



177 - Building undergraduate knowledge about the scientific profession through Our Project In Hawai'i's Intertidal (OPIHI)

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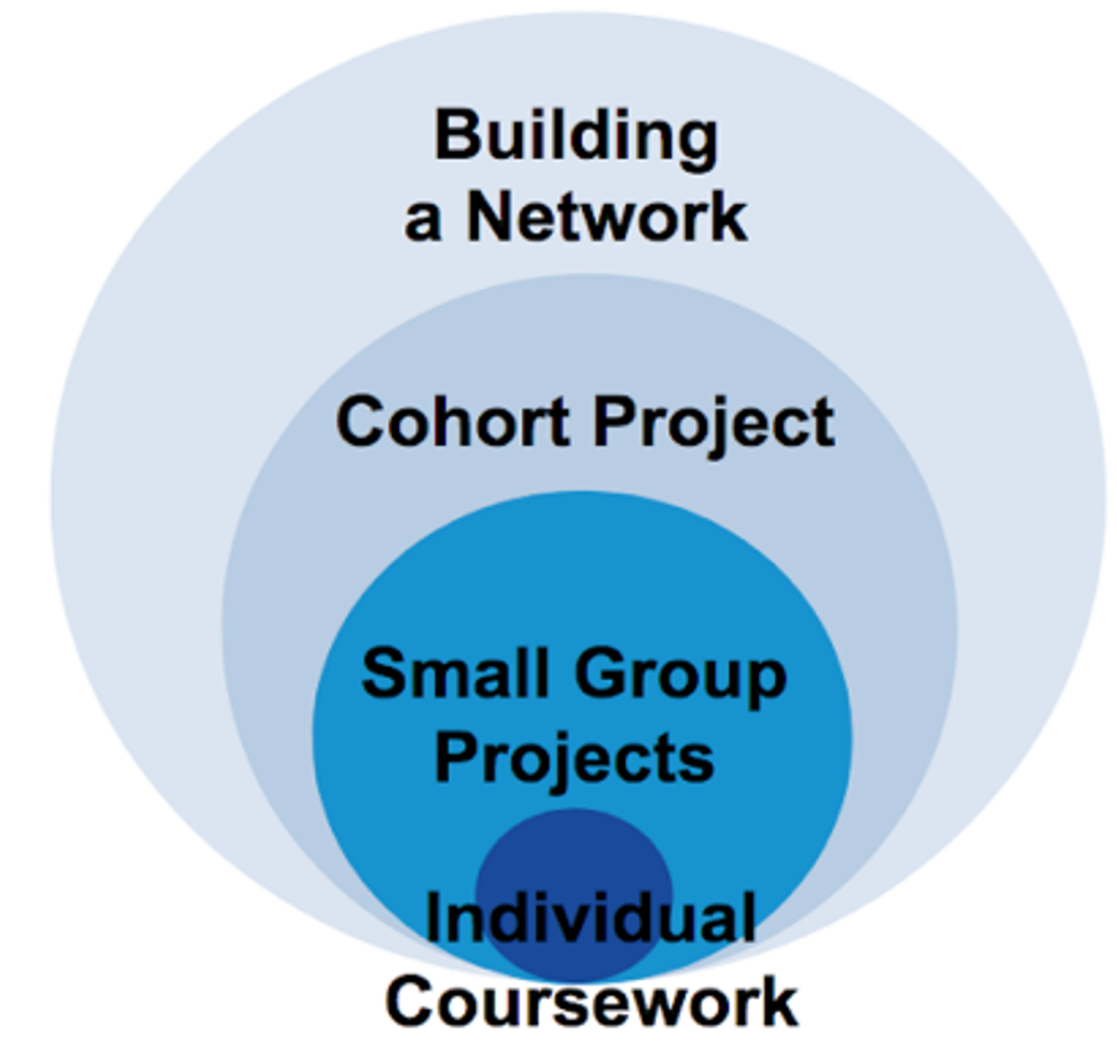
Undergraduate Research Experiences

- **Important:** To fostering students' emerging scientific identities
- **Intensive Support:** Needed for project to contribute to scientific knowledge base
- **Mentoring Burden:** Most labs can only support a limited number of students
- **Marine environment:** Involves logistical constraints but provides engaging environment for learning

OPIHI: Nested, Tiered Structure Distributes Mentorship

Structured year-long program with regularly-scheduled evening classes and weekend field day– includes service learning, community outreach, and peer and community presentations

- Regularly scheduled individual coursework
- Whole class jointly contributes to a cohort project – learning collaboration and scientific skills together
- Small groups of students are paired with research collaborators. They collect data together—but analyze it individually. Collaborators provide overarching research questions for students to explore and assist with experimental design and training; but more importantly get to share their passion and have trained student help.
- Graduate student shepherds students through writing proposals and final reports and organizing field logistics.



The Problem

Growing demand: There is growing student and institutional demand for research opportunities.

Difficult to students to engage in undergrad research: especially if have “average” GPAs, juggling multiple jobs, and/or less comfortable contacting professors directly.

Mismatch between supply and demand.

Process Knowledge

Students in the program significantly increased their confidence in their scientific process skills - from formulating a research question to writing scientifically.



