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E Ke Hoa Aloha ʻĀina

Strategies for Teaching Hawaiian Culture Based, Place Based Scientific Inquiry

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Abstract

“E ke hoa, aloha ‘āina.” Greetings friend, love the land.” This was a traditional greeting in ancient Molokai that spoke to the peoples’ love for the land. This is also the title for my action research paper to analyze the value of teaching marine science to 11th and 12th grade students in O Hina I Ka Malama Hawaiian Language Immersion Program at Molokai High School using a place-based, culture based approach. I chose to focus my research on Aloha Aina, an ancient Hawaiian tradition to love the land because this is how my students live their everyday life. The research methods consisted of a pretest and a posttest as well as interviews with the students and their parents to get their thoughts on the value of this type of educational strategy. I found that it was a help to the students to increase rigor. By creating a relationship with the students and giving them relevant curriculum it resulted in increased rigor in their schoolwork. “E ke hoa, aloha ‘āina.”
Part I: Introduction

“E ke hoa, Aloha ‘Āina.” Greetings friend, Love the land. This was a traditional greeting in ancient Molokai. It was the way in which the ancestors lived, to love the land. From the top of the mountain of Kamakou, the highest peak on Molokai, to the ocean channels of Kolohe, Pailolo and Kaiwi that surround Molokai and separate us from Maui, Lanai and Oahu, to the point of Kapuupoi where the sun rises in the east to the points of Laau and Ilio where the sun sets in the west, from the highest sea cliffs in the world on the north shore to the fishponds on the barrier reef of the south shore the ancestors loved the land and all that it provided for the people. They were one with the land and the ocean.

From ancient time Molokai was famous for these nicknames: Na Kai Pooloolou o Molokai Nui A Hina and Molokai Aina Momona. What was the meaning of these names? They spoke to the abundance of taro and fish from the land and the sea. In the verdant north shore valleys, taro was planted in taro patches as abundant as the stars in the sky. On the south shore, every district had walled fishponds and fish traps as large as 500 acres. That is the meaning of the word pooloolou, when the water bubbles from the large schools of mullet that lived in the fishponds and on the reef flat surrounding the ponds. The land was plentiful with abundant food resources. The people had great love for their land. Food was plentiful for all people. The people flourished from the abundance of food provided by the land.

Aloha. My name is Gandharva Mahina Hou Ross and I am a child of Molokai and Hina mother of Molokai. I was born in Kauai and when I was 3 years old I moved with my mother and younger brother to Waialua Molokai where I have resided until
today. The years of my youth, is when I was introduced to the concept to love the land. I went fishing and hunting from the mountains down to the sea. I went diving in the ocean and caught prawns, fish and shellfish in the stream. I planted taro in ancient taro patches that we restored. My adopted father taught me all of these things. He learned to do these things from his grandfather, fishing and farming, and this is how we survived in my childhood. We would go get limpets along the shoreline, we would go catch rock crabs, lay net on the reef and throw net to catch our dinner. Another favorite pastime was to go diving for lobster and octopus. We would take frequent trips to the mountain to go hunting for deer and pigs. We lived off the abundance of the land and ocean. When I went to high school and college I began to take all kinds of science classes and I began to see the connections between science and the traditional Hawaiian concept to love the land.

In 1998 I became a teacher at Molokai High School and with the help of one of my mentors Uncle “Mac” Poepoe and I created a place based, culture based science curriculum for Hui Malama O Moomomi. Uncle Mac had been the person who managed the marine resources at Moomomi and we have seen the improvement in the abundance of those resources. He encouraged me to create a place based culture based science curriculum using Moomomi as the place. In the past 10 years as a teacher at Molokai we have had many experts in the educational field come and offer us professional development opportunities. I took some of these valuable ideas and concepts and included them in the curriculum that I had developed. I also understand the students’ aptitude in relation to technology. I combined these concepts with the traditional Hawaiian concept of Aloha Aina. What are the results of this? Aloha Aina: A Hawaiian
science curriculum. With this curriculum I have created I have tried to create a connection between the students’ prior knowledge and the current state science standards.

