

MARSFEST Workshop Evaluation and Outcomes. A. J. Shaner¹, S. R. Buxner¹, J. M. Keller², C. Bitter¹, ¹Lunar and Planetary Laboratory, University of Arizona, Tucson, AZ 85721 (ashaner@lpl.arizona.edu), ²Physics Department, Cal Poly San Luis Obsipo, SLO, CA 93407 (jmkeller@calpoly.edu)

Introduction: The Phoenix Education and Public Outreach (E/PO) program supports national reform standards for the professional development of educators. As scientific and technological advances occur, teachers' understanding of those advances must maintain pace in order to effectively facilitate student learning. The guiding philosophy of the workshop was to investigate in Alaska the types of science questions the Phoenix Mars Lander mission will attempt to study: the history of water at the site (including clues regarding its origin and evidence for past episodic liquid water), characterize soil characteristics and habitability, measure current polar atmospheric conditions, and search for evidence for climate change on Mars. Fairbanks, AK and surrounding areas were used as a setting for teachers to conduct investigations using instruments similar to those aboard the Phoenix Lander. Following the workshop, teachers became liaisons for the Phoenix E/PO team to educators, students, and the public in their home communities. Educational video materials will be disseminated to allow students and the public to better relate Phoenix surface science investigations on Mars to the film footage of teachers studying similar questions in Alaska.

Evaluation: The goals of the MARSFEST evaluation were to 1) provide the workshop planners with daily feedback from participants regarding the daily progression of the workshop, 2) determine what changes, if any, participants had in their understanding of Earth/Mars science, including Phoenix mission and 2001 Mars Odyssey GRS science, and 3) determine what changes, if any, participants had in their understanding of inquiry teaching. A longitudinal 5-year study is currently being conducted to investigate changes occurring in participants teaching in the year following the workshop.

Evaluation Instruments: Each day concluded with a Likert-scale survey eliciting participants' attitudes towards the day's activities. "Gots, Needs, Comments, and Concerns", were also included on this survey. This survey allowed participants to demonstrate knowledge learned that day (Gots) as well as any information they felt they missed or was not presented (Needs). This survey was also used to address any comments or concerns the participants had about the workshop in general (Comments and Concerns). A 12-item pedagogy survey was developed by the evaluation team and distributed to participants before arriving in Alaska, at the end of the workshop, and will be administered again 12 months after the workshop. These

surveys were meant to measure participants' perceptions of their effectiveness in teaching inquiry-based science, how the workshop affected the way they plan to teach, and how they perceive their science teaching has changed over the twelve months following the workshop. Items for the survey were based off of selected indicators of inquiry science teaching found in the National Research Council's (NRC) National Science Education Standards. A six-item content survey was developed to measure gains in the participants' knowledge of the science presented by workshop scientists as well as from presented curricular materials.

Participants were also asked to reflect on their experiences over the course of the workshop. Participants were given prompts and were to reflect on specific questions given to them in reflection journals. The journal prompts asked them to reflect on: 1) how their experiences over the past two days affected their understanding of the scientific process and/or how scientists learn about Earth and Mars, 2) any revelations and frustrations they had experienced related to their investigation(s) they had conducted, 3) how they would use the past two days' experiences in their classroom and in a professional development setting, and 4) which two experiences over the past two days had been the most useful and why. Finally, at the end of the workshop, participants were given a Likert-scale survey which lists all 28 inquiry teaching standards found in the NRC standards. This survey asked participants to rate to what extent they felt the workshop modeled each of the indicators for inquiry teaching. Because some of the indicators were not emphasized as much as others, or were not modeled at all, low scores were expected for such items.

Results: Results of daily evaluations showed that overall, the teachers recognized that workshop was modeling inquiry and that they were being asked to go through varying levels and degrees of the process from a simple activity of planning a mission to a complete investigation of their own from their original research question through reporting to the community about their findings. Results of the pre-workshop pedagogy survey showed that participants came into the workshop feeling confident about their abilities to teach inquiry science. Post-workshop survey results indicate the workshop helped to reinforce this confidence. Results of the content survey showed that participants increased in their understanding of Earth/Mars science as well as science from both the 2001 Mars Odyssey and Phoenix missions.

Qualitative analysis of the participants' journal reflections reinforced the results of the content surveys and reflected excitement and revelations from the participants' experiences. Participants' discussions included their new understanding of Mars science including the exploration of Mars, their revelations of what science is and how it is done, and what they should be doing different in their classrooms and professional development settings.

Future Evaluation: In addition to a 1-year post workshop pedagogy survey, select teachers will be interviewed over the next four years to evaluate the long term-impact of the 2006 workshop as well as follow-up support of teachers.

Additional Information: If you have any questions or would like additional information regarding the MARSFEST evaluation contact Andy Shaner at 520-626-9661 (or email at ashaner@lpl.arizona.edu).