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From Akamai Intern to PDP Instructor: The Coupled Impact on Becoming a STEM Professional

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Abstract

The Akamai Internship in Hawai‘i and the Professional Development Program (PDP) address key issues of sustaining a diverse, equitable, and inclusive STEM workforce in industry and academia. Established in 2002, the Akamai program builds capacity to overcome the brain-drain workforce problem that Hawai‘i faces by connecting local undergraduate students with internship opportunities in the STEM industries on the islands of Maui and Hawai‘i. The PDP provides opportunities for graduate students, early-career scientists and industry leaders to learn effective andragogical practices for teaching science and engineering to the next generation at the undergraduate level. A unique, grounding aspect of the Akamai program across all cohorts is a week-long course preparing interns to work with their local industry partners and build an inclusive community. The course is co-led by Akamai program staff and PDP alumni in collaboration with PDP design teams who run complementary inquiry learning activities. Since the first cohort of 2003, 451 interns and around 100 design team members have participated in Akamai. Of the 451 interns who participated in the Akamai program, at least 8 participants have become PDP design team members. The purpose of this panel discussion is to feature four of those alumni that participated in both Akamai and PDP programs. The panelists will share the factors that influenced them to become a PDP instructor as well as highlight the impacts that both programs had in shaping their respective life and career pathways.

Keywords: Akamai, internships, Maui, Hawai‘i, STEM identity

1. Introduction

The Institute for Scientist and Engineer Educators (ISEE) based in the University of California, Santa Cruz founded and managed both the Akamai Internship Program and the Professional Development Program (PDP) on the islands of Maui and Hawai‘i. The Akamai Internship Program was first established in 2002 with the goal of supporting a local workforce for Hawai‘i’s science and technology industries. The program is designed for undergraduate students to have a summer internship at a Hawai‘i science, technology, engineering or mathematics (STEM) institution. Before the internship, the entire Akamai intern cohort goes through a week-long preparatory course to develop inquiry and professional skills. Throughout the summer internship, interns remain connected with instructors for check-ins and science communication skill development. The program culminates with symposia where the interns present their projects.

Akamai has demonstrated success in improving retention of underrepresented groups in STEM. A 2018 analysis of 222 alumni at least three years after participating in Akamai reported 87% persistence in STEM pathways, either continuing STEM degree programs (17%) or entering the STEM workforce (70%). The most important outcome from this longitudinal study is that factors that often predict disparities in persistence (e.g., gender and URM status) showed no statistical effect in Akamai alumni (Barnes et al., 2018).

The Akamai Program has a special connection with the PDP in the following ways: The preparatory course features inquiry activities led by PDP design teams. The Akamai Program staff also consists almost entirely of PDP alumni. Incredibly, there have been at least 8 Akamai Program alumni that have gone on to become PDP design team members.

This panel explores the perspectives of four individuals who were Akamai interns and later PDP design team members.

2. Methodology

In this paper and panel discussion, we present four narratives as local students that have experienced both the Akamai and PDP programs. Each panelist presents personal reflections to unpack the impact that Akamai and PDP experiences have upon our respective career pathways. We use a talk story methodology as a culturally relevant method and hybrid Indigenous/Western research approach to present indigenous and settler-dominant ways of knowing and being in STEM.

3. Panelists’ perspectives

3.1 Lelemia Irvine, 2006 Akamai Maui cohort

I was thrilled to receive the acceptance letter with the Akamai 2006 Maui Cohort Internship. I was blessed with a dilemma and a choice to intern: (1) in Washington DC for a U.S. government office or (2) on Maui with the Pacific Disaster Center to use GIS to map Avian Influenza outbreaks with Bird migrations. Reflecting and refracting back to this moment in my life, I have no regrets staying in Hawai‘i and going to Maui. I hail from a big Hawaiian ‘ohana and have ‘ohana on every island of the archipelago. We stay connected through family reunions, letters and phone calls — and in present day 2022, social media. For my immediate family, prior to 2006, travel to the neighbor islands to visit ‘ohana was limited because of the big expense. The Akamai internship allowed me the opportunity to physically be present and spend time reconnecting to my Maui Nui roots. My paternal great-great grandmother was born in and has lineal connections to Kaupō, Maui.

