

Chapter 16

Live Interactive Virtual Explorations via the High Performance Wireless Research and Education Network

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ABSTRACT

Researchers affiliated with the National Science Foundation funded High Performance Wireless Research and Education Network (HPWREN), are conducting case studies and facilitating technology transfer activities that enable Live Interactive Virtual Explorations (LIVE) between hard-to-reach science sites and an array of education communities. This chapter discusses lessons learned – both technological and pedagogical – during a longitudinal study of HPWREN LIVE case studies and technology transfer activities.

BACKGROUND AND HISTORY OF LIVE INTERACTIVE VIRTUAL EXPLORATIONS

Though Live Interactive Virtual Explorations (LIVE) were not coined such until 2007, researchers with the National Science Foundation funded High Performance Wireless Research and Educa-

tion Network (HPWREN) began experiments with real-time distance learning activities in 2001. The first activity occurred between the office of the HPWREN principal investigator and a computer laboratory at the Pala Native American Learning Center. Facilitated by the HPWREN team, this 2001 activity occurred during a semester-long community college class taught by an HPWREN researcher via collaboration with Palomar College. The Computer Science and Information Systems

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course introduced tribal members to computer and Internet fundamentals as well as multicast technology. While the course was primarily taught in a traditional classroom format, the real-time video/audio experiments occurred a few times during the semester and allowed researchers to better understand the current state of multicast across low-cost wireless access links. These early experiments included the use of vic, a multicast video tool, and rat, an audio tool. Meanwhile, Blackboard was the browser interface used for all class lecture presentations, assignments, and online discussions. The 2001 experiments did not continue into 2002, as both video and audio were consistently very choppy due to packet losses on the network infrastructure, which has subsequently been addressed with equipment upgrades.

A couple of years later, the researchers started experiments again with an IP-based conferencing product (Polycom) across the network. One such test occurred in March 2003 between a hard-to-reach site within Anza-Borrego Desert State Park and a conference in urban Irvine (California). Specifically, teachers attending the National Teacher Training Institute Conference participated in an underwater tour of Crystal Cove State Park and examined fossilized oyster beds in nearby Fish Creek – while sitting in a conference room about 100 miles away. The remote interactive presentations utilized Polycom software for both video and audio while the hardware setup at Fish Creek utilized a tripod-mounted four-foot antenna pointing to an HPWREN node atop a nearby mountaintop. This node connects to several additional mountaintop nodes ending up at the HPWREN originating node at the San Diego Supercomputer Center at the University of California – San Diego.

This March 2003 activity was evaluated with the use of informal Likert-scale pre- and post-surveys, which were distributed to participants. The respondents answered questions that measured compatibility, complexity, relative advantage, and adoption. The analysis of responses and quantification of variables is based upon prior research

conducted by Rogers (1995), Valente (1996), Rice and Gattiker (2001), and Bruch (2002).

The survey respondents consisted of 13 elementary school teachers and two principals from southern California. Results from these surveys are as follows:

Compatibility Perceptions

Among pre-survey respondents, only 30 percent agree that the distance learning activity is compatible with their curricula while post-survey results increased to 85 percent. Likewise, 62 percent of pre-survey respondents agree that the activity meets their teaching needs while 85 percent of post-survey respondents agree.

Complexity Perceptions

Among both pre-survey and post-survey respondents, 39 percent agree that the activity requires too much technological knowledge. Similarly, before the activity, 46 percent agreed that technical assistance would be required to participate in a LIVE activity while 61 percent agreed after the activity.

Relative Advantage Perceptions

Among pre-survey respondents, 69 percent agree that the activities will improve teaching efforts while 100 percent of the post-survey respondents agree. Likewise, 92 percent agreed that the activities will allow for better information dissemination and 100 percent of the post-survey respondents agree.

Adoption

Among pre-survey respondents, 39 percent agree that they will use the technology in future classes; this number increased to 54 percent with the post-surveys. Before the activity, 85 percent agree that

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