The main focus of my research was to use place based education as a way of increasing relevance and rigor of science at the high school level. I am aware that there are not many Hawaiian students entering science careers. I feel that if students experience place based science education they will be more likely to continue scientific inquiry and enter into science careers. They will also become interested in continuing their education. Some will continue their education by enrolling in community colleges and universities. Some will enter into the natural resource management fields. Others will become responsible fisherman and farmers, and it will be there responsibility to educate future generations, their children and grandchildren. Therefore the main question for my inquiry is: Will using place based scientific inquiry as a way of teaching science increase the rigor and relevancy for Hawaiian language Immersion students in their high school science classes?

**Section II: Literary Review**

This is a chant written by Vanda Wahinekuipua Hanakahi and John Kaʻimikaua to demonstrate the value of the traditional knowledge of the families of ancient Molokai.

‘Āe no Molokai ka piko o ka pae ‘āina ‘o Hawaiʻi nei
He wahi laʻa ‘ihī no ke anaina mea hōʻola
Mai ka lae o Kumukahi a hiki i Lehua ‘āhiehie i ka ʻehukai
Aia ‘o Keʻieʻie i Māhana, he waihona ūmoumou
Aia ‘o Keopukaloa, ka Ulukukui o Lanikāula
Aia i ka wēkiu ‘o Kāmākou, ka wai hōʻola o Kupuwailani
Aia nā kilokilo ma Pu‘u ‘Ano‘ano ma Nā‘iwa

‘O ke kumu hea la, ke kama a Hina mai kahiko mai?

‘O Molokai Pule ‘O‘o

He kahua ‘ike o ka wā i hala aku

He kahua ‘ike i kēia ao nei

He kahua‘ike o ka wā e hiki mai ana

‘O Molokai Nui a Hina

‘O Molokai Nui a Hina e

He inoa no, No nā mea hō‘ola, Mahalo Ke Akua

Na Vanda Wahinekuipua Hanakahi lāua ‘o John Ka‘imikaua

“‘O ke kahua ma mua, ma hope ke kūkulu.” (Pukui1983, No.2459,) This is an ancient proverbial saying passed down for generations to explain the way they lived. It is translated to mean: First you need the foundation and then you can build. They would not build anything unless the foundation was set solid. If you try and build without first securing the foundation you will run into trouble in the future. That could be an explanation as to why so many of our native Hawaiian students struggle in school. They are going to school without the foundation being set. What is the foundation that will allow the students to succeed? They need a Hawaiian foundation so that they can make a connection to their traditional knowledge and what they are learning in school. The appropriate foundation for our students at Molokai High School is their love for the land. This is a quote from Kawika Ka‘alakea (1999) that speaks to the Hawaiians association to the land.
Up the mountains, down the ocean. I was taught many good things. I was lucky. I learned all the land. I learned how to plant taro, sweet potato. Fishing. All these things. That’s how we survived. We had to do it; nobody gonna do that for us. That’s why my grandmother said ‘Put your hand on the land. And what goes in the land it will take care of you.’ In the land is many things. That’s where our food comes. That is where our culture comes and our language comes from the land. Everything. That’s aina. We Hawaiians come from the aina. (Harden, MJ (1999) pg 64)

In this section of my paper, the literary review, I will share some of my findings in the current educational literature. 1) First, I will share some information about the ancestors of Molokai in the ancient days, how they loved the land. 2) Second, I will share some of the struggles that affect my students at Molokai High School. 3) I will also share some of the educational strategies that I use at the Hawaiian Language Immersion Program O Hina I Ka Malama at Molokai High School to help and support the students to connect the curriculum at school to their traditional knowledge. 4) I will also share the different standards, state and national that I use to build my curriculum.

1) The way of the ancestors

Who are the students that I am talking about? “He kalo kanu o ka ‘āina” (Pukui 1983 No.157) What does this mean? “Kalo kanu o ka ‘āina.” In the ways of our ancestors, this was a saying that spoke of a person who lived in the same place for generations. Most of my students at O Hina I Ka Malama are “kalo kanu o ka ‘āina.” Where are they from? They are the children of Hina
In the ancient chant *Mele A Paku‘i* by Paku‘i, a court orator from a family of orators from the beginning of time on Molokai, states


Molokai is the child of the gods Wakea and Hina. And the descendants of these ancestors are the children that I teach. How did the ancestors of Molokai live? They were the people who loved the land. They are famous for all of the work they did on the land. The land was fat and abundant with food. Molokai was famous in ancient days for the abundance of fishing resources along the protected south shore. Judge Daniel Kahaulelio wrote in the Hawaiian newspaper, *Ka Nupepa Kuokoa* in 1902, reprinted in *Ka Oihana Lawaia* (2006) about the abundance of the mullet in the fishponds found along Molokai’s south shore:

At the birthplace of the Honorable John W Kalua and the Honorable Senator S.E. Kaiue, Great Molokai, the land of Hina, there are many mullet ponds and some were noted for the fatness of their mullets: Ualapue, Niaupala, Pipio, Pukoo and Kupeke, it was these ponds the people of Lahaina depended on and looked to (Kahaulelio2006 pg. 263).