The moment I saw Kahu enter the room, I felt at peace. “I have a question for you. How many of you in this room believe that the telescopes should be on Haleakalā and Mauna Kea? Raise your hand if they should be there.” The late Kahu Uncle Charlie Maxwell lovingly asked us after watching the video

"Sense of Place" in the late afternoon on our first day of the 2006 Akamai Maui Short Course. We were in a spacious (and in a very cold) physics classroom at Maui Community College campus. Of the 14 of us in the cohort, the overwhelming majority raised their hand in favor of the telescopes to remain built on these Mauna. Uncle Charlie encouraged us to look around in the room.

Uncle proceeded in his thought experiment and put forth the inverse query to us: "raise your hand if you believe that the telescopes should not be built." There were no hands up. And then, Uncle Charlie casted further his examining fishing line: "Raise your hand if you are neutral." Two hands flew up in the air. Continuing his line of Kūpunatific investigation, Kahu Uncle Charlie asked in his sweet kūpuna voice: "How many of you in this room are Hawaiian? Raise your hands up. Lift them high." Myself and another intern lifted our hands up. Uncle prodded even more, "Why do you as a Hawaiian have that stance right now?"

I shared that as an aspiring scientist, I love science and technology but as a Hawaiian, I do not know how to untangle my love of science with my knowing that the Mauna are sacred. I expressed that I felt a tug in my naʻau (seat of knowledge and emotions). A tug, a yank really from my naʻau to me at the early phase of my training of becoming a Hawaiian Engineer and my place within this seemingly never-ending, ongoing battle between the Mauna protectors and the telescopes. I accepted the internship because my naʻau was insisting that I have a purpose to go hoʻolohe (to listen) to every axis of perspectives regarding the telescopes and each Mauna. I felt my naʻau strings pulling me to really pay attention to the voices of the kupuna (respected elders), my ʻohana (family) and the lāhui (Nationals of the occupied Hawaiian Kingdom) as I moved higher in my educational aspirations in an engineering career pathway.

Initially, Kahu Uncle Charlie was scheduled to meet with our cohort for only that 1.5-hour time slot on Tuesday, May 30, 2006. However, at the co-request of Uncle Charlie and the interns, PDP changed the schedule recognizing the need to spend more time with Uncle, a living Hawaiian treasure. The late Kahu Charles "Charlie" Maxwell is a revered kūpuna, a formal police officer, Native Hawaiian leader, Kahuna (Hawaiian spiritual leader), haku mele (songwriter), cultural practitioner and Hawaiian cultural teacher. On March 15, 2012, he took a journey on the path of no return, across the rainbow bridge and departed this earthly world physically at Maui Memorial Medical Center (Learn more about Kahu Charles Maxwell here).

During our sessions, Uncle Charlie shared his personal firsthand accounts of the occupation and successful return of Kahoʻolawe — an island of war turned into an island of aloha. In preparation for our field trip to the summit of Haleakalā and to engage in a sunrise ceremony before touring the telescopes, Uncle Charlie taught us the sunrise chant called "E Ala E". Although Uncle Charlie could not physically go up the summit for health reasons, his grandson stood in his stead and lead the ceremonies at the summit of Ala Hea Ka La ("The Path to Call the Sun"), the ancient name of Haleakalā as shared to Uncle Charlie by the late Papa Kawika Kaalakea, a renowned Kahu (Hawaiian priest). At the moment of first light until the sun pierced through the ocean/clouds, we chanted in one voice — in the cold, in the rain, in the wind — calling out to the sun, e Ala e (Rise up)!

Sunrise Ceremony with Maxwell Ohana at Haleakalā on Friday, June 2, 2006.

Lelemia Irvine at one of the Haleakalā telescopes on Friday, June 2, 2006.

In 2012, I returned to Maui for the Professional Development Program, Inquiry Institute Workshop where I worked with Austin Barnes on an Inquiry Activity on Life Cycle Analysis to employ at Maui Community College. Initially, not in the schedule of the closing of the inquiry, I asked if I could share an opening chant. The PDP staff gave us the time. The words came to me on the shores of Lahaina. In 2006, I was not fully conscious at the time that Uncle Charlie and his grandson gifted me this huge teaching as a Hawaiian Scientist. That as a Hawaiian scientist I am both rooted-science from Hawaiian lifeways and transplanted-sciences. Their sharing was short but a time filled with potent lessons ever unfolding to this day.

The training at Akamai/PDP along with many other life events prepared me to earn my dream job as professor. I am a trained engineer that is the first appointed physics faculty member at the University of Hawai‘i—West O‘ahu. I teach physics content in a Hawaiian way. Akamai and PDP experiences showed me that Hawai‘i certainly has homegrown expertise and a growing local STEM industry. Through their genuine showing — not telling — I gained a sense of my Scientist/Engineer identity and most importantly, ‘I no need be afraid of “da brain drain” because there is a STEM job for me at home in the archipelago of Hawai‘i. I aspire to pass on these teachings to my students — the next generation of community leaders in Hawai‘i and beyond.

