

Live Interactive Virtual Explorations provide students with glimpse of life at the Old Point Loma Lighthouse in the late 1800s

By Kimberly Bruch, Hans-Werner Braun, and Susan Teel

LIVE INTERACTIVE VIRTUAL

Explorations (LIVE) uses video conferencing software and wireless technology to connect hard-to-reach science and cultural resource sites, such as Cabrillo National Monument in San Diego, to students across the country. A LIVE pilot project was first implemented in 2006 at Cabrillo in partnership with the High Performance Wireless Research and Education Network (HPWREN), which is funded by the National Science Foundation. LIVE programs focus on three objectives: (1) exploration and understanding of hard-to-reach science and living history sites, (2) provision of a medium for traditionally underserved students and other students who do not have transportation to access sites in the National Park System, and (3) preparation of students going on fieldtrips to such sites.

For several years, the LIVE project team, which consists of researchers from HPWREN, San Diego State University, and the Southern California Research Learning Center, has worked with National Park Service (NPS) staff to experiment with ways in which distance learning projects like LIVE can assist park sites in connecting youth to America's great outdoors and promote participation in science, technology, engineering, and mathematics—(STEM) based activities on federal lands. The LIVE project team has collaborated with staff at Cabrillo National Monument to integrate the LIVE technology with best practice interpretive techniques and experiment with various combinations of equipment. LIVE equipment, including the LIVE backpack (fig. 1, next page),

Abstract

Many national parks are participating in Live Interactive Virtual Explorations (LIVE), which uses video conferencing software and wireless technology to connect hard-to-reach science and history sites, such as Cabrillo National Monument in San Diego, to students across the country. A LIVE pilot project was first implemented in 2006 at Cabrillo in partnership with the High Performance Wireless Research and Education Network (HPWREN), which is funded by National Science Foundation. LIVE programs focus on three objectives: (1) exploration and understanding of hard-to-reach science and cultural sites, (2) provision of a medium for traditionally underserved students and other students who do not have transportation to access sites in the National Park System, and (3) preparation of students going on fieldtrips to such sites. LIVE broadcasts enable National Park Service scientists and historians to share science and educational information remotely with people who are otherwise unable to visit the site. This article explores a LIVE activity between Cabrillo National Monument's Old Point Loma Lighthouse and a third-grade classroom.

Keywords

Cabrillo National Monument, distance learning, Old Point Loma Lighthouse

allows NPS scientists and historians at the park to remotely share science and educational information with people who are otherwise unable to visit the site in person. Worn by the presenter, the LIVE backpack holds a laptop computer, which is configured to wirelessly connect to the Internet, a camcorder, and a head set. This arrangement allows the presenter untethered freedom of movement in the field.

On 15 November 2011 the LIVE team worked with NPS interpreter Emily Floyd and eight-year-old student and NPS volunteer Elizabeth Bruch on a pilot LIVE activity that connected 17 third graders at a San Diego elementary school to the Old Point Loma Lighthouse at Cabrillo National Monument (fig. 2, page 25). An Apple iPad2 with an internal microphone and camera was deployed at the lighthouse while the school used an Apple MacBook-

Pro; the Internet-based video conferencing freeware Skype served as the software interface for this activity. Both the school and the park sites were equipped with broadband connections, thus facilitating the video conference at VHS quality. Specifically, the lighthouse connected to the HPWREN while the school connected to their district's broadband connection.

Prior to LIVE activities, students were given print materials related to the Old Point Loma Lighthouse, including a photograph of the site, a map depicting their school's location in relation to the lighthouse, and an image showing the various rooms inside the lighthouse. The students were also given a small container of heavy whipping cream, which their teacher explained would be used during the LIVE activity. As the program began the students were welcomed to the lighthouse by their

classmate Elizabeth who was dressed in period clothing and situated in front of the lighthouse (fig. 2; additional photos can be found at <http://www.signonsandiego.com/photos/galleries/2011/nov/15/point-loma-lighthouse-156-birthday/>). Park Ranger Emily (also dressed in period clothing) asked how many students had been to the lighthouse; several raised their hands and shouted “yes!” Park Ranger Emily then gave an overview of the lifestyle of a lighthouse keeper and his family during the 1880s and answered a few questions posed by the students. After Emily explained the layout of the lighthouse, the children were led, via LIVE, into the kitchen and given a glimpse of a butter churn. At this juncture the students were instructed to start shaking their cream to make their own butter in the classroom—just as cream was churned into butter in the 1800s!

