LESSONS FROM A TRAIN-THE-TRAINER PROFESSIONAL DEVELOPMENT PROGRAM. C. Shupla¹, A. Gladney², S. Shipp³, J. Truxillo³, H. Dalton¹, K. LaConte¹, ¹Lunar and Planetary Institute (3600 Bay Area Blvd, Houston, TX 77058, shupla@lpi.usra.edu), ²Research Institute of Texas, Harris County Department of Education (6300 Irvington Blvd., Houston, TX 77022, agladney@hcde-texas.org).

Introduction: The Sustainable Trainer Engagement Program (STEP) is a modified train-the-trainer professional development program being conducted by the Lunar and Planetary Institute (LPI). STEP has provided two cohorts of 6-8th grade science specialists and lead teachers in the Houston region with in-depth Earth and Space Science (ESS) content, activities, and pedagogy over 15 days each, aligned with Texas ESS standards. STEP leaders have and are continuing to assist the participants in presenting workshops to other teachers. Scientist mentors assist with participants’ efforts. This effort began in 2012, funded through a NASA SMD EPOESS grant; there are a variety of lessons learned to date.

Project Objectives: This project has two overarching goals: to improve middle school instruction in ESS; and to create and test an innovative model for Train-the-Trainer. In order to meet these goals, STEP is: 1) Increasing the ESS knowledge and pedagogy, and skills and confidence in providing professional development of middle school science specialists and lead teachers; 2) Integrating local scientists into the project as mentors to the teachers; 3) Supporting teachers in implementing workshops for the teachers they are responsible for advising; and 4) Determining elements of success, through ongoing and longitudinal evaluation, for replicating the effort in the future and informing other projects that may adopt the model.

Mechanisms: While providing initial professional development in specific ESS topics, STEP incorporated discussions of how to conduct the content-rich activities in a classroom, how to engage the students in the content, and how to present the topics to teachers in workshops. Participants analyzed and discussed best practices in professional development, shared how they already mentor and work with other teachers at their schools and districts, and ways that they have modified activities. STEP also included presentations by scientist mentors, and opportunities to chat live and virtually, over lunch, online, and during evening receptions.

A few participants worked in pairs to implement and share content and activities with other teachers in their districts; most had difficulty doing so, due to institutional limitations and time limitations. In order to facilitate their ability to practice conducting workshops, LPI organized a variety of workshops to be conducted through the Harris County Department of Education (HCDE), and invited STEP participants to assist in planning and conducting these workshops. STEP also provided funding for participants to attend and present workshops at the Conference for the Advancement of Science Teaching (CAST), and held day-long meetings specifically for planning these workshops and for follow-up discussions after.

Main findings to date: While there were many participant expectations (such as limited ESS knowledge of science teachers, a great need to focus on topics tied to the state science standards, and time limitations) there were other unexpected findings worth sharing.

Leaders in science education may not be confident in presenting ESS professional development. Many STEP participants were uncomfortable with leading workshops initially, but through STEP professional development and particularly through opportunities to present jointly with others, their confidence increased. (See Evaluation of STEP.)

Arranging for school or district content-specific professional development can be difficult. Most STEP participants are comfortable with sharing activities and resources with teachers, but many are limited at the school and district level in their ability to conduct professional development. Several STEP participants were able to arrange for district professional development time to be spent specifically on ESS content, but most were not able to do so. Often, participants still wanted to assist in presenting workshops through other venues.

School and district professional development sessions are usually short. Due to both limited time and the great need to cover a variety of topics, most of the STEP workshops offered at districts were 1-3 hours, some with multiple topics addressed within that period. Some STEP participants shared content and activities with other teachers during informal meetings after school. Only one of the district workshops held a full
day devoted to a single topic. This limited the ability of the attendees to delve deeply into content or assessments of content; the primary focus was on sharing effective activities that address the content.

Educators are unsure how to best work with scientists. Participants were unsure how to best work with scientist mentors, despite multiple opportunities to interact and plan with scientist mentors. If a scientist had developed an effective classroom activity, participants were much more likely to invite him to present during the workshop. Participants were much more likely to invite the scientists to mentor or speak to their students than to assist in planning professional development.

Educators value in-person meetings over short teleconferences. Participants found it very difficult to set aside time for short after-school and evening teleconferences, intended to enable them to share their classroom and professional development experiences, to gain deeper insight into the science content, and to plan workshops together. More participants were able to attend additional meeting days (offered on both weekdays and weekends) than were able to attend after-school teleconferences, which were offered repeatedly.

Program Achievements:

Professional development for STEP participants: STEP provided 15 days of thematic workshops for each cohort, and several additional follow-up workshops to extend participants opportunities to interact, plan, network, and clarify their understanding. STEP also held four evening receptions for additional opportunities for participants to network with scientists and each other, held at Rice University, the University of Houston, and at the National Weather Service station.

STEP compiled content and activities for each of the Texas ESS middle school standards. Activities, powerpoints, and assessment tools were developed (with input from STEP participants) for 14 topics. All materials are freely available online both for the participants but also for them to share with other educators, at www.lpi.usra.edu/education/step2012/participant.

Workshops conducted by STEP participants: From late 2012 through 2014, STEP participants conducted 35 workshops for approximately 1,630 science teachers in Texas. Professional development trainings were conducted at HCDE, Aldine ISD, Pasadena ISD, Santa Fe ISD, the CAST conference, Deer Park ISD, and LPI. Topics ranged from characteristics of the universe to weather and climatic interactions, and included solar system, plate tectonics, lunar phases, seasons, topography, and tides. Additional 2015 workshops by STEP participants are being planned for Pasadena ISD, Cy-Fair ISD, CAST, and HCDE.

Evaluation of STEP: STEP evaluation is being conducted by an external evaluation team at the Research Institute of Texas, part of the Harris County Department of Education. Evaluation tools include participant surveys after each workshop, annual content knowledge tests, focus group discussions, annual surveys measuring educator attitudes towards teaching ESS, surveys of STEP participant use of activities, surveys of STEP participants and scientist mentors regarding their interactions, and surveys of teachers after attending workshops conducted by STEP participants.

Evaluation shows an increase after one year in STEP participants’ knowledge (cohort 1 showed a 10% increase; cohort 2 showed a 20% increase), confidence in preparing other teachers to teach Earth and Space Science showed a 41% increase (cohort 1) and a 44% increase (cohort 2); and confidence in having the skill level to prepare other teachers showed a 29% increase (cohort 1) and a 47% increase (cohort 2).

Surveys of teachers attending professional development conducted by STEP participants shows very positive responses, with averages of workshops at 2013 CAST as 3.46 on a 4 point scale, workshops at HCDE ranging from 4.1 to 5.0 on a 5 point scale. Workshop results from 2014 CAST and recent HCDE workshops appearing even stronger than earlier workshops.

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For More Information: Please go to the STEP homepage (www.lpi.usra.edu/education/step2012/) or contact PI Christine Shupla at shupla@lpi.usra.edu.