EXPLORING THE SOLAR SYSTEM TEACHER WORKSHOP: LESSONS
LEARNED AND TEACHER PLANS. M.M. Lindstrom, J.S. Allen, C.C. Allen, G. Eskridge,
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Organization. In June 1995 JSC planetary scientists conducted a three week teacher
workshop on “Exploring the Solar System (Ex SS)” [1] as part of the NASA Science Teacher
Enhancement Program (STEP). The scientists were assisted by the JSC education branch and
two lead teachers who had previously helped develop the meteorite educational activities [2].
Additional support was provided by the Lunar and Planetary Institute, Space Center Houston,
and the University of Houston, Clear Lake. Funding for the workshop which included teacher
stipends and tuition for 3 hours college credit at UHCL came primarily from the STEP at NASA
headquarters education office, with limited support for exploration activities from code SX.

Participants. Attendees for the workshop were 20 middle school teachers selected as
interdisciplinary teams representing four local school districts from urban, suburban, and rural
areas. Because of the requirement that each team have at least one science teacher and one non-
science teacher, the distribution of teachers was approximately equally between science, math
(and computers), and non-technical (English, social studies, art, PE). This interdisciplinary
nature was designed to foster development of multi-faceted units and was nurtured by the two
lead teachers who represented science and English. Some teams were all from the same school,
other teams represented several schools.

Content. The outline for the workshop was presented last year [1] and is only summarized
here. The five main topics were Astronomy, the Solar System, the Moon, Meteorites, and Mars.
Each topic began with basic astronomical or geologic observations and proceeded to more detailed
petrologic or geochemical measurements and concluded with future exploration. Each sub-topic
consisted of a mixture of expert talks, laboratory experiences, and hands-on classroom activities
from NASA educational materials. The lab visits were not simply tours, rather they were
simulated exercises that allowed teachers to experience how we collect data and how we use data
in mapping, experimental petrology, age dating, and identifying a basalt’s parent body.

The teachers were given large binders full of background information and classroom activities
as well as posters, videos and CD-ROMs. Each team was expected to produce a plan to use
these materials and the workshop experiences in their classes and also for training other teachers.

Evaluation and Teacher Plans Response to the workshop was extremely positive. The
energy level in the classroom was exciting. Evaluations were distributed several times during the
workshop allowing for readjustments in real time. The only negative comments were "too much-
too fast", but when asked what to eliminate, they still wanted everything to remain.

The four teams developed very different plans for implementation in the classroom. The
complexity of the plans varied with teachers experiences. The first plan was a week long focus
on scientific measurement and observation with the range in theme from molecules to planets.
The second plan was a 2 week unit on the planets which incorporated planetary geology and
geologic samples as well as astronomy. The third plan was a 6 week unit for 6th graders on a
mission to the moon. It included astronaut training in physical education, technology, and
science. Additional units on meteorites and Mars are planned for 7th and 8th grade in subsequent
years. The fourth and most complex plan is using meteorites as the theme for the entire year of
8th grade science. Meteorites are used as a connecting thread in teaching astronomy, geology,
chemistry, physics, biology and are utilized in the teaching of social studies, English, math, and
computers as well.
The four plans have been implemented to some extent during the fall semester, but not with the full planned detail because of schedule or administrative problems. Reluctance on the part of administrators and new teachers to using this plan is centered around mandatory teaching of essential elements and lack of time available to teach supplemental topics.

Lessons Learned
1. Interdisciplinary planning was great, there were many creative ideas and activities put forward. However, the theme and activities may be difficult to implement when teams are back in school where support may not be adequate from administrators and teachers unfamiliar with the project.
2. Any presentation of the Ex SS activities must have an emphasis on processes that relate directly to Earth so that teachers may teach to the standardized curriculum and tests.
3. It was challenging but valuable to bring 20 teachers into specialized curation, geochemistry, and petrology labs. Teachers were able to learn firsthand how we collect and use data. Also, scientists gained a better understanding of how to interact with the public.
4. The use of computers for the Internet and CD-ROMs is highly variable in schools. Many teachers and students do not have equipment or time to access this technology.

The Ex SS workshop was a highly successful educator program at JSC which could be used at other NASA centers or university geology departments. The NASA materials are available to all scientists and the outline is easily modified to highlight local specialties. The workshop was rewarding for teachers and scientists alike and we now have 20 teachers who support space exploration and will have students write Congress to encourage future exploration. Activities from the summer workshop have been presented by teachers at 2 regional meetings, GSA Ex SS and regional NSTA to enthusiastic audiences.