

Maximum outreach... minimum budget

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Abstract. Many astronomical institutions have budgetary constraints that prevent them from spending large amounts on public outreach. This is especially true for smaller organizations, such as the Canada-France-Hawaii Telescope (CFHT), where manpower and funding are at a premium. To maximize our impact, we employ unconventional and affordable outreach techniques that underscore our commitment to astronomy education and our local community. We participate in many unique community interactions, ranging from rodeo calf-dressing tournaments to art gallery exhibitions of CFHT images. Further, we have developed many creative methods to communicate complex astronomical concepts to both children and adults, including the use of a modified webcam to teach infrared astronomy and the production of online newsletter for parents, children, and educators. This presentation will discuss the outreach methods CFHT has found most effective in our local schools and our rural community.

Keywords. Outreach, schools, observatories, Hawaii

1. Introduction

The main office of the Canada-France-Hawaii Telescope (CFHT) is located in the rural town of Kamuela, Hawaii. Kamuela is located on the Big Island of Hawaii and boasts a population of approximately 8,000 people. Overall, the Big Island is home to 171,000 people and has a population density of 42 people per square mile (16 per km²). In comparison, the population density of Paris is 64,000 people per square mile (25,000 per km²). CFHT focuses the bulk of its outreach efforts on this tight knit rural community.

CFHT's staff includes approximately 50 full time employees, with one employee devoted half-time to public outreach. Aided by an outreach committee, this person organizes and facilitates the majority of the company's outreach efforts. How does a small organization on a limited budget manage to generate effective outreach in a small community?

The outreach challenges at CFHT are not unique to the organization; rather, everyone working in the field of astronomy outreach shares them. Specifically, these outreach challenges include (1) explaining difficult concepts, (2) connecting with a rural community, (3) communicating the importance of astronomical research and (4) humanizing astronomers and technical staff. To maximize its outreach impact, CFHT employs unconventional and affordable outreach techniques that underscore their commitment to astronomy education and the local community.

2. Challenge 1: Explaining difficult concepts

The first challenge faced is that astronomical concepts can be difficult for the public, especially children, to understand. Very complex phenomena occur in space and astronomers spend years studying highly specific areas. The general public does not have this time. They want to understand the universe, however, they lack the educational

background to fully comprehend the physical processes that occur in space. At CFHT, inexpensive and innovative solutions meet this challenge.

2.1. *Multi-wavelength astronomy*

When CFHT was commissioning the infrared camera, Wircam, the challenge of explaining how Wircam differed from the already existing optical camera, Megacam, arose. The outreach personal and technical staff discovered an interesting option. Off the shelf webcams can be modified to exploit the already existing IR sensitivity of the their detectors. Modification details can be found at the website [wikihow \(www.wikihow.com/Make-a-Webcam-Into-an-Infrared-Camera\)](http://www.wikihow.com/Make-a-Webcam-Into-an-Infrared-Camera).

Once the webcam was modified, it became a regular fixture at CFHT events. The IR webcam was set up on one computer and a regular webcam on a second. Visitors were encouraged to compare ordinary items in both cameras. The most popular item for comparison was a remote control. In the optical camera, the remote seems to emit a small flash of light. In the IR camera, however, the true power of the remote is seen with a large flash of light. With one simple demonstration, the children learned that light existed that they could not see. Once they recognized that simple fact, a new door into the universe opened for them.

2.2. *The solar system*

One of the most highly requested topics for classrooms visits is the solar system. After talking to teachers, CFHT's outreach personal realized that the 1extras' in the solar system – comets and asteroids – were frequently not taught in schools. To supplement the classroom education, CFHT developed a comet and asteroid demonstration.

The demonstration begins with a discussion of comets. After explaining what a comet is, where they are found in the solar system, and their travels around the sun, the “*make your own comet*” demonstration begins. The presenter adds dry ice, dirt, corn syrup, and water to a sealable plastic bag, while explaining each ingredient's significance to the comet. While the “comet” forms, the presenter talks about the size of comets and their tails. The “comet” is finished when the water mixture has frozen around the dry ice, making it safe to touch with bare hands. The comet can be shown to the students and cracked open to demonstrate how the mixture froze around the dry ice core.

Part two of the lesson presents the students with edible meteors. Students are given meteor “samples” which consist of various sweet treats that represent various types of meteors, and pictures of actual meteors. The students are then asked to match the treats with the pictures. For example, a piece of solid chocolate represents a solid iron meteor. Once the students have completed matching the items, the correct answers are given along with an explanation of each meteor type.

2.3. *General solutions for explaining difficult concepts*

CFHT employs an audience-focused approach towards outreach. When classroom visits are requested, CFHT works with the teacher to customize talks for their students. This has lead to talks on the solar system, Hawaiian navigation and the search for extraterrestrial intelligence. Each talk is customized the class, and emphasizes the work that CFHT does in that field.

The CFHT representative who visits the classroom has a policy of answering all student questions that are asked seriously. After spending an hour talking to students, a connection develops. The fastest way to lose that connection and alienate students is to dismiss their questions. Granted, the questions can stray away from the specific topic at hand, but for many students, the visiting scientist is the first scientific expert they



Figure 1. Make your own comet !

have ever met. Answering students' questions provides an enduring link, they will remember the scientist, and occasionally, enthusiastically greet them when seen around the community.

Finally, CFHT provides resources to teachers. Under the watchful eye of the CFHT librarian, a quarterly newsletter entitled *Hoku* (star in Hawaiian) is published[†]. *Hoku* provides information on upcoming CFHT events and sections on special events in the sky and astronomy for the quarter. CFHT also produces coloring books and teacher packets for interested parties.