While the children in the classroom were shaking their cream, Emily and Elizabeth continued the tour of the lighthouse, showing the students the living room. The children asked questions such as “What did children do for fun?” “Elizabeth, where are your glasses?” And “Elizabeth, why do you have twine in your pigtails instead of your usual ponytail holders?” The answers provided by Ranger Emily fascinated the children who were especially intrigued by the fact that children of the 1800s jumped rope just as they do, but were quite surprised that not everyone who needed glasses was able to wear them, as spectacles were a privilege in this era. Additionally, the third graders were interested in learning how Elizabeth got to be a volunteer for the National Park Service at the Old Point Loma Lighthouse while they were in their classroom. By this time the cream that the children had been shaking turned into butter and was then enjoyed as a classroom snack with saltine crackers following the LIVE activity.

Overall the LIVE program was well received by the students, although the



Figure 1. Untethered and free to move about, a ranger at Cabrillo National Monument investigates a tidepool along with her off-site audience during a LIVE presentation. The backpack holds a laptop computer that is configured to connect wirelessly to the Internet while transmitting video in real time from the handheld camcorder and commentary from the head set.

teacher reported that the video appeared choppy at times and the audio was delayed and degraded by interference from strong wind at the park. These problems were likely caused by the addition of unrelated multiple users of the broadband connections at the school, which reduced available bandwidth resulting in audio latency. The majority of the students agreed that the LIVE activity had prompted them to ask their parents to take them on a fieldtrip to the lighthouse.

Natural resource uses of LIVE

LIVE activities are not restricted to school programs, but can also be designed for many other applications. For example, scientists at Cabrillo National Monu-

ment use the LIVE programming to share real-time images with university students studying the park environment who are unable to travel to the southern California coastline. Another application of the LIVE technology is used by geologists at Mammoth Cave National Park in Kentucky where DSL-connected laptops equipped with videoconferencing software are used to share their experiences studying the world's longest cave system with education and research communities throughout the United States. Yet another example of LIVE activities is demonstrated at Biscayne National Park, Florida: scientists, archaeologists, and interpreters located at the park's Atlantic coast visitor center have broadcast to audiences at scientific confer-



Figure 2. Volunteer Elizabeth Bruch, dressed in period clothing, participated in the LIVE activity along with an interpretive ranger at the Point Loma Lighthouse.

ences, as well as to Cabrillo National Monument visitor center in order to compare the coastal ecology of parks on the Atlantic and Pacific coasts. LIVE has also been used for “Science lectures from the field” where NPS natural resource staffs at parks discuss science and monitoring subject matter with graduate students or faculty at universities.

Park staff who are interested in learning more about the LIVE activities can attend workshops offered annually by the National Park Service and HPWREN. These workshops take place at various national park sites and include detailed instruction on how to use the LIVE backpacks, host LIVE activities, and install basic wireless (Wi-Fi) systems in parks. The workshops also include a module outlining propos-

als for entry into Project Management Information System (PMIS) to fund LIVE programs that directly benefit visitors. Announcement of the LIVE workshops and materials from previous workshops can be found on the Sea to Shining Sea LIVE Web site at <http://seatoshiningsea.org/news.html>.

Acknowledgments

This article is a contribution of the High Performance Wireless Research and Education Network, funded by the National Science Foundation (Grant Numbers 0087344, 0426879 and 0944131), and the University of California, San Diego. The Live Interactive Virtual Explorations project is also funded by the National Park Service with assistance provided by staff at Cabrillo National Monument and the Southern California Research Learning Center. San Diego State University Field Stations Program staff is instrumental in the development and evolution of LIVE.

About the authors

Kimberly Mann Bruch is with Communications and Outreach at HPWREN, University of California–San Diego (UCSD), San Diego Super Computer Center, 9500 Gilman Drive #0505, La Jolla 92093-0505. She can be reached at kbruch@ucsd.edu. **Hans-Werner Braun** is the principal investigator of HPWREN, UCSD, San Diego Super Computer Center and can be reached at hwb@ucsd.edu.

Susan Teel is director of the NPS Southern California Research Learning Center, 401 West Hillcrest Drive, Thousand Oaks 91360.