This was the lifestyle and traditional knowledge of the ancestors of my students. From the knowledge of the ancestors, passed down through the generations to the parents and then to my students, this is the background knowledge that my students come to me
with. When my students are on vacation or when they spend time with their families they go holoholo from the mountains down to the sea. They go diving in the streams and on the reefs. They plant taro in the wetland taro patches. They gather limpets, rock crabs and lobsters along the shoreline. They lay net and throw net on the reefs to gather food for their subsistence diet. They go hunting in the mountains for deer and pigs. They live off the abundance of the land.

2) The struggles of Molokai students in the current educational setting

“He kākano i ruia mai i Rangiatea” (Grace 2003, pg23)

This is a traditional Maori poetical saying that speaks to the importance of the native people living on the land. A kākano is a seed and also represents the Maori people, from Rangiatea, the ancient homeland known as Hawai‘iki. Many of the people, customs and traditions have been lost but what remains is very important and needs to be cared for and cherished.

Why did I choose to include this saying from the people of New Zealand? I chose to include this saying because it is a line from a song taught to us, the students of O Hina I Ka Malama by Waimarie Maxwell, an exchange student from Rotorua New Zealand. She later died in a car crash in Molokai. We will never forget her. Out of this tragedy a great bond has been formed between us the families of Molokai and the families of Waimarie from New Zealand. We have visited her homeland and her family has visited Molokai. We have continued to make trips with our students to Aotearoa and school groups from Aotearoa have made weeklong visits every few years. A strong bond between our people on Molokai and our Maori cousins has been formed. A bond forged in the love for a classmate and family member who has passed on to the world of our
ancestors. The Maori people are a great example for us the people of Hawaii. They are steadfast in their Maori culture. They have revived their language and customs. This is the same with the Hawaiian culture and indigenous cultures worldwide. We need to look to our past to prepare the way for the future. We need to preserve the way of our ancestors and learn to find a common ground with the ever changing modern technology to create a world in which our children and their children’s children can be successful.

As Kanaiaupuni wrote in “Ka‘akālai Kū Kanaka: A Call for Strengths Based Approaches from a Native Hawaiian Perspective.”(Kana‘iaupuni 2004, pg.1) “We need to look to the strengths of our native Hawaiian people. If we look to the strengths of our people we give the opportunities for our students to be successful. If we focus on the weaknesses of our people then problems become evident.”

What are the strengths of the students of Molokai? It is their love for the land that has been handed down for generations. *E ke hoa aloha ʻāina*. The students live this concept of aloha ʻāina to love the land. They are firmly grounded in the teachings of their ancestors. And then they attend schools in the public school system. And they are required to follow a different set of concepts and foundations. For many of the students I teach, this foundation is not firmly set. It is a foreign concept that is difficult to adapt to. Some students are successful in this transition but many are not. What can I do to ensure that they are successful in their educational pursuits? I have come up with a place based culture based model of scientific inquiry utilizing the latest technology. Molokai is the place and the Hawaiian culture is the host culture.

3) Educational Strategies used in the research

“*Ma ka hana ka ‘ike*” (Pukui, 1983, No. 2088) ”In doing one learns.”
Due to a variety of reasons, Molokai High School is in restructuring. Due to our standing as a school in restructuring under the No Child Left Behind act, many experts in the field of professional development for education have visited our school to hold workshops to help increase student achievement.

Michelle Swanson came to Molokai to help develop the Molokai High School Natural Resources Academy. The Natural resources Academy is a project based learning approach to studying the natural resources of Molokai. Davies, Cameron, Politano, and Gregory (1992) write: “Teachers today are using and developing numerous innovative strategies to make their assessment, evaluation and reporting more manageable for themselves and more effective for their students and their parents.” In project based learning, different subject area teachers use collaborative teaching and learning strategies to work on one large project that entails the standards of the different subject area content. This helps the students plan their projects so they don’t need to complete a different project for each class. They do one project for a group of classes that allow them to demonstrate the mastery of multiple standards.

