

The Value of Place-Based STEAM Curriculum and Instruction

A Natural Partnership: Science & Culture

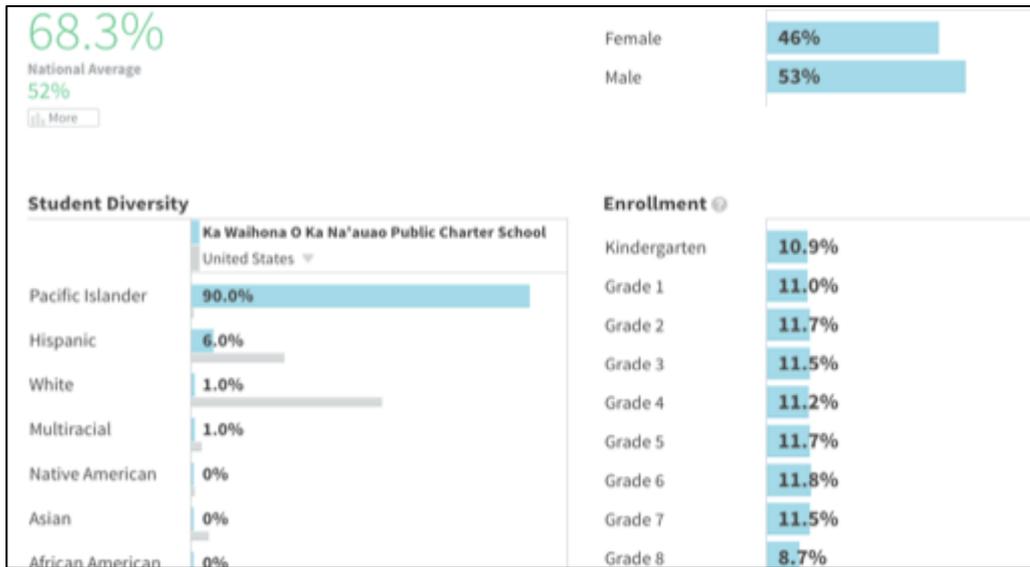


Ho`opili- To Connect



Place-based, culturally sustaining education provides students the opportunities to reconnect with their kupuna—they feel the mana, the power in knowing that their ancestors once walked where they are now walking; the power in being able to identify with family, or the host culture; the power and act of being in awe from seeing and participating in the scientific “genius” that sustained Hawaiians for centuries.

Ka Waihona o Ka Na`auao Demographics

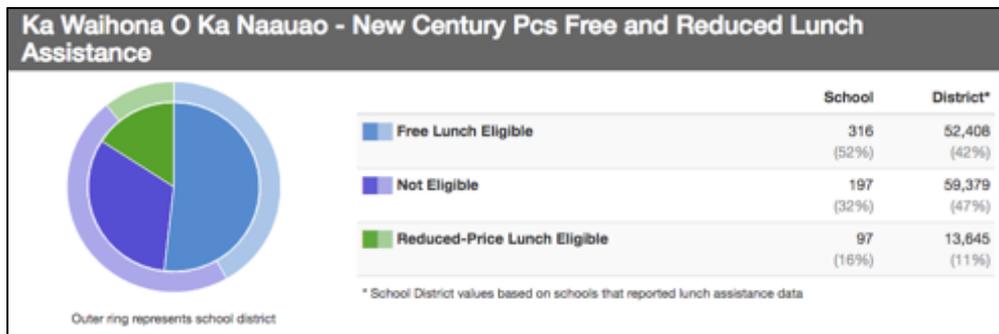


<https://k12.niche.com/ka-waihona-o-ka-naauao-public-charter-school-waianae-hi/>

The Importance of Connecting to Place

At KWON, we have a high Pacific Islander population at 90% and a high free and reduced lunch demographic at 68%.

With such a high Pacific Island population there is a need to connect our students to their place as well as to help them to reconnect to their cultural identity.



<http://elementaryschools.org/directory/hi/cities/waianae/ka-waihona-o-ka-naauao-new-century-pcs/150003000286/#section-4>

Invasive Species as a Pathway to Learning:

mālama
‘āina

Nānā i ke kumu

What better way to build connection and engagement then... Looking to the source

Initial Introduction and Engagement:
With a visit to a Loko I`a at He`eia
Up Close & Personal with Mangroves



Seeing first hand, the damage, the destruction, the spread of this invasive was impactful because it left a strong impression on the students. They really grabbed hold of the fact that the seeds were dropped down by airplanes with good intentions, to control erosion.



