PROJECT ARTIST: INTEGRATING ASTRONOMY AND PLANETARY SCIENCES INTO THE ELEMENTARY AND MIDDLE SCHOOL CURRICULUM; Larry A. Lebofsky, Lunar and Planetary Laboratory, University of Arizona 85721 and Nancy R. Lebofsky, Steward Observatory, University of Arizona, Tucson, Arizona 85721

Scientists from the University of Arizona and teachers from southern Arizona are collaborating on ways to make astronomy and planetary science ("space science") accessible and interesting to children from diverse backgrounds at both the elementary and middle school levels. Programs which offer instruction in space science through hands-on experiences, integrated curriculum, and translated materials are described below and will be presented in the session.

In elementary school, science is a subject that is often neglected by teachers for a variety of reasons. In particular, the demands of the basic "reading, writing, and arithmetic" can consume the entire school day leaving little or no time for science. Therefore, in order to teach science, science must be integrated into the existing school curriculum.

Space science can be used to introduce students to the natural world which is a part of their lives. Even children in an urban environment are aware of such phenomena as day and night, shadows, and the seasons. It is a science that transcends cultures, has been prominent in the news in recent years, and can generate excitement in young minds as no other science can. Space science also provides a useful tool for understanding other sciences and mathematics, and for developing problem solving skills which are important in our technological world.

Over the past five years we have been conducting a series of workshops for elementary and middle school teachers from Southern Arizona. Our workshops have included one-day workshops for bilingual teachers, two-day aerospace workshops, and one-, two-, and four-week workshops in space sciences.

One of our current programs is Project ARTIST (Astronomy-Related Teacher Inservice Training), which started out as a two-week pilot workshop in 1990. Project ARTIST is now a four-year program of workshops and materials development funded by the National Science Foundation Teacher Enhancement program. ARTIST provided four-week workshops 48 teachers of grades K-8 from schools throughout Pima County. The workshop stressed hands-on activities and experiments, while providing instruction in space science content and concepts. ARTIST also encouraged the use of space science materials across the curriculum. In fact, several teacher "teams" attended the workshop. One more summer workshop will accommodate 24 teachers in 1995 under current funding.

ARTIST staff members were assisted in both the planning and presentation of the workshops by approximately 20 facilitators, i.e., classroom teachers who had attended previous ARTIST workshops and had been using space science materials in their classes. A TUSD curriculum specialist was added to the team during the planning stages, and amateur astronomer David Levy was added to the staff in 1993. Of the over 60 ARTIST participants and facilitators more than 40 are women, 13 are Hispanic, over 20 teach in schools with large minority populations, more than 10 teach in bilingual or limited Eng-
lish proficiency classrooms, one is a bilingual special education teacher, one is a teacher of
gifted students, and two teach on reservations. Therefore, the student population affected
by these teachers’ new skills and knowledge is very broadbased, including students from
groups traditionally underrepresented in the sciences.

Project ARTIST seems to work well because of its partnership approach. Research
scientists provide content, planetarium personnel emphasize concepts, and facilitators
put activities in the context of the classroom. Primary, intermediate, and middle school
teachers bring a diversity of experiences and methodologies to the program, enhanced
by the special insights of bilingual, ESL, gifted, and special ed teachers. Amateur astron-
omers and guest staff provide unique experiences in observational astronomy and
planetary surfaces. Mutual respect by each component for the professionalism of every
other component allows everyone involved to learn from each other.

Project ARTIST provided funds for 20 facilitators to attend the National Science
Teachers Association regional and national conventions in Kansas City, Anaheim, Min-
nepolis, and Las Vegas. The facilitators assisted project staff in presenting 11 one-hour
hands-on workshops and two four-hour short courses at these meetings. Facilitators and
workshop participants have also attended the Arizona Science Teachers Association con-
ventions in 1993 and 1994, as well as the 1994 ASP meeting, presenting several hands-on
activities during five one-hour workshops attended by over 200 teachers.

In addition to providing the audiences with information and activities, the ARTIST
teachers benefited from peer interaction, the empowering experience of being a leader,
and, for many, their first attendance at a state or national conference.

In addition to ARTIST, our Eisenhower-funded Project ACCESS! (All Children
Can Explore the Solar System) provides space science content, concepts, and classroom
activities for 40 K–5 teachers from Pima County. ACCESS provides inservice workshops
on two thematic units (Earth, Sun, and Moon in Space and Stars and Constellations),
plus an assessment session after the teachers have applied the activities and content in
their classrooms.

At this meeting we will present a variety of materials from the workshops, activities
developed by the workshop participants, and materials produced by the students of
the workshop participants. This presentation will stress the integration of science with
language arts, fine arts, math, and social studies.