3.2 Stacey Sueoka, 2007 Akamai Maui cohort

I cannot say I knew what my future looked like, but the one thing I knew as a graduating high school student was I wanted to leave my home on Kaua‘i island to go to college somewhere new. I wanted to explore the world, learn to really appreciate why home is so special to me, and eventually move back to the place I love and be with my community, family and friends. I knew I had a knack for mathematics and the sciences, but I didn’t know how I wanted to use this knowledge and skill. In the summer of 2007, after completing my Physics degree at Pacific University in Oregon I had the opportunity to participate in the Akamai Program. I was placed as an intern on Maui at Textron Systems, a government contractor based in Kīhei that did work with the Air Force telescope on Haleakalā. The internship provided a number of opportunities: to experience a technology job in the state of Hawai‘i, to build and develop a network with other interns with similar aspirations, and to see the broad range of skills that were needed in the technical workforce within the state. At that time, I was on my way to teach English in Japan while deferring my start in optical engineering graduate school; but it gave me a sense of

Akamai Maui cohort on Haleakalā, 2007.

Akamai Staff, 2021. From left to right: David Harrington, Mike Nassir, Stacey Sueoka, Lisa Hunter, Cynthia Nelly Carrión, Jerome Shaw, Nicole Mattacola, Austin Barnes.

hope that I could find work back home when I was ready to return.

During my graduate school years at the College of Optical Sciences in Arizona I received an invitation as an alum of the program to attend an Akamai Technical Workshop on Maui. This workshop was sponsored by the National Solar Observatory (NSO), the organization building the Daniel K. Inouye Solar Telescope on Haleakalā. I was able to develop a relationship with NSO which led to three summer research assistantships and eventually a job as an optical systems engineer once I completed my PhD. In 2015, during my first year of work I was reunited with one of the Akamai instructors Dave Harrington, who joined NSO as a scientist. As a former PDP participant, he encouraged me to participate in PDP because he knew of my interest in supporting Akamai. Since then I have participated in PDP as an inquiry team member and leader for Akamai PREP inquiry activities, a PDP and Akamai staff member and Akamai intern mentor.

I feel indebted to ISEE and Akamai and all the people involved with the programs, they helped me realize my goal of returning home to work. I wanted to become part of that community, to inspire other local students pursuing STEM to find their way. I also hope to continue utilizing my knowledge and training from PDP to make my workplace more diverse, equitable and inclusive.

3.3 Austin Barnes, 2009 Akamai Maui cohort

My first experience with the Institute for Scientist and Engineer Educators (ISEE) was through the Akamai Internship Program in 2009. As an undergraduate studying in the continental U.S., I hoped that majoring in astrophysics would eventually lead me back to my home state of Hawai‘i. Before the Akamai internship, I believed the common misconception that only through majoring in astronomy or marine biology could locals who loved STEM hope to find a science career path within the islands because tourism absolutely dominates the local economy. I cannot remember now how I heard about Akamai — no doubt through word of mouth from an Akamai alum — but its ties directly to astronomy in Hawai‘i, particularly on Maunakea and Haleakalā, were exactly what I was looking for as a way to gain real-world experience in the astronomical field and build community back home. I was honored to be accepted into the program and was placed in Kīhei, Maui, at Oceanit Laboratories in the Maui Research and Technology Park (a branch they have since closed), under the mentorship of Russell Fox and advisors Rita Cognion and Curt Leonard.

I worked on a project to test and fine-tune a data pipeline for Oceanit’s small, deployable telescope system (HANDS) used to track satellites. With my mentor’s help, I created scripts to take in images, identify satellites and calibration stars in order to estimate satellite brightness for identification. I remember how much time Akamai staff spent with each of us to hone our communication skills, and how much that experience transformed how I prepare, practice, and put together presentation materials to this day.

The Akamai program has remained one of the most memorable summer experiences I ever had in my academic career for several reasons. In addition to

learning much more about the vast number of telescopes in use on Maui and Hawai‘i Island, I saw that this industry employs an even greater number of engineers, technicians, and computer scientists than astronomers. Not only that, but it seemed to attract and support technological ventures of all sorts, some closely related, others only tangentially related. This was a revelation for me as someone who had somehow been convinced that STEM-focused locals had to leave for the continental U.S. to find a stimulating job. As Akamai's reputation as an extremely successful internship pairing local students with companies constantly seeking local talent spread, the program welcomed other host organizations like the Natural Energy Laboratory of Hawai‘i Authority (NELHA), opening up an even greater breadth of possibilities in STEM disciplines like biology, chemistry, and ocean sciences. Though the illusion of a lack of local opportunity persists, it is certainly weakening thanks to Akamai.