<http://www.hokulea.com/learning-journey-loko-ea-fishpond-and-waimea-valley-august-29/>

LOKO EA FISHPOND
Loko Pu`u`One



Students were fascinated by the notion that even in the fishpond their can be “bullies”

Nānā i ke kumu

Visit by Invasive Species Specialist & Outreach Educator for OISC, Chris Frolich
A Source of `Ike, Knowledge



Ground Surveys



Aerial Surveys



Control

In life, we can only hope that what we do moves others to make a difference. We can only hope that we inspire others to reach for something that they may never have thought to reach for before...

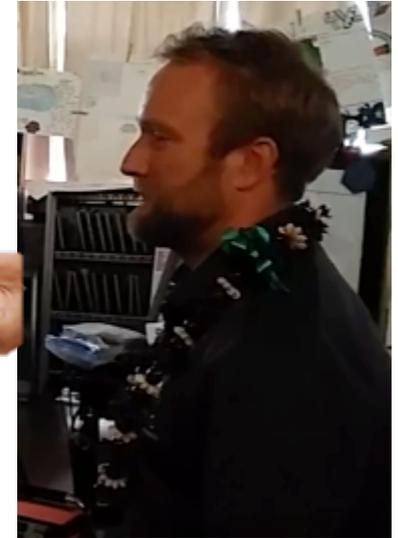
Chris made himself relatable.

My students instantly bonded with him—key to their being open to taking in all the `Ike he had to share, all the `Ike to make them think...

The Power of The Ripple Effect



<http://bianchilawgroup.com/pebble-life/>



The Power to Inspire...

When collaborators from the community come into the classroom, they send a message to the students out on the Leeward Coast, that they are important.

Building Engagement:

Claims-Evidence-Reasons=Instructional Tool to Help Students He Mana Ko Ka Leo—The Voice Has Power

This is a powerful tool to place in one's science toolbox. It is a tool that has cross-over value.

Being able to make a claim (to state an opinion) and support it with evidence and reasons, is a necessary skill to possess in all academic areas.

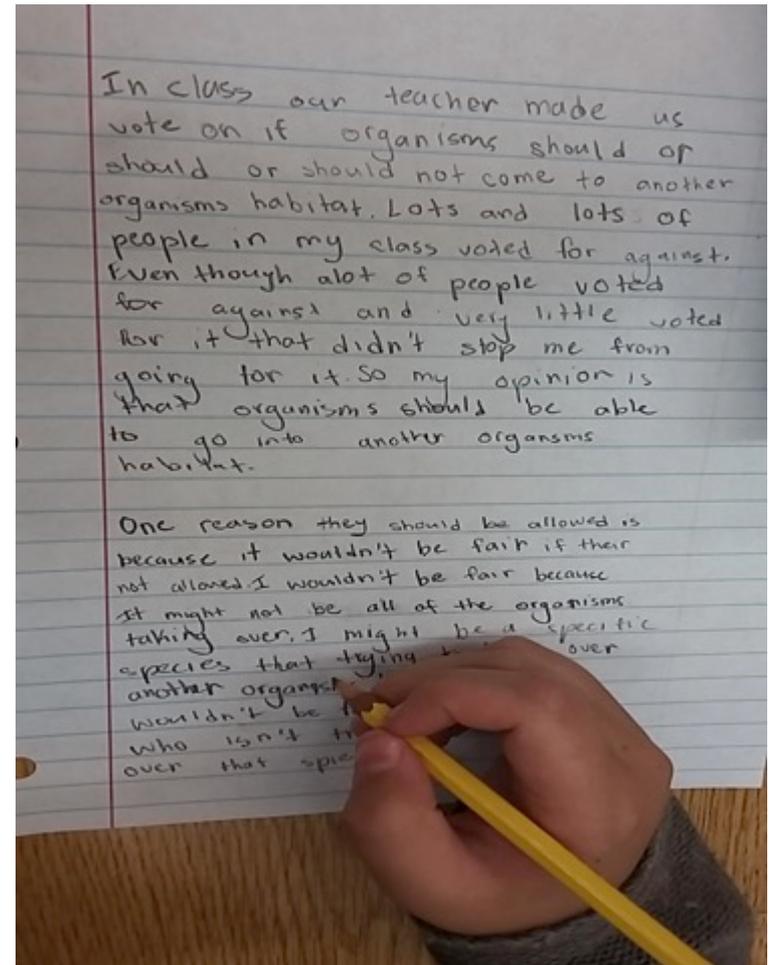
An Introduction to Invasive species

https://youtu.be/HAY_UsGjyZk



- Assessing students schema of where invasive species fit into the ecological picture...
- Students create their initial Claim-Evidence-Reason "line-up". These provide students the opportunity to develop an opinion. It also allows students to pick up multiple perspectives in further developing their opinion.
- Changing opinions based on shema-building is encouraged.

Creating Voice: Finalizing Initial Claims



`Ike: Knowledge

Knowledge is key, it's instrumental, it's power. It backs-up the claim that you are making. It strengthen and solidifies it.

