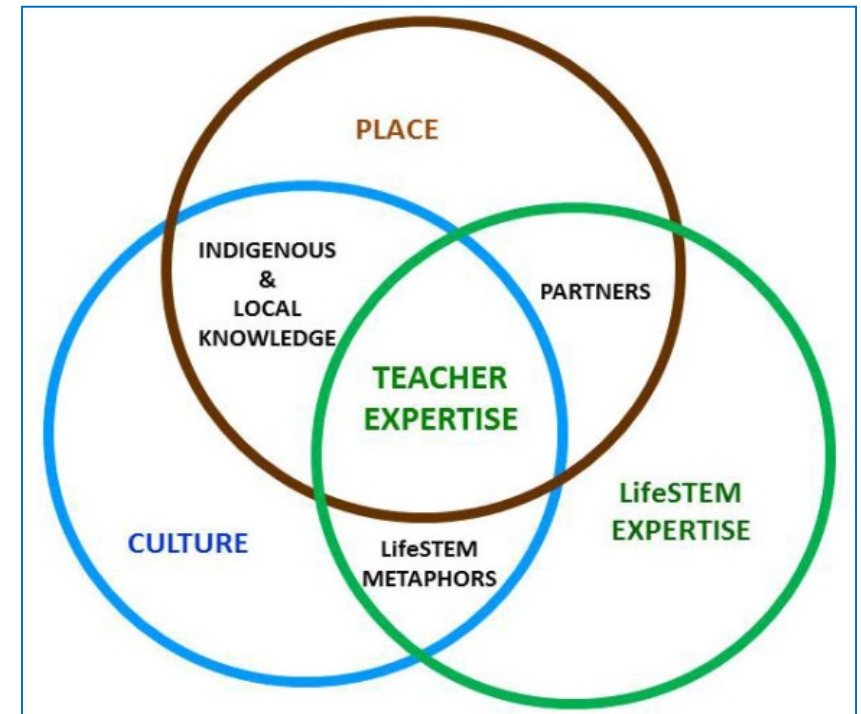
1. **Community mapping:** identify place-based resources;
2. **Curricular mapping:** incorporate resources into standards-based lessons;
3. **Place-based Pedagogy:** Community focused, place-based, culturally sustaining.

## 3 Domains of Place-based Knowledge (PBK)

1. **Place:** people, agencies, place names;
2. **STEM** content and practices;
3. **Culture:** Indigenous/local values, practices, stories.

## PD Guidelines:

1. Cultural funds of knowledge (Moll 1992); culturally responsive teaching (Howard 2020);
2. Teacher agency (Bandura 2006; Sewell 1992);
3. Cultural mental models (Bang et al 2007).



Intersecting knowledge domains supports teachers' PBK, expertise, agency. P Chinn

**PD Goal:** Teachers develop place-based systems and inquiry-oriented knowledge foundational to STEM curriculum development, teaching, assessment.