The other aspect of Akamai that has stayed with me is the inclusive community built and sustained by the program. From the first day of the Akamai preparatory course to this day, I have felt welcomed and supported by Akamai's staff, instructors, mentors, and my fellow alumni. The Akamai staff have intentionally designed the program with equitable and inclusive pedagogy (see Shaw et al., 2022, in this collection), and they also prioritize assisting alumni in pursuing and furthering their career aspirations by circulating and encouraging relevant local job postings and offering professional development opportunities run by ISEE.

Oceanit advisors Rita Cognion (left) and Curt Leonard (right) with Akamai intern Austin Barnes in 2009.

It is as a result of this last point that I ended up participating in ISEE's PDP twice in graduate school which later led to me become an ISEE staff member. When the Akamai program sent me their annual check-in to learn where I had ended up after the program, they invited me to apply for the PDP as a STEM graduate student at the University of Hawai‘i at Mānoa. I had never been interested in teaching, but because I knew the quality of ISEE programs from my Akamai Internship experience, without hesitation I joined the program that has shaped my future even more than Akamai has. The PDP community, which overlaps significantly with that of Akamai, is also one of the most inclusive communities of which I have ever been a part. As a community of practice focused on improving STEM higher-education through equitable and inclusive pedagogy, this work rejuvenated my quickly-waning trust and interest in academia. At PDP, I was equipped with the tools to apply evidence-based research and literature on STEM pedagogy and put it into practice in the same broken academic system I was entering. I can now see that the PDP was a gateway for me to enter much larger discussions about equity both within the U.S. and on the global stage. I now research the inequitable impacts of sea level rise on coastal communities in California, Hawai‘i, and Pacific Island Nations, and use much of the same language and thinking I learned in PDP.

When the chance to put what I had gained in both Akamai and the PDP into practice by managing the Akamai Internship Program and becoming a lead PDP instructor arose, I knew I wanted to pour myself back into these programs that have given me so much. I was privileged and honored to rejoin ISEE as staff for nearly 5 years from 2015 through 2019, and believe my pathway is a testament to how impactful the programs and community created by

ISEE are to those of us fortunate enough to participate in them.

3.4 Devin Chu, 2011 Akamai Hawai‘i Island cohort

Growing up in Hilo, Hawai‘i, I was exposed to astronomy as a young child. I participated in numerous educational community programs throughout my time as a K–12 student, and I began to see astronomy as a way for me to pursue my love of science while also remaining in my community. As I went off to college in the continental US, I made it a personal goal to return home to Hawai‘i as an astronomer.

The Akamai Internship Program was my first connection to ISEE. When I applied to the Akamai Internship Program during my first year of college in 2011, I did not realize how much this program would differ from a typical internship program. My appreciation for Akamai began immediately during the first week of the program at the University of Hawai‘i, Maui College, known as the prep course. For the first time, I was exposed to an inquiry learning activity. I was challenged to formulate an investigation with my team, rather than follow a predetermined set of instructions as done in a typical school laboratory setting. This experience emphasized to me the importance of inquiry in science investigations.

Additionally, I appreciated the intent of the Akamai program to foster my physics identity, which is defined by Hazari et al. 2009 as “how students see themselves in relation to the field of physics based upon both their perceptions of physics and their negotiation and navigation of everyday experiences with physics.” At Akamai, my cohort and I had the amazing opportunity to visit Haleakalā. We toured the Pan-STARRS observatory and got to see different parts of the telescope up close. After touring the telescopes, we took in the Haleakalā’s beauty and awe. Seeing Haleakalā with the rest of Maui and even Hawai‘i Island in the backdrop helped me feel a greater connection of my work to my island home.

Devin Chu working at Gemini observatory (photo credit: Akamai).

This was my first trip to Haleakalā, and it was a very moving experience.