During the EXPLORE phase, students will build their base of knowledge so that their opinion and claims will be based on facts, on evidence ascertained from multiple, reliable resources.



Our initial explorations and investigations looking at the impact of two invasive species, mangrove, and tilapia on the loko i`a ecosystem helped oil the students' gears and started getting them into the frame of mind, that not all plants on our `aina are the same. This fascinated them. The idea that plants can have adverse affects on its ecosystem/habitat.

Invasive Species as a Pathway to Learn About ...

mālama 'āina

How did the initial schema building on invasive species support Chris' visit?

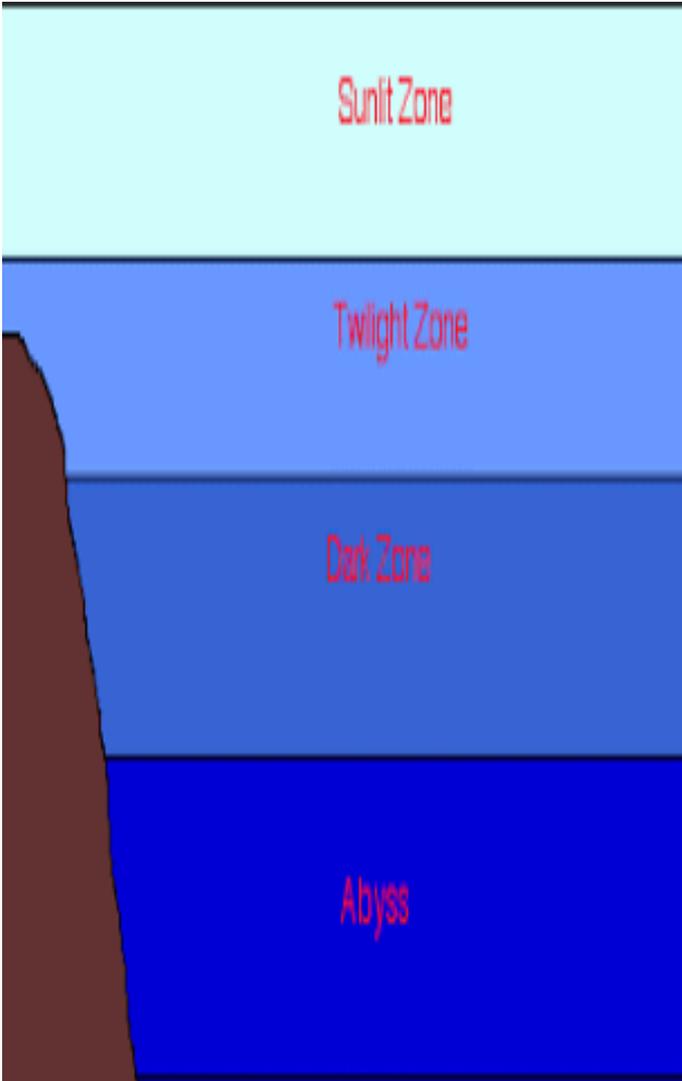


[7.5 minute version] Invasion - Little Fire Ants in Hawaii

Now they were ready for Chris' to provide more information—not to tell them what to think, but to provide another avenue of information, from an “expert.” He provided the “food” to fuel their thinking, so that they could further build their claims, either maintaining them or changing them based on the evidence shared.

Kai Hohonu:

Going Deep-Layering the Learning



The diagram illustrates the vertical layers of the ocean. From top to bottom, the layers are: Sunlit Zone (lightest blue), Twilight Zone (medium blue), Dark Zone (darker blue), and Abyss (darkest blue). A brown landmass is shown on the left side of the diagram.

Sunlit Zone

Shallowest layer-Zoom into one invasive species in one ecosystem, the loko i`a, fishpond