Parnell (1995) says, “We must provide all our students with meaningful experiences…We cannot afford to leave anyone behind if we can help it. We must help all students develop the knowledge skills and values to become lifelong learners.” Reardon (2004) notes:

One factor influencing the degree to which we master an activity is the quality of the learning experience itself—the quality of the moments when we are engaged with new information or experiences. Rich in complexity, these moments profoundly influence how our neural connections develop.
Another strategy that increases the chance for student success is to have the students participate in setting the requirements for the project. Davies (2005) says:

Criteria are simply the standards by which something can be judged or valued. When we determine these criteria we are deciding what counts…we show ways to involve students in setting criteria. That’s because we have found when students take part in developing criteria, they are much more likely to understand what is expected of them, “buy in” and then accomplish the task successfully.

Forte and Schurr (1995) wrote: “Today’s teachers and administrators continue to search for innovative ways to encourage student participation in the learning process and to utilize authentic measures to assess student growth in any given subject area.”

I combined these educational strategies with the traditional resource management practices of our ancestors of Molokai to create this type of place based culture based curriculum. Molokai is the place. From the mountain to the sea, students conduct scientific inquiry on the plant and animal resources of their district. This scientific inquiry becomes the subject area for further research projects. When the traditional knowledge is included in the curriculum, the students become more interested in the material and become more motivated to learn and advance their studies.

I am grateful to Uncle Mac Poepeoe for encouraging me to create this place based curriculum. Moomomi is the place. Uncle Mac is the one who manages the shoreline at Moomomi on the northwest coast of Molokai. Uncle Mac has managed this area by teaching the residents of the area traditional resource management by educating the people to the spawning cycles and seasons of important marine resources. In order to ensure plentiful fishing resources for future generations we must understand the
spawning seasons so we do not disturb the natural cycles. Uncle Mac created the Moomomi Pono fishing calendar, a calendar that explains the spawning seasons of important marine resources in the Moomomi area. These are a few quotes from the calendar. "Be pono. Take only what you need. Try a variety of fishes. Be pono for the future." (Pono Fishing Calendar, 2009). This type of place-based education is a great resource for native people around the world. The place and resources will be different but the concept is the same. When students are connected to traditional practices as a way make the curriculum relevant they will become more interested in education.

4) State and National Performance Standards

_He aupuni palapala ko ‘u; o ke kanaka pono ‘o ia ko ‘u kanaka_ (Pukui 1983, No. 64)

This famous saying spoken by Kauikeouli Kamehameha III explains the importance of the written word. For generations Hawaiians had no writing. Their history was an oral history. Kauikeouli encouraged his people to learn to read and write and at the time of the overthrow in 1893 Hawaii was one of the most literate nations in the world. Documents are very important in the world today as well. What are the documents that guide us in the educational field? _Nā Honua Mauli Ola_, a set of Hawaiian cultural standards state the importance of including culture and language revitalization in our educational system. I also chose the appropriate State of Hawaii Content & Performance standards as well as the national science standards that match to the area we are investigating. One of the main standards I focus on is participating in scientific inquiry. Douglas Llewellyn (2002) writes: “[The national standards are encouraging science teachers to plan inquiry based science programs for their students..."
and develop communities of learners who reflect the intellectual attitudes and social values conducive to science inquiry” (Douglas Llewellyn (2002) p. 174)

I also use these content specific standards: *Unity & Diversity in Organisms, Classification, Interdependence, and Cells tissues and Organs*. By using cultural standards as well as state and national science standards students are able to make connections between their traditional knowledge and what they are required to learn in the current school system

**Section III: Procedures**

1. ‘*O Hina I Ka Malama*: The place and subjects of the study

   Molokai High School is where the study is taking place, at O Hina I Ka Malama, the Hawaiian Language Immersion Program. Molokai is the fifth largest of the Hawaiian Islands located in between Maui and Oahu. Molokai is a rural island with less than ten thousand residents. Seventy-five percent of the residents are native Hawaiians. A large majority of the residents depend on subsistence fishing, hunting and farming for a significant portion of their diet. Molokai High School is the only public high school on Molokai with students in grades 9 through 12. The school is located on the Hawaiian Homelands of Hoolehua in the district of Naiwa.