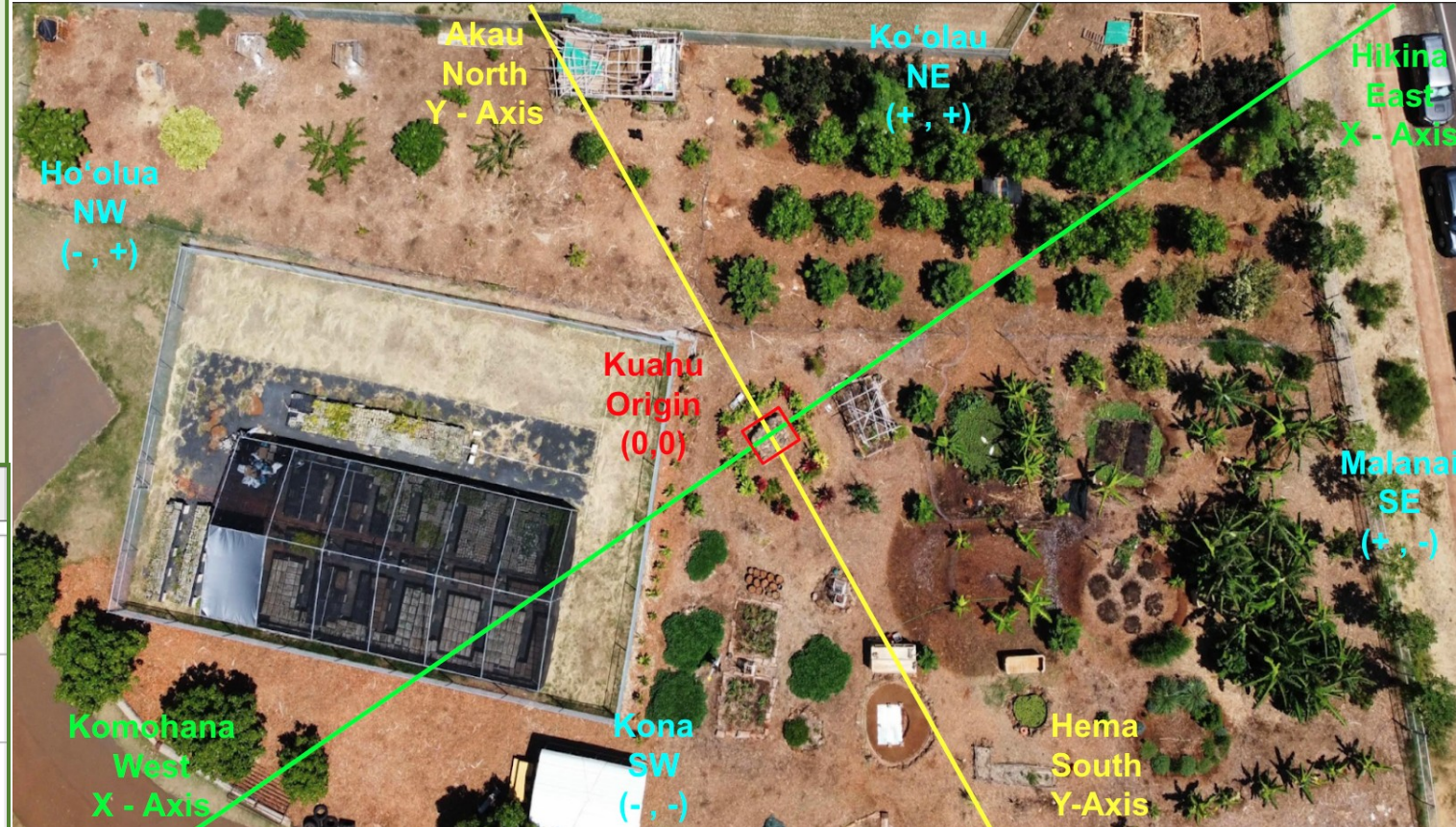
# HAWAI'I Teacher agency: Creating an abundant homestead from a school yard

Devin, colleagues, community members reclaim/revitalize/repurpose schoolyard for:

- Māla, garden, food sovereignty
- STEM
- Social studies
- Geography: Hawaiian cardinal points

Māla Areas of Study

Ko'olau North East (+,+)	Ho'olua North West (-,+)	Kona South West (-,-)	Malanai South East (+,-)	
The Hills (Windbreaker)	Citrus Orchard	Imu (Underground Oven)	Herb Garden	'Ai Circle
The Diamond	Hale Moa	'Uala Beds	Lā'au Lapa'au (Medicine Circle)	Duck Pond
Papaya Fence Line		Kuhio Hale (Aquaponics)	Tea Circle	Rabbit Circles
		B-Building (Location of Classrooms)		



Drone photo of māla: ahu, stone structure marking significant site, at piko, origin. Source: Devin Takahashi