Twilight Zone

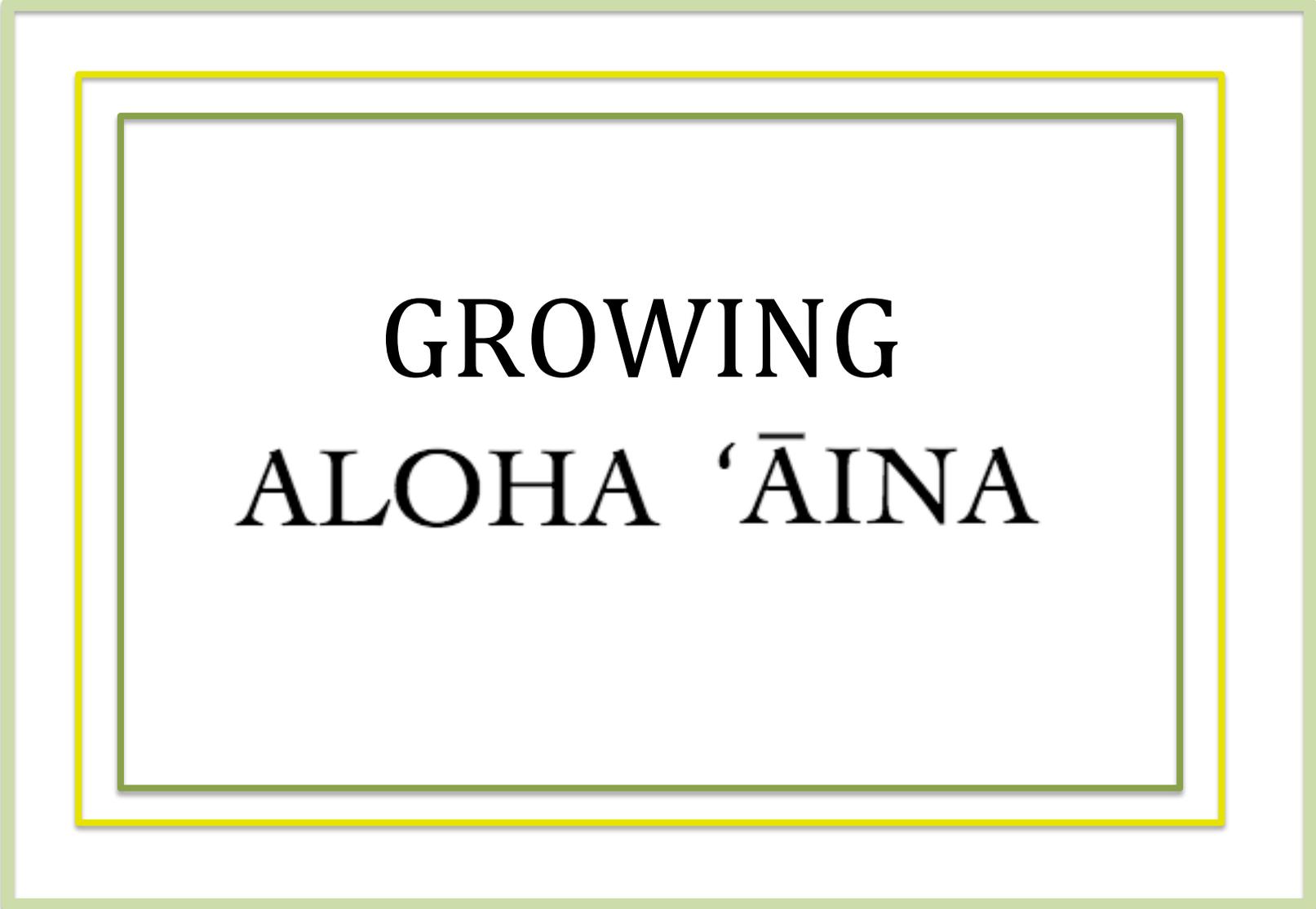
Next layer-Seek out a source, an expert to go even deeper, we sought out an invasive species outreach educator, Chris Frohlich of OISC

Dark Zone

Another layer deeper-Further exploration. Visit a different type of fishpond, research additional invasive species and learn more about their impacts

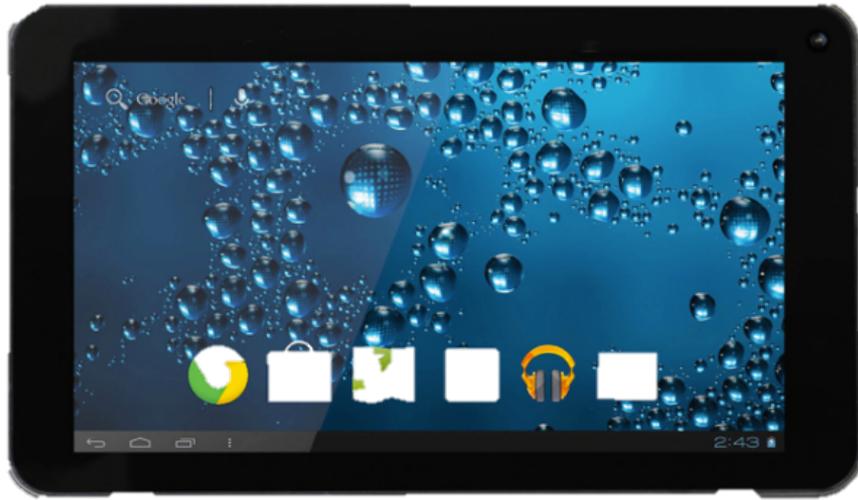
Abyss

Deep Sea-Take a stand by taking all that you've learned, synthesize the information, and provide evidence compiled from learnings, then present creatively—put a spin on it