   *O Hina I Ka Malama* is the name of the Hawaiian Language Immersion Program at Molokai High and Molokai Middle Schools. The Hawaiian Language Immersion Program was created in 1987 as a part of the State of Hawaii *Department of Education (DOE)* due to Hawaii State Law (Article X, Section 4) with the support of the parents of the students who wished to have their children educated in the Hawaiian Language and culture.([http://www.k12.hi.us/~kaiapuni/](http://www.k12.hi.us/~kaiapuni/)). The Hawaiian Language Immersion Program,
O Hina I Ka Malama began at Molokai High and Intermediate School in 1999 with 10 students in the seventh grade. The first class of 7 graduated in 2005 (Peters, 2005).

In the 2009-2010 school year when the study was conducted there were 9 students in the 11th and 12th grade enrolled in Marine Science. There are 4 girls in the senior class and 1 boy and 4 girls in the junior class. All students are Native Hawaiian.

2. The procedures of the study

The study is based on the concept of Aloha ʻĀina, love for the land. This is a traditional Hawaiian concept to love the land, for the land provided all that was needed to sustain life on an island. You need to care for your resources. You need to plant your food crops to ensure maximum production. All of these practices were planned according to the different seasons and moon phases. Certain food crops preferred certain growing seasons and also became more productive if planted on certain nights of the moon. Important marine food sources spawned during certain times of the year on specific moon phases. The Hawaiian people planned all of their daily activities around the moon calendar to ensure continued productivity of important marine resources and maximum productivity of planted crops.

The families of the students enrolled in O Hina I Ka Malama continue to practice many of these traditional concepts so I decided to focus on a place based culture based approach to create relevancy in the curriculum. If the curriculum is relevant and fun, students will be more interested in school and will therefore produce better results. We take frequent field trips to our island to experience scientific inquiry and to actually see, touch, hear and feel our aina a me ke kai, our land and ocean and to understand the vast wisdom and knowledge of our ancestors. I searched for community partnerships and they
were easy to find. Lots of people in the community dedicated their time to help and allow this project to succeed. I am very grateful to them for all of their support. I received help from Uncle Mac Poepeoe, the resource manager for Hui Malama O Moomomi. Uncle Murv Dudoit, Tutu Lei Lee and Noelani Yamashita from Ka Honua Momoma, who manage Alii and Kaloko’eli Fishponds also gave their support. Walter Ritte, Kalaniua Ritte, and Hanohano Naehu from Keawanui Learning Center also were a host site. We were also very fortunate to visit Uncle Leimana Naki, the manager of Kahinapohaku Fishpond. And a special thanks to Uncle Merv Dudiot for being our van driver with Ka Honua Momona’s van. I am very grateful to all of these people for providing continued support to our program and sharing with my students all of their traditional resource management knowledge

On the first day of class for the semester, the students took a pretest. The pretest questions are attached to the end of this paper. The questions on this test were to gauge the student prior knowledge of the marine invertebrates found in the waters surrounding Molokai. Next the student studied each on the families of marine invertebrates in the textbooks Biology (Strauss & Lisowski, 2000) and A Living Ocean (Klemm, 1999). This inquiry was to prepare students for their standardized test and to meet the standards set forth in the Hawaii State Content Standards. Next we went on field trips to marine environments. On these field trips, students searched for any marine invertebrates they could find in the area. We took pictures of what we found with digital underwater cameras and video cameras. GPS reading were taken were each species was collected. Specimens were collected to take back to the classroom for further investigation.
When we get back to the classroom we have a dissection assignment. Students draw each specimen showing the top and bottom views. Next students match the external body parts of the specimens with the drawings in the textbook. Then students dissect the specimens and do their internal anatomical drawings. All of the internal organs and systems are identified. Next specimens are identified and classified according to their scientific families. After dissection all specimens are cooked for lunch. It is a very important Hawaiian concept that if you are going to kill something you need to eat it. Students prepare their favorite recipe.