# Rethinking Educational Observations from Place-based, Culturally Responsive Perspectives

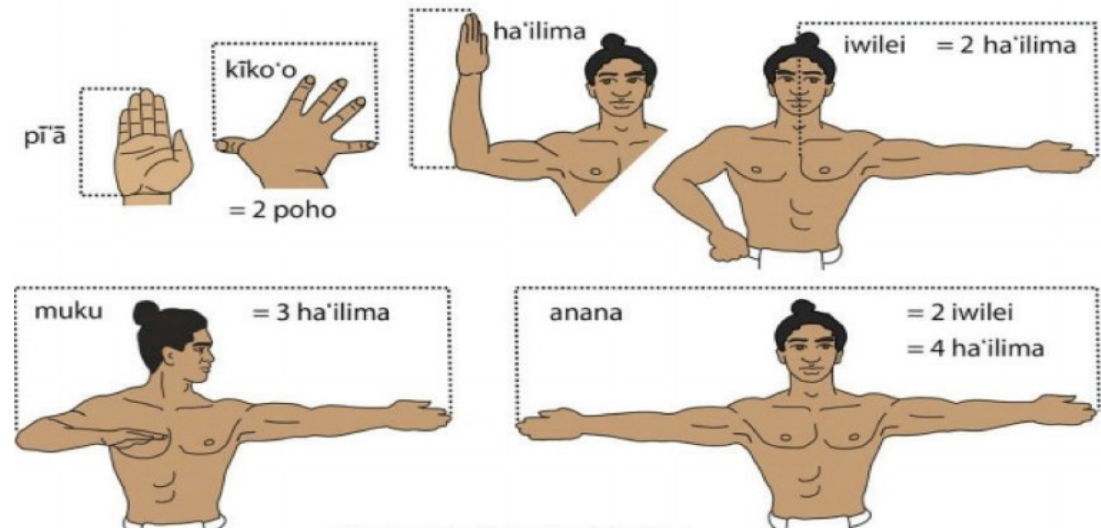
## Elements of Culturally Responsive Teaching

(Howard, 2020)

- Incorporates diverse cultural knowledges, skills;
- Applies active learning, multicultural content, diverse assessments;
- Nurtures academic and social emotional well-being and belonging;
- Incorporates input from family and community;
- Connects to lives and community.

**A'o**: reciprocal relationship of teaching and learning.

## Nā Anakahi Hawai'i (Hawaiian Units of Measurement)



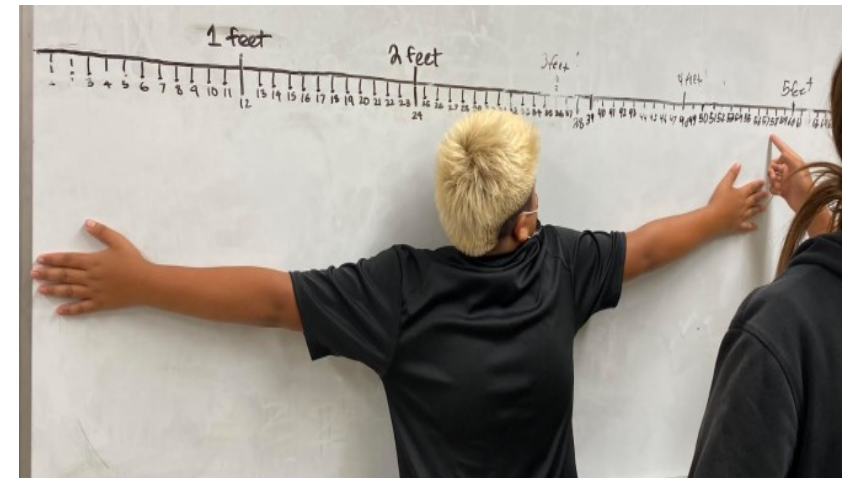
**Researcher Devin Takahashi, Math, M.Ed. PBE, Sustainability**