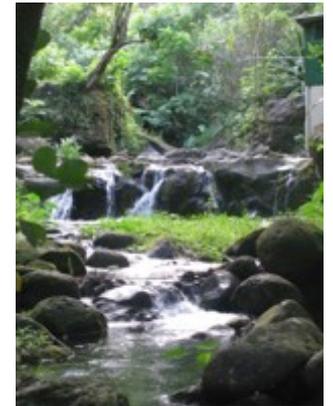
**GROWING
ALOHA 'ĀINA**

Put Down the Electronics



If you are always glued to your games, glued to your electronics, if you grew up in a world where selfies, and instagram filled your world, where you never needed to leave your house, what would make you care about this place that we live? What would make you want to ensure that it's resources are maintained, not wasted, cared for?

Leave the Four Walls Behind



For our students, leaving our four walls and taking them to see how amazing the systems are here in Hawai'i, how amazing the design and technology that went into them-- the lo'i; the loko i`a that helped their ancestors to thrive (with the watershed feeding into both, helping both to thrive, helping us to thrive

Get Plugged Into the 'ĀINA



Going to a culture-based site, plugs our students back into the `aina. This is a reconnection that they are starving for, they don't realize it, or know it, but it's a piece missing in their puzzle. But when they get a taste of it...it nourishes their minds, hearts, souls, spirits.

And it is this being and feeling moved, in Hawaiian culture it's a feeling you get in your na`au...

It's life changing. It's identity building. It provided a sense of belonging that may have been missing. A sense of belonging to the aina, and to one's culture or host culture.

Valuing Resources



Getting out, walking about, "E huli ka lima i lalo" working the land, understanding the reciprocal relationship we share...

This relationship, that gives us so much, comes to be valued.

EXPLORE: Building a Sense of Responsibility/Kuleana Through Place



If we care for the `aina, then the `aina will care for us. This is the connection between kuleana and malama `aina. It is the understanding of this reciprocal process, reciprocal relationship.

By interacting with the `aina, working with it, caring for it, a relationship builds between `aina and kanaka. It is the core upon which sustainability of land, and kanaka is built.

It is also a humble reminder that He ali`i ka `aina, a he kauwa ke kanaka.

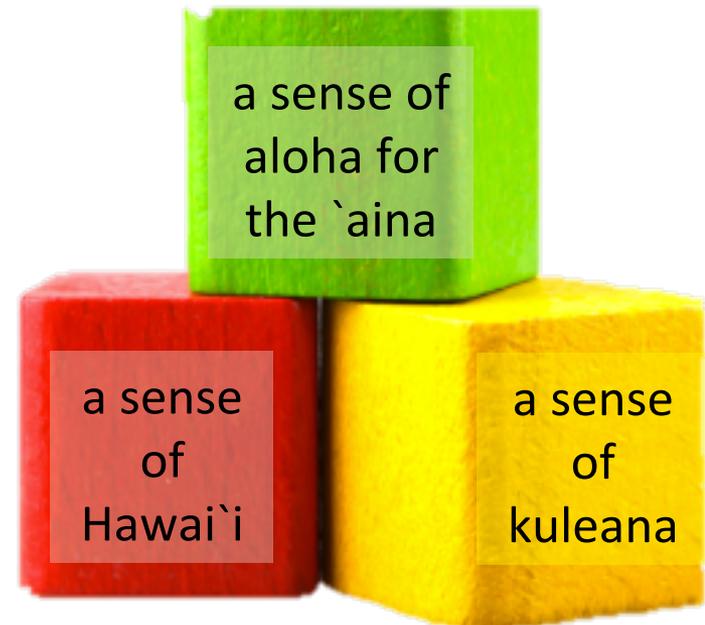
We are All Scientists



While interacting with the place we live, we help students to get in touch with their naturally curious, scientific parts of themselves...



And along the way we are building:



a sense of
aloha for
the `aina

a sense
of
Hawai`i

a sense
of
kuleana

Laulima: `A`ohe hana nui ke alu `ia

No task is too big when done together

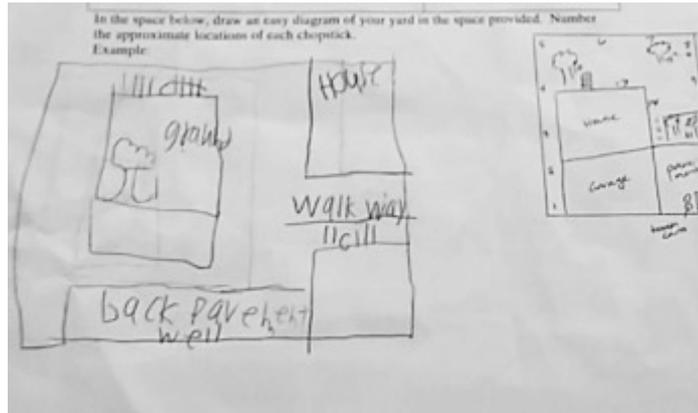
Following in the footsteps of their kupuna—their forefathers, students were provided the opportunity to follow/practice one of their place-based cultural traditions...*laulima*.