“We came across **several environmental and technical issues**. However, these **provided us opportunity to work together** to come up with solutions to these issues. This project truly **taught us teamwork and problem solving.**”

Career Interests

26% undecided (pre) → researcher (post) (N = 6/23)

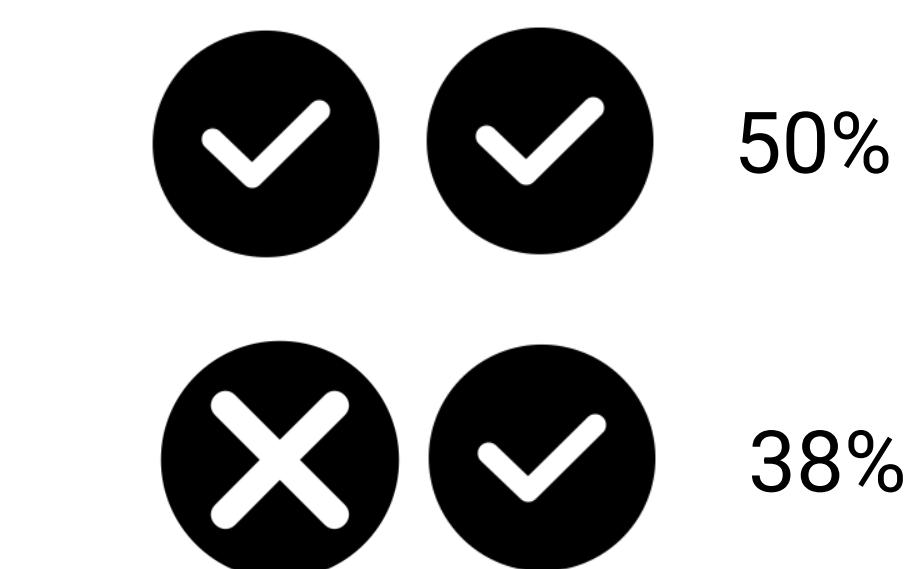


Marine biology or medical doctor → *Researcher*
 “Because **I think it's fun** to do a form of research where I work towards **discovering something for myself and for a scientific community**”

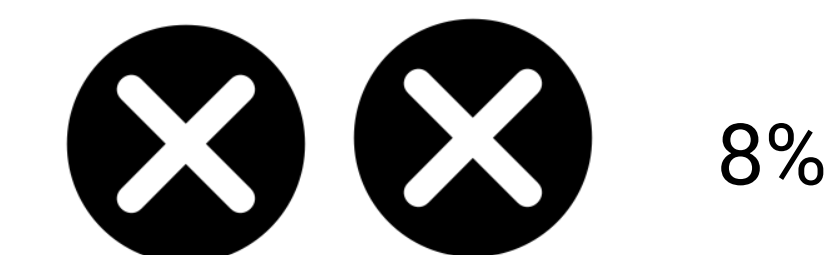


Scientific Identity

Do you identify as a “scientist”? Why or why not?
 Pre-survey → Post-survey
 N = 26



“After going into the field, making observations, doing scientific research, analyzing data, writing about it, and presenting it to an audience has **equipped me with the confidence to identify as a scientist.**”



“Not necessarily. Would like to publish a paper in order to identify me as a scientist.”

Connection to Hawai'i

Students overwhelmingly developed a deeper, stronger connection to Hawai'i's coastal environment.

“I feel that **I've developed a strong connection** with Hawai'i's coastal environment thanks to the knowledge I've acquired during this internship. I can now appreciate the **uniqueness of Hawai'i's ecology**, and I've become very interested in understanding the different ecological dynamics that take place across the islands.”



Proposed Solution: Course-based Undergraduate Research Experience (CURE)

CUREs engage cohorts of students in research projects in a more controlled and collaborative environment than typical undergraduate research experiences. They are gaining in popularity as a mechanism for introducing students to the entirety of the scientific process while spreading out the mentoring burden.

Key Features:

- Opportunities to make discoveries that are of interest to stakeholders outside the classroom (and communicate research to these stakeholders)
- Work builds off and has the potential to contribute to larger body of knowledge
- Students engage in range of scientific practices
- Students must troubleshoot, problem-solve, and repeat aspects of work for research to progress
- New research questions are generated each year

Communication

Students present to their classmates, scientific collaborators, and to the community where they conduct research. Students gained in their confidence in their ability to convey scientific information to both scientists and the public.



“I honestly feel that this internship has prepared me with the **knowledge and skills** that I am going to need to excel throughout the marine science field. Mahalo for helping me find the **bridge between being a Hawaiian [and being] in science.**”

Highlights

Structure enables scaling of both scientific research & undergraduate engagement in marine research

Nested configuration can serve as a model for addressing critical gap in undergraduate research opportunities

Having a **model marine ecosystem** (i.e. the intertidal) helps frame projects and provided cohesive content umbrella.

Challenges

Constant **balancing of educational and scientific goals** is difficult.

Can be challenging to navigate having research questions come from partners, but able to be answered in **time frame of program** → rigor of research projects has varied

Only way for one faculty member to run this program is by “letting go” a little; program is imperfect first foray into scientific research.

Next Steps

Growing Pains: First 5 years funded by grant. Going into 2nd year of being part of UHM School of Life Sciences.

Long-term Effects: Need to follow-up with participants to learn about program effects, if any, on professional trajectory.

Data Sources

There have been 6 cohorts (N = 71. Spr. 16–Spr. 2021)

Data sources for this study (cohorts 4 & 5) include post-program interviews as well as questionnaires administered pre-, mid-, and post-program (2018–2020).

Acknowledgments