**Embodied measurements** (Kaaronen et al 2023):

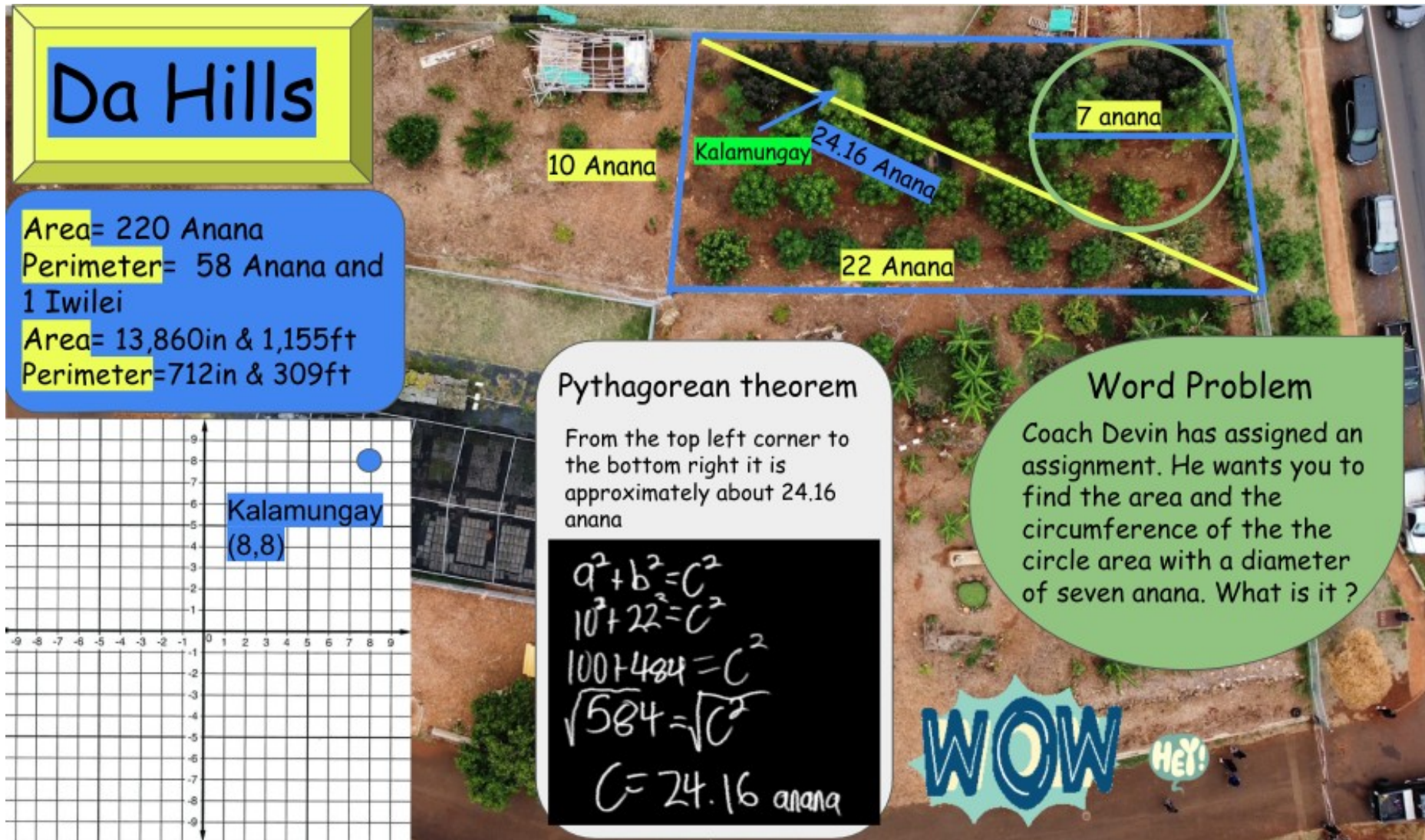
7-8th grade NH students apply Hawaiian measuring system.

Experiential, active learning: Standardizing measurement by finding mean of students' anana.

Photo: Devin Takahashi



# Student presentation: Applying anana in māla, assessing engagement and learning



- Incorporates diverse cultural knowledges, skills;
- Applies active learning, multicultural content, diverse assessments;
- Nurtures academic and social emotional well-being and belonging;
- Incorporates input from family and community;
- Connects to lives and community.

# Evidence of student learning

## Period 1

- 16 SPED students

## Period 3

- 18 Gen. Ed. students
- 1 with IEP

**EdPuzzle Pre and Post Assessment scores**

Participants Grade 8 (# of Students)	Assessment	Pre Assessment Score	Post Assessment Score
Period 1 (16)	Pythagorean Theorem	43%	88%
Period 1 (16)	Graphing Ordered Pairs	56%	92%
Period 3 (19)	Pythagorean Theorem	58%	86%
Period 3 (19)	Graphing Ordered Pairs	74%	95%

\*Percentages are whole class averages



# AMERICAN SAMOA Culturally responsive, place-based PD

Middle school teachers Iutita Savali, Sarah Pritchard-Sua discover Leone Village's rich resources for earth science & archeology curricula

## 1. Community mapping:

- Identify resources: interview elders
- 2009 8.1 EQ, tsunami; Tataga Matau adze quarry, "discover" archeologist Epifania Suafo'a-Taua'i, traditional stories.

## 2. Curricular mapping:

- Intersect place, culture, content standards
- ES unit: EQ, tsunami, escape routes;
- Archeology unit: place names, stories, Indigenous STEM
- Co-develop lessons with Suafo'a-Taua'i.

