Making the Connection Between Formal and Informal Learning

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The Space Science Institute (SSI) of Boulder, Colorado has recently developed two museum exhibits called the Space Weather Center and MarsQuest. It is currently planning to develop a third exhibit called Cosmic Origins. The Space Weather Center was developed in partnership with various research missions at NASA’s Goddard Space Flight Center. These exhibitions provide research scientists the opportunity to engage in a number of activities that are vital to the success of these national outreach programs. The focus of this paper will be on how the MarsQuest project is making connections between informal and formal education and the roles that scientists can play in these endeavors.

Science centers and museums are playing an important role in the public’s understanding of science through experiential learning. They serve millions of Americans. In 2000, over 120 million people visited the Association of Science-Technology Centers (ASTC) member institutions in the U.S. (ASTC 2001). An increasingly important part of the educational infrastructure is the number of programs that science centers offer for school children and teachers. It is estimated that in 2000 nearly 26 million schoolchildren were served by ASTC member institutions (ASTC 2001). Science Centers are playing an integral role in cultivating our country’s science literacy.

In order to engage the museum-going public in the adventure of Mars exploration, the Space Science Institute of Boulder, Colorado developed MarsQuest. It includes a 5,000 square-foot traveling exhibition that is now touring the country, a 40 minute planetarium show, and a comprehensive education program. The exhibition will enable millions of Americans to share in the excitement of the scientific exploration of Mars and learn more about their own planet in the process. The associated education program will also be described, with particular emphasis on workshops to orient museum staff (e.g. museum educators and docents) and workshops for master educators near host museums and science centers. The workshops make innovative connections between the exhibition’s interactive experiences and lesson plans aligned with the National Science Education Standards (NRC 1996). These exhibit programs are good models for actively involving scientists and their discoveries to help improve informal science education in the museum community and for forging a stronger connection between formal and informal education.

MarsQuest is currently on a three-year national tour, which is fully booked and scheduled to end in August 2003. It has been so successful that the tour manager, ASTC, has begun a waiting list of museums and science centers that are interested in booking the exhibition if a second tour is scheduled. The number of museums on the waiting list now exceeds the number of available slots. A second three-year tour would begin in early 2004, when Mars exploration will
again be in the news. These ongoing and future missions create an unprecedented opportunity to use the public’s excitement over Mars exploration to draw visitors to museums and science centers and generate interest in science in general.

*MarsQuest* has been a tremendously successful exhibit not just in terms of attendance, but in achieving its education goals. Randi Korn and Associates (RK&A) performed evaluations of *MarsQuest* at different stages in the project, including a final summative evaluation (Randi Korn et al. 2002). In the summative evaluation, RK&A found that all of the interviewees at two different host sites (Tucson, Arizona, and Hampton, Virginia) were able to articulate at least part of *MarsQuest*’s main message (Earth-Mars comparisons). With other science exhibits, RK&A has found that it is more common for visitors to be unaware that there is an overarching theme connecting exhibit components, or to be unable to describe the exhibition’s main message. After visiting *MarsQuest*, all of the interviewees were also able to recall specific facts about Mars, especially information that compared Mars with Earth. For example, some visitors correctly indicated that some landscape features on Mars are much larger than similar features on Earth, while others noted differences between Earth and Mars in terms of size, temperature, and gravity.

SSI is committed to strengthening the infrastructure of informal science education through professional development activities. The *MarsQuest* exhibition provides a strong connection between formal and informal education. At each venue that hosts the exhibition, the Institute conducts separate workshops for museum educators, docents, and local teachers that are designed to inspire and empower participants to extend the excitement and science content of the exhibit and NASA’s Mars Exploration Program into classrooms and museum-based education programs in an ongoing fashion (e.g., floor demonstrations and camp-ins). The workshops are well aligned with the best practices and standards for the professional development of educators (Loucks-Horsley 1998) as well as aligned with the National Science Education Standards (1997). These workshops were developed collaboratively by Dr. Cheri Morrow, Education and Public Outreach Manager of the Space Science Institute, and Sheri Klug, Director of the Mars K-12 Education Program at Arizona State University. The workshops are co-facilitated by Dr. Morrow and Sheri Klug. They desire that the workshops leave a legacy that remains after the exhibition leaves. This only happens if museum educators feel confident to include Mars classroom activities in their outreach program.

The Space Science Institute is also working to ensure mutually beneficial connections between *MarsQuest* host museums and the NASA Education infrastructure (e.g., JPL’s Solar System Ambassadors and Solar System Educators, Educator Resource Centers, and Space Grant Colleges). The *MarsQuest* education program assembles a kit of exemplary educational materials (including both a Docent Guide and an Educator Guide), which are linked to *MarsQuest* and tailored for compatibility with host site educational programming. The workshops orient and equip museum staff adequately to enable ongoing implementation of educational programming enhancements linked to the exhibits. They provide opportunities for teachers in grades 4-9 to learn how to use exhibit components and related standards-based curricular materials with their students. SSI in partnership with TERC and JPL have support from NSF to create a Website,
called *MarsQuest Online*, that will assist museum staff and teachers, in preparing for and following up with exhibit-related educational programming. Finally, the *MarsQuest* Education Program is forging new and lasting partnerships between exhibit host sites and Mars scientists.

**References**

Association of Science-Technology Centers 2001, ASTC Sourcebook of Science Centers Statistics (Washington: ASTC)