THE HOME-SCHOOL CONNECTION: LFA Home-Testing Kits

What better way to bring laulima to life than by creating “Citizen Scientists”

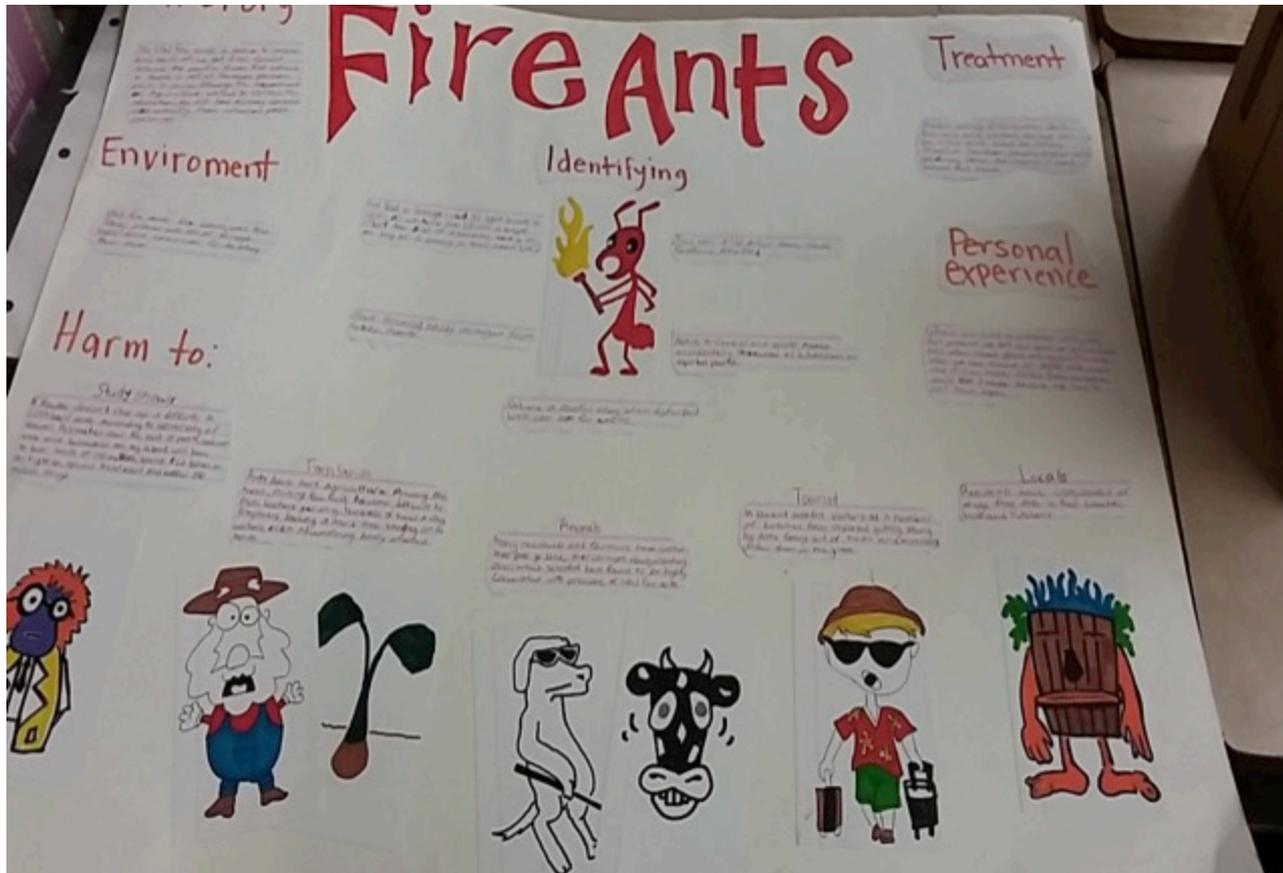
Benefit: Proactive vs. Reactive



Explain

Provides opportunities to engage in oral traditions

When students have opportunities to share what they know with others, we are giving them opportunities to practice and participate in an oral tradition that makes up a part of many of my students' identities, not to mention that effective communication is an integral 21st century skill.