## 3. Place-based pedagogies

- New sites for teaching/learning.
- New networks of human resources.

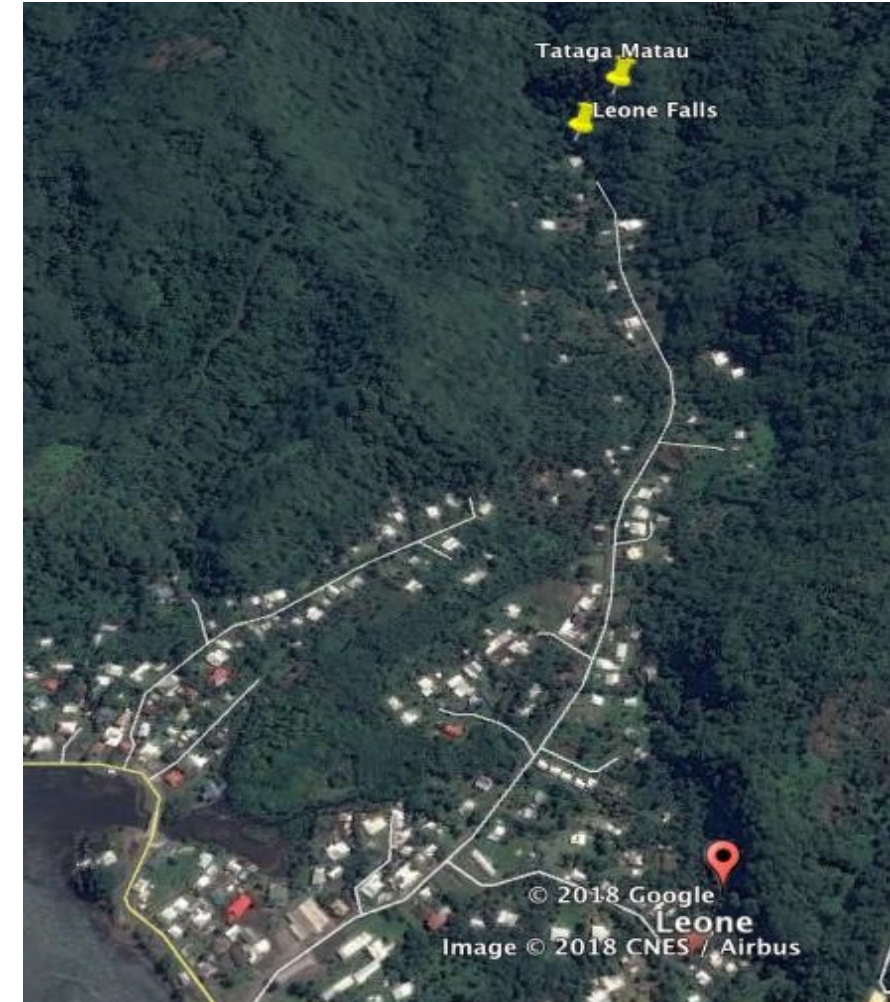


Fig. 1 Leone Village (Source: Savali and Pritchard-Sua)

# Leone Village: Resources for earth science, archeology, language arts curricula

Oral history collected from High Talking Chief Silivelio Suafo'a, Auma, Leone (1991)

- ✧ A family from Cook Islands traveled to Leone.
- ✧ They traded their goods for stone tools.
- ✧ The couple went to gather stones and left their two sons to wait with a sailor.
- ✧ The sons slept and the sailor wandered off, following the smoke of the umu (oven).
- ✧ The two sons went searching for the parents in different directions – Puna Mai to the west of the Leafu stream and Puna Loa to the east.
- ✧ The parents sailed home with the stone tools then went back to search for their sons when they did not return.
- ✧ They found only water springs that sang like a weeping child.
- ✧ In an attempt to soothe the weeping sons, the mother called out.
- ✧ But the voices comforted the parents and told them that they would remain in Leone to mark their first journey to Samoa and to help the people appreciate their surrounding resources.
- ✧ The parents returned to their homeland but will always return to Leone for more stone tools knowing their sons are here.