Next students create field guides and PowerPoint presentations to share what they have learned. All of the species from the different areas are included in the field guide and PowerPoint. Each group was responsible for a field guide from each area we visited. One group made a field guide for Moomomi, another for Alii Fishpond, Keawanui Fishpond, and Kahinapohaku Fishpond. Information included in the field guide and PowerPoint are the scientific, Hawaiian, and common name of the specimen, GPS coordinates for where the specimen was found, digital photographs, student drawings and resource management recommendations for the area of study. What are the important food resources of the area? Are there invasive species that are impacting the health of the native species in the area? This is a continuation of what they learn at home and will be something they can pass on to future generations. And students gain responsibility for the area and feel a connection to the place and want to care for it for generations to come.

The next step in the unit is to have a family night where the community, parents, grandparents and other friends and family come to the school to see what the students have learned. Students practice their speeches and have their field guides and
PowerPoint ready to share with the community. After the community performance, students are given the posttest to gauge the progress of each student. The posttest is the same test as the pretest.

E. Procedures for Data Collection

There are two important aspects of data collection for this study. The first series of data was collected from the pretest and the posttest. Data collected from these sources is qualitative. Both the pretest and the posttest are attached to the end of this document. On this test there are a variety of questions about each family of invertebrates that we studied for the quarter. The pretest and posttest are the same test, the only difference being the date of the test. The pretest is taken on the first day of the quarter and the posttest is taken after students inquiry, field trips, dissection and community presentations.

The second method of data collection for this study is parent and student interviews to get their thoughts on the value of place-based culture based scientific inquiry. Data from the interviews is qualitative. Interview questions are attached to the end of this document. Student progress is easily measured by improvement of test scores. Other ways of expressing progress is gathered from the thoughts of the students and their parents. Other proof of student learning cannot be measured in this study. You need to be there at Moomomi or the different fishponds we have visited to see with your own eyes the learning that takes place in the natural environment. You need to be there to see the growth of the students when they see concepts in the book come to life as the students experience these concepts in the natural environments.

Part IV: Analyzing the Data
1. Quantitative study

On the first day of the quarter, students take the pretest on marine invertebrates. Then we begin our scientific inquiry. Students investigated five families of marine invertebrates. The families studied are Echinoderms, Mollusks, Crustaceans, Cephalopods, and Cnidarians. We used BIOLOGY (Strauss & Lisowski, 2000), THE LIVING OCEAN (Klemm, 1999), and HAWAII SEA CREATURES: A GUIDE TO HAWAI‘I’S MARINE INVERTEBRATES (Hoover, J. 1999) to conduct our investigation. We also took frequent trips to the shoreline environments of Moomomi, Kahinapohaku Fishpond, Keawanui Fishpond, Alii Fishpond and Kalokoeli Fishpond to search for the different marine invertebrates we can find there. Whatever marine invertebrates we found at these sites we saved them and brought them back to the classroom for dissection and further investigation. Specimens are dissected to investigate the internal anatomy of each species. Students can see if the specimen is spawning. They can see what each specimen eats. Students make anatomical drawing of the outside and inside of each organism and match their drawings with the anatomical drawings in the textbook. After these different kinds of investigation students create a field guide of the marine invertebrates found in each area. After this students take the posttest to gauge their learning.

This is the data that was gathered. Each test had 20 questions. There were 4 questions for each family of marine invertebrates. Students need to give 5 examples of each family of marine invertebrates. Students need to draw the typical body plan of each family and label the different body parts. Students need to describe the habitat in which these invertebrates are found. They also need to show what each family eats.
Prior to giving the pretest I thought the students would have some prior knowledge of these marine invertebrates because they have some traditional knowledge about these resources. When I actually gave the pretest to the students I was surprised at the amount of information they already knew. Everyone had some prior knowledge. The lowest score was 11 out of 100 and the highest score was 42 out of 100. The average score on the pretest was 26.3. This showed that they had some prior knowledge on the marine invertebrates of Molokai but also showed they had room to improve and learn new things. In the last week of the quarter I gave the students the posttest. I was pleased with the progress of the students. All of the scores improved. The lowest score on the posttest was 62% and the highest score was 82% so every student showed some improvement. The average score on the posttest was 75%. So the average increase from the pretest to the posttest was about 50%.

Then I continued to analyze the data from the pretest and post test by looking at individual questions and select families of invertebrates. I noticed that students did very
well at identifying examples of each family and did well at drawing the body plan of each family and labeling the parts of each specimen. I need to spend more time teaching about where they live and what they eat. I also noticed that students did not do as well for the cephalopod family as the other families. I think the reason for this is that we did not actually see any cephalopods on our field trips. We saw examples of the other 4 families so students had actual hands on experience with these families but not with cephalopods.