During the prep course at University of Hawai‘i, Maui College, we also did an exercise where we reflected on our names and how we can imagine ourselves in the field of STEM. For this exercise, we had a special guest who was knowledgeable in Hawaiian language and culture. I shared how my family name and middle name came from Chinese-Cantonese and Japanese, respectively. My names are a reflection of my multiethnic background and my family’s history of immigration to Hawai‘i. For my colleagues with Hawaiian names, our guest helped explain the meaning of their names and connections to the land and science. I found this experience incredibly interesting because it emphasized how our individual identities matter in the pursuit of our dreams.

These are examples of how Akamai nurtured my physics identity and made me feel a greater connection to my work and Hawai‘i. I have no doubt that my improved physics identity helped me enjoy my

internship more when I returned to Hilo to work at Gemini Observatory.

I completed my internship with valuable experience and further confidence that I can succeed in STEM. I drew upon my training to continue my education in astronomy and I updated the Akamai Internship Program of my progress. After graduating from Dartmouth College with my degree in physics and astronomy in 2014, I immediately attended a PhD program in astronomy and astrophysics at the University of California, Los Angeles (UCLA). In 2018, the PDP alumni among UCLA graduate students and faculty encouraged me to try out for PDP. I signed up for PDP with their encouragement. After joining PDP, I was assigned to the Akamai Internship Program prep course design team. I was excited to return to the Akamai Internship Program as a design team member and give back to the program that had such an influence on my career development.

During my time in PDP, I learned so much about the importance of inclusive education and backwards design. I also learned about how it's best to design activities with equitable practices in mind. Our team wanted to foster our students' physics identities for our design activity by explaining to the students that their inquiry activity is very similar to real-life scientific investigations. While designing the activity, I could not help but look back at my experience as an Akamai Intern and remember my first exposure to an inquiry activity. The lead up to the Akamai prep course had me very excited to return to the program.

I tremendously enjoyed my time as a design team member at Akamai. It felt so gratifying seeing our design activity take place and interacting with the interns and. In addition to teaching our inquiry activity, it was also rewarding to speak to the interns and share my previous experiences. After the 2018 Akamai Internship Program prep course finished, I knew I wanted to return another year as a design team leader. I felt a strong sense of community and desire to give back. My experience as a design team leader in 2019 was similarly rewarding.

Undoubtedly, the Akamai Internship Program had an immensely positive impact on my development as an astrophysicist. Akamai helped me develop inquiry skills and nurtured my physics identity. I am grateful for my experience as an Akamai intern, and my gratitude motivated me to give back to the program. When the time came to serve as a PDP design team member, I responded with enthusiasm in a large part because of my positive experience as an Akamai intern. Through PDP, I gained greater knowledge of inclusive education and backwards design that further helped me as a scientist. Because of Akamai and PDP, I am the astrophysicist I am today.

4. Conclusion

From the four narratives presented, the Akamai Internship and PDP Programs played a significant role for each participant to remain on the path of pursuing a STEM career. Common themes from the four narratives include: (1) strong desire to have a STEM job in Hawai‘i, (2) passion to give back to our island home, and (3) internships play a key role in reinforcing STEM identity. Of the four panelists, two have gained successful employment in the STEM industry in Hawai‘i. One participant secured a physics faculty position in the University of Hawai‘i system while the other participant is in the STEM industry. The remaining two participants are in graduate and post-graduate programs with strong hopes and desires to return and work in Hawai‘i. Overall, the Akamai experiences provided unforgettable moments that shaped us as STEM professionals which motivated us to return to PDP as instructors. Based on these talk-story narratives, these types of programs helped each participant persist and thrive in STEM.

5. Post-conference panel summary

We presented a panel summary of this paper at the PDP Reunion Conference, held in Hilo, Hawai‘i in May 2020. As discussed in Section 2, we employed a talk story methodology, and each author shared their story before we heard from members of the audience on their perspectives, questions, and reflections. The panel presentations and feedback from audience members made one thing very clear: the coupled impact of Akamai and the PDP on the authors and, somewhat surprisingly, other PDP participants who were not Akamai alumni but taught in the Akamai PREP course has been significant, long-lasting, and is quite unique. The two-strand model in which PDP participants overlap with a venue like Akamai PREP is particularly meaningful when the venue is rooted in place and valued by the participants of that venue. Those who taught in PREP spoke about how special it was to connect with local students who enjoyed and benefited so much from the Akamai program. We believe this is an extremely valuable lesson that can be applied to other internship and professional development programs.

Many members of the panel audience expressed appreciation for the talk story format that not only complemented the essence of this panel paper but also demonstrated an authentic mode of sharing in the diverse cultures of Hawai‘i. The authors appreciate Lisa Hunter and ISEE for creating space for our stories and lessons to be shared and published.

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