Teachers, archeologist Suafoa-Taua'i at Puna Mai and Puna Loa springs named after sons. (Photos: P. Chinn)



# OUTCOME: Teachers create place-based, culturally sustaining curricula

## Intersect Samoan & Western knowledge:

- ES: Rock cycle, plate tectonics, hot spot origin of Samoan archipelago;
- Language arts: adze trade between Cook Islands and Leone
- History: 2009 tsunami reached Leone Falls, 11 died;
- New FTs: Puna Loa, Puna Mai springs, grinding facets, Archeology lab, AS Heritage Preservation Office;
- Active learning: collages of 4 escape routes at 6 hour intervals
- Outcomes: Gains in learning, liked collages with escape routes.
- Stewardship: restore mangroves, clean up tsunami litter.



Leone Bay: Mr. Taua'i and polishing facets (Photo: P. Chinn)



## Place-based knowledge and teacher agency increased

### Place-Based Knowledge significantly increased

#### Change in mean of 19 teachers:

- Start: 3-5 PEOPLE who could be resources
- End: 16-17 PEOPLE

$P(T \leq t)$  two-tail  $8.62 \text{ E-}08 \lll 0.01$

- Start: 3-5 PLACES that could be resources
- End: 16-18 PLACES

$P(T \leq t)$  two-tail  $2.25 \text{ E-}08 \lll 0.01$

Sarah Pritchard-Su'a and Lutita Savali reflected:

*"This placed based paper using our backyard as a starting point has really opened our eyes to knowledge that wasn't known before. It can be the foundation to build new knowledge and to develop a complete, localized, STEM place-based curriculum."*

Photo: Class on petroglyph rock, Leone Bay



EPI SUAFO'A-TAUA'I  
Archaeologist



# Discussion

## Place- and culture-based Instructional Design

- Involves educational ecosystem perspectives;
- Expands educational access;
- Develops teacher agency and expertise;
- Creates real world curricula and resource networks;
- Leads to authentic assessment.

## Challenges to PD for underrepresented, minoritized students

- Barriers to engaging with communities and cultures;
- Lack of administrative support for teacher-led initiatives, community-based learning;
- Use of commercial texts and standardized tests;
- Complexity of place- and culture- based issues and resources.

# Conclusion

Instructional observation is one of many research methods in researchers' toolkits to study effective teaching of culturally diverse, underrepresented, racially minoritized students.



Dwarf 'ōhi'a lehua, *Metrosideros polymorpha*,  
Wai'aleale Bog, Kaua'i. Photo P. Chinn

**Acknowledgements:** I am grateful to my students, community partners, colleagues, and support from NSF No.1721356. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author and do not necessarily reflect the views of the National Science Foundation.

# References

- Bandura, A. (2006). Toward a psychology of human agency. *Perspectives on Psychological Science*, 1:164-180.
- Bang, M., Medin, D.L., Atran, S. (2007). Cultural mosaics and mental models of nature. *PNAS*, 104 (35) 13868-13874. <https://doi.org/10.1073/pnas.0706627104>
- Chinn, P. (2012). Place and culture-based professional development: Exploring factors that support pedagogical content knowledge, expertise, and agency. In B. Fraser, K. Tobin and C. McRobbie (Eds.), *Second International Handbook of Science Education* (pp. 323-334). Springer.
- Chinn, P. (2007). Decolonizing methodologies and indigenous knowledge: The role of culture, place, and personal experience in professional development. *Journal of Research in Science Teaching*, 44, 1247-1268.
- Howard, T. C. (2020). 7 Culturally Responsive Teaching Strategies and Instructional Practices. Retrieved from <https://www.hmhco.com/blog/culturally-responsive-teaching-strategies-instruction-practices>
- Kaaronen, R. O., Manninen, M. A., Eronen, J. T. (2023). Body-based units of measure in cultural evolution. *Science*, 380 (6648), DOI: 10.1126/science.adf1936.
- Moll, L. C. (1992). Bilingual classroom studies and community analysis: Some recent trends. *Educational Researcher*, 21, 21-24.
- Sewell Jr., W. H. (1992). A Theory of Structure: Duality, Agency, and Transformation. *American Journal of Sociology*, 98, 1-29. <http://dx.doi.org/10.1086/229967>
- Wenger, E. (n.d.). Communities of practice: Learning as a social system. Retrieved from <https://thesystemsthinker.com/communities-of-practice-learning-as-a-social-system/>