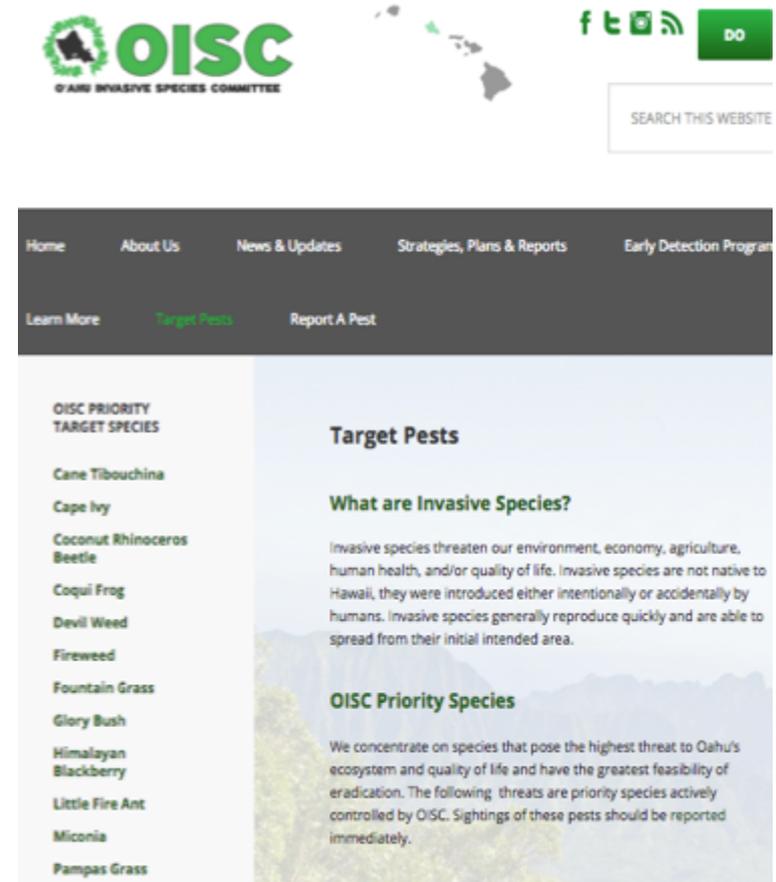
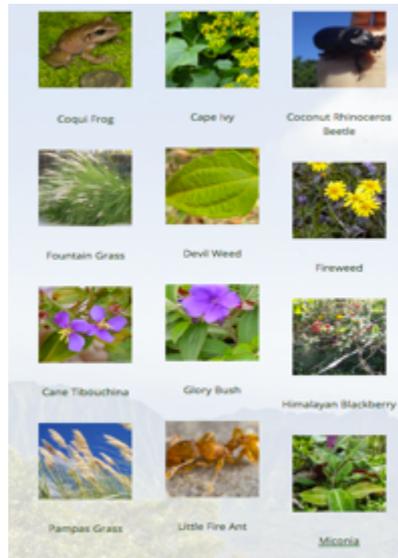
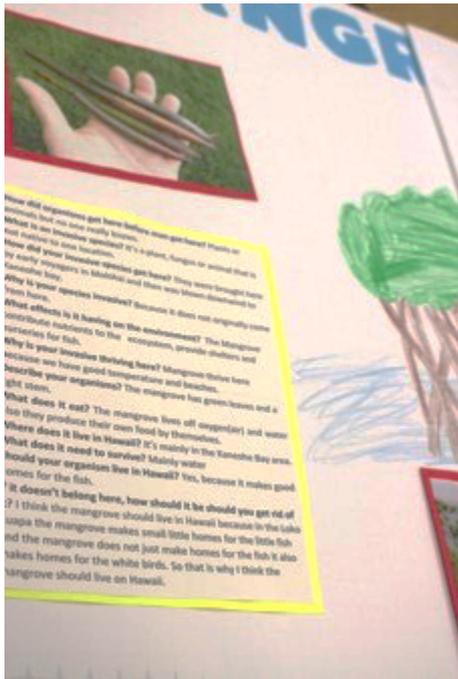


Students went home and shared and explained what they learned about LFA to their families. The depth of what they took away with them, the impact that it made on students is exemplified in this student's poster.

EXTEND

An important part of the 5 E process are the extensions that you make during the unit. Chris' visit became an inspiration and jumping off point to do further investigations on invasive species.

Chris' visit provided an intimate connection from which grew students interest in learning more about other invasive species in Hawai'i. Towards this end students visited the OISC website that Chris introduced us to during his visit with us.