3. Challenge 2: connecting with the community

The second challenge arises when an organisation, like CFHT, is comprised primarily of employees who are not native residents of the small community where the organization is located. Kamuela is a very close knit community. Many of the residents have lived in the town for long periods of time, some stretching back generations. Outsiders are welcomed, but often kept at an arm's length. How does a company with multi-national ties reach out and become accepted in such a small community?

3.1. Community involvement

The Parker Ranch, one of the largest active cattle ranches in the United States of America, surrounds Kamuela. *Paniolo* (cowboy in Hawaiian) tradition is engrained in the community. While few of the CFHT staff have ranch experience, CFHT participates in a charity event at the annual Parker Ranch rodeo. The CFHT team competes against other community teams in trying to put a shirt on a calf. The team that puts the shirt on the fastest wins. Parker Ranch donates each team's entrance fee to a charity of the winner's choosing.

Another annual Kamuela event is the American Cancer Society Relay for Life fundraiser. The Relay for Life is a twelve hour walk-a-thon in support of cancer research and survivor services. Teams raise money for donation to the Hawaii chapter of the American Cancer

[†] see www.cfht.hawaii.edu/Reference/Library/hoku



Figure 2. The CFHT rodeo team in action.

Society. The presence of the CFHT team demonstrates to the Kamuela community that CFHT is committed to more than just astronomy.

3.2. *General solutions for community connection*

While neither of the above events directly relate to astronomy, CFHT strives to be a good neighbor. The organisation has learned to be charitable – offering tours of the telescope facility to raise money for local charities. CFHT schedules their yearly star party in conjunction with the community Christmas parade to support the parade efforts. CFHT staff participates in school events, ranging from judging science fairs to appearing at career day. CFHT's seemingly small efforts have had a huge impact on its recognition in and connection to the community.

4. Challenge 3: why astronomy?

People everywhere are conscious of the financial cost of science. Almost every science story in the media details the price of the instrument or the research. Despite this focus on the price tag, very little discussion occurs regarding what scientists actually do. The challenge becomes explaining why astronomy is important, and what do astronomers actually do.

4.1. *CFHT's images*

Thanks to the Hubble Space Telescope, for a generation, the general public has been regularly exposed to the beauty of space. CFHT is unique in the fact that telescope time is scheduled for publicity images. When the weather conditions are not optimal for science, the nighttime observing staff takes images on fields chosen for their aesthetics. These images are chosen by Jean-Charles Cullianne, one of CFHT's astronomers, and then turned into the famous CFHT *Hawaiian Starlight Calendar*. The calendar is produced yearly and sold at cost to the public.

The calendar images have found themselves expanded into other forms. CFHT creates custom bookmarks and stickers created from calendar images. These products are given to visitors and students. For the International Year of Astronomy, several images were printed on 5 inch \times 5 inch canvas and framed. These pictures were displayed in art exhibits and educational institutions around the world.



Figure 3. Kids admiring *Hawaiian starlight*.

Dr. Cuillandre has also used the CFHT images in combination with his own images of Mauna Kea to produce the film *Hawaiian Starlight*. *Hawaiian Starlight* displays, through time lapse photography, ever changing views of Mauna Kea. At several points, the film leaves Earth and flashes to views of the universe. The film has been shown around the world and has won an award at a film festival.

4.2. *General suggestions on explaining the importance of astronomy*

While astronomy images are one of the best ways to communicate astronomy's importance to the public, the creation of such images can be expensive. CFHT also developed many low cost solutions to engage people in astronomy.

CFHT provides tours of the telescope and Kamuela offices to educational groups. These tours allow students to see how a telescope works. Because the hostile environment at the summit of Mauna Kea prevents children under the age of 16 from visiting the telescope, CFHT opens its remote observing room on occasion to allow those visitors the opportunity to experience the summit.

5. Challenge 4: debunking astronomer stereotypes

The specter of Einstein haunts scientists and is used by the public as the criteria of what a scientist looks like and how they act. How can astronomers and technical staff be humanized rather than stereotyped? CFHT found that the best way to show that astronomers have personality is to highlight their passions. Nothing captures an audience more than an involved and enthusiastic speaker.

For example, two members of CFHT formed a robot club for interested community members because they wanted to share their love for building robots. Other staff members were among the charter members of the West Hawaii Astronomy Club because they wanted to share their passion for amateur astronomy.

Other ways in which CFHT staff shares their enthusiasm with the community include baking custom designed cookies in the shape of the CFHT dome. Additionally, CFHT logo balloons make appearance at events and are given away to children. While astronomy is not directly related to any of these items, they all encourage the public to see the CFHT staff as a collection of individuals, rather than a single stereotype.

Finally, the topic of women in science is close to the hearts of many at CFHT. Female CFHT staff members participate in several events each year targeted at middle school girls encouraging them to pursue careers in science. The clearest way to show young girls that women can work in science is for them to see women working in science. Young girls gain a sense of empowerment when they see a female scientist walk into a classroom.

6. Summary

In conclusion, budget is not the beginning and end of effective outreach. CFHT has found that by applying the following five principles, successful outreach can be achieved on any budget:

- Focus on the needs of the audience rather than the desire of the speaker;
- Take an interest in local events;
- Show the community what astronomers do;
- Establish that astronomy can be fun – astronomers and engineers are people too;
- Realize that imagination and time, not budget are the ultimate limitations.