One of the weaknesses of this qualitative study was the small data set that was analyzed. There were only 8 students who participated in the study and the test was only given twice so I only had 16 pieces of data to analyze. But I needed to do what I could with what I had. If I could do the study again I would get more students involved.

**Qualitative Study**

For the qualitative study I interviewed the students and their parents to understand their thoughts on the value of place based culture based scientific inquiry of marine invertebrates. I predicted that the students would enjoy being able to get out of school and visit the marine environments of Molokai to investigate the marine invertebrates. That’s how Hawaiians learn. There is an ancient Hawaiian saying, “Paa ka waha, nana ka maka, hoolohe ke pepeiao, hana ka lima, pela e ao ai ka Hawaii.” Translated into English it means “Close the mouth, the eyes look, the ears listen and the hands do, that’s how Hawaiians learn.” Another famous Hawaiian saying is “Ma ka hana ka ike.” Which means “In doing one learns.” Through this place based culture based scientific inquiry I saw the truth in these ancient Hawaiian sayings. Hawaiian really do learn better when they get to experience firsthand the learning and not just read about it in a book.
I was pleasantly surprised at what I heard in the interviews. Every student said that their favorite part of the year was the field trips. When I asked the students if this type of education would be appropriate for future generations of students and every student said that they thought this was a great way to teach scientific inquiry for future students as well. They also all said that their behavior and attitude towards school improved because of the opportunity to leave school and go to the ocean to study the marine environment. Students enjoy coming to school.

These are some of the thoughts of the parents of the students who participated in the study. Every one of the parents thought it was a good idea to do place based culture based scientific inquiry. Their children’s grades improved in science class as well as other classes. They are very supportive of this style of learning. It changed the attitude of their children towards school. Hawaiian children as well as native students around the world learn better when they can learn hands on. “A great way to keep the students focused and engaged.” Other students should also have the opportunity to do place based culture based scientific inquiry.

While analyzing the data in this study I saw the true value of teaching place based culture based scientific inquiry. Students were more engaged. They had a positive attitude towards school. Their grades improved. I had predicted that this learning strategy would have a positive impact on student learning but i couldn’t have predicted the support of all students and parents.

Part V: Conclusion

What are the main results of this study? It truly was of great benefit to the students of O Hina I Ka Malama enrolled in 11th and 12th grade marine science to
participate in place based culture based scientific inquiry. That’s how Hawaiians learn best. They learn by doing. Close you mouth, look with your eyes, listen with your ears and let your hands do the work.

I did a qualitative and quantitative study and both had similar results. Students were interested in school. They had an improved attitude towards attending school. Their grades increased and their test scores increased as well. In the qualitative study, it was evident in the increase in test scores that the students really learned something new about the marine invertebrates of Molokai. In the qualitative study I saw similar results. Both the students and their parents thought this was a great way to learn. They said it resulted in a changed attitude towards attending school and furthering their education in a science related field. They thought it would be appropriate for other students not in the Hawaiian language immersion program as well as for future Hawaiian Language Immersion students as well. The results were very satisfying.

This type of education is a great way of motivating students to do well in school and further their education but I did notice some ways I could improve the study. One of the things I could do to improve the assignments is to increase the usage of Hawaiian language in all settings. I should give the students more time to find all of the correct Hawaiian terminology for the anatomy of the specimens studied. Student became familiar with the English and Latin terminology but need to do more research on Hawaiian terminology. Another thing that I can improve on next time these lessons are taught is to focus more on the habitat of the different species as well as the diet of the different species. I think I will continue to monitor the progress of the incoming freshman class. They will be doing place based culture based scientific inquiry for the
next four years as a student in O Hina I Ka Malama and hopefully a large percentage of them will want to continue their education in a science related field.

I really see the value of this style of education and I want to share what I have learned with other teachers so that they can give the opportunity for their students to participate in place based culture based scientific inquiry as well. In order to accomplish this I have been added to the Kulia I Ka Nuu team that teaches a summer professional development course at University of Hawaii at Manoa. I will be one of Professor Pauline Chinn’s helpers for the class Mālama I Ka ‘Āina EDCS 433 Interdisciplinary Science Curriculum and EDCS 450 Materials and Methods. I think it is of great value to share what I have discovered with others so more students have the opportunity to do place based culture based scientific inquiry. These are my main thoughts on this study.