OISC Website= <http://www.oahuisc.org/>

EVALUATE WITH The A in STEAM: Creating and Synthesizing Through Art

Understanding invasive species impacts—tilapia kinesthetic/movement food chain game



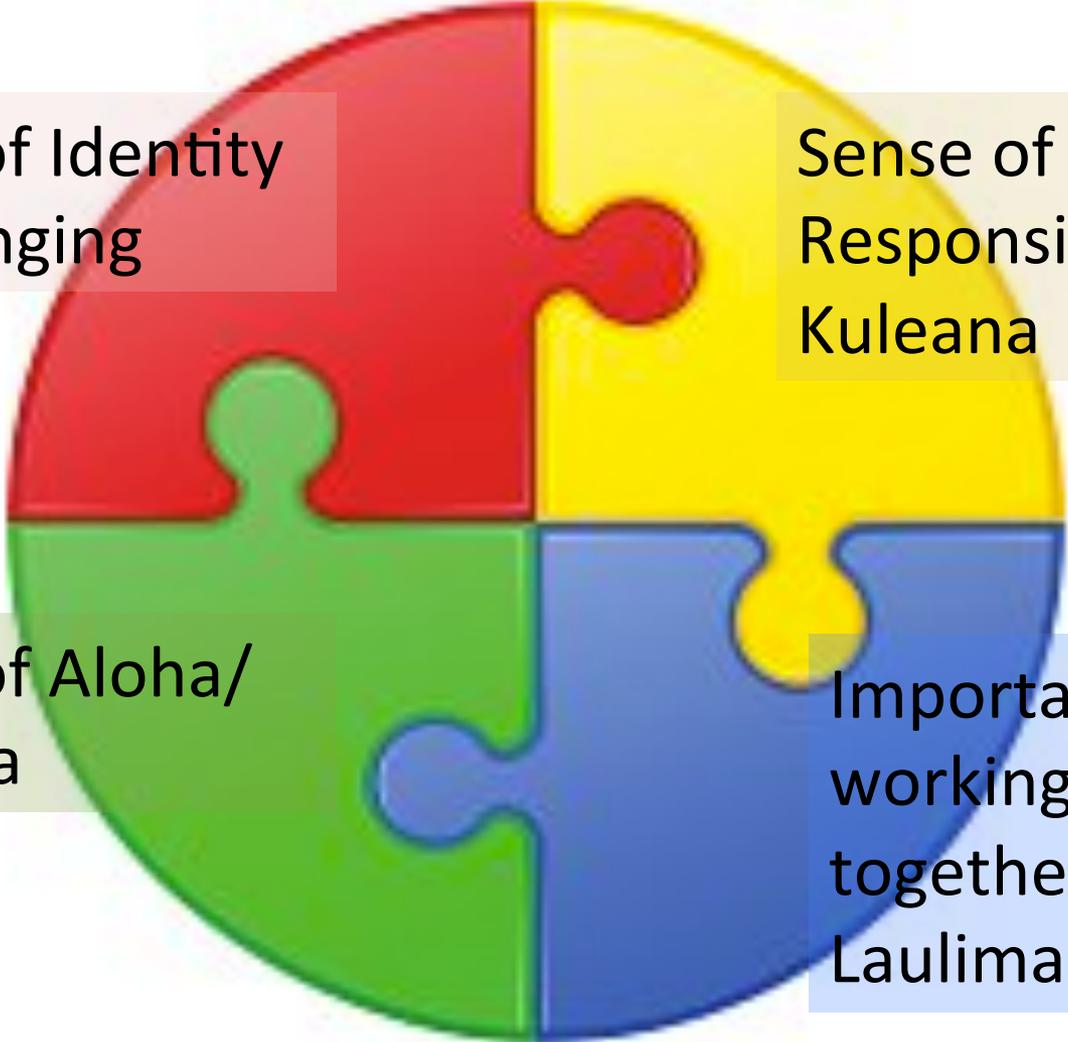
Invasive species research and art connection



Rationale: to help students internalize and understand what and why certain organisms belong in the fishpond, and why certain organisms, don't.

The arts give our students the opportunity to express themselves in a variety of ways. It provides us, the teachers, with alternate ways of assessing our students. Students learn that there are more than one way to get to point B as well as the value of creativity. Art is a great tool that incorporates design thinking and can even involve engineering. It is a great tool for students to use in synthesizing the science that they learned.

When All the Pieces Come Together=
A Strengthened Sense of Hawai`i as a place and as
a state of being



Sense of Identity
& Belonging

Sense of
Responsibility:
Kuleana

Sense of Aloha/
Malama

Importance of
working
together:
Laulima

Mahalo Nui Loa

- Pauline Chinn-our fearless steam professor, and leader who brought us all together, and who whole-heartedly believes in each and every one of us...
- Chris Frohlich-OISC Outreach Educator who's sincerity, passion and commitment to his mission and vision touches the lives of many...
- Jackie Camit-one of the many teachers in our group committed to awesome curriculum and instruction in STEAM
- To all my former Kumu—you are all still a very important part of my life!!