“E ke hoa Aloha ‘Āina.”
Attachment A

**Marine Science Invertebrate Pre-test**

1. Give 5 examples of echinoderms.
2. Draw the body plan of a typical echinoderm and label the body parts.
3. Where do echinoderms live?
4. What do echinoderms eat?
5. Give 5 examples of crustaceans.
6. Draw the body plan of a typical crustacean and label the body parts.
7. Where do crustaceans live?
8. What do crustaceans eat?
9. Give 5 examples of mollusks.
10. Draw the body plan of a typical mollusk and label the body parts.
11. Where do mollusks live?
12. What do mollusks eat?
13. Give 5 examples of cephalopods.
14. Draw the body plan of a typical cephalopod and label the body parts.
15. Where do cephalopods live?
16. What do cephalopods eat?
17. Give 5 examples of cnidarians.
18. Draw the body plan of a typical cnidarians and label the body parts.
19. Where do cnidarians live?
20. What do cnidarians eat?
Attachment B

**Marine Science Invertebrate Post-test**

1. Give 5 examples of echinoderms.
2. Draw the body plan of a typical echinoderm and label the body parts.
3. Where do echinoderms live?
4. What do echinoderms eat?
5. Give 5 examples of crustaceans.
6. Draw the body plan of a typical crustacean and label the body parts.
7. Where do crustaceans live?
8. What do crustaceans eat?
9. Give 5 examples of mollusks.
10. Draw the body plan of a typical mollusk and label the body parts.
11. Where do mollusks live?
12. What do mollusks eat?
13. Give 5 examples of cephalopods.
14. Draw the body plan of a typical cephalopod and label the body parts.
15. Where do cephalopods live?
16. What do cephalopods eat?
17. Give 5 examples of cnidarians.
18. Draw the body plan of a typical cnidarians and label the body parts.
19. Where do cnidarians live?
20. What do cnidarians eat?
Attachment C

Parent Interview

1. How long has your family been involved with the Hawaiian language revitalization efforts?

2. Does your child enjoy attending ‘O Hina I Ka Malama? Give some reasons or examples?

3. How do you feel about the increased number of field trips to marine environments to do place based education?

4. How has placed-based education impacted your child’s attitude towards school?

5. How has place-based education impacted your child’s achievement in school?

6. Would you recommend place-based education as a way of teaching science to the students of ‘O Hina I Ka Malama

7. Give any other thoughts or feelings on the value of place based education.
Attachment D

Student Interview

1. How long have you been a student in Hawaiian Immersion?

2. Do you enjoy attending ‘O Hina I Ka Malama? Give examples or reasons?

3. How do you feel about the increased number of field trips to marine environments to do place based education?

4. How has place-based education impacted your attitude towards school?

5. How has place-based education impacted your achievement in school?

6. Would you recommend place-based education as a way of teaching science to the students of ‘O Hina I Ka Malama in the future?

7. Give any other thoughts or feelings on the value of place based education.
Table 1
Scores on the pretest and posttest

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<th>Posttest</th>
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<td></td>
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Average: 26.375, 74.875
Deviation: 11.168, 6.071
Range: 31, 20

Figure 1. Bar graph showing the students’ pretest and posttest scores.
Table 2  
Scores for each type of question

<table>
<thead>
<tr>
<th>Student</th>
<th>Examples</th>
<th>Drawing</th>
<th>Habitat</th>
<th>Diet</th>
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<td>8</td>
<td>20</td>
<td>20</td>
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Average 21.625 20.75 17 15.5  
Lowest score 19 15 11 11  
Highest score 24 25 20 19  
Mean 24 25 18,17 15  
Deviation 2.326094213 3.845219667 2.725540575 2.618614683  
Average 21.5 20.5 17.5 15  

**Figure 2.** Bar graph showing the students’ score for each type of question.
Table 3
Student scores on families of marine invertebrates

<table>
<thead>
<tr>
<th>Student</th>
<th>Echinoderms</th>
<th>Crustaceans</th>
<th>Mollusks</th>
<th>Cephalopods</th>
<th>Cnidarians</th>
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<td>1.995530721</td>
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Figure 3. Bar graph showing the students’ score on the families of marine invertebrates.
References

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