

produced records of children's songs about the sky are also available.

There probably are as many participatory styles for planetarium teaching as there are styles in a normal classroom, and then a few more. The latest addition to participation techniques — initiated by one of our panelists, Terence Murtagh — is interactive decisions on topics to explore in a planetarium program. Measuring, using data to calculate answers to mathematical problems, creative writing under stars with a musical or natural-sounds background, and fantasy journeys in which audience members close their eyes and use imaginations to extend what the planetarium can demonstrate — perhaps a mind trip into a black hole, complete with references to relativity, aching feelings as one is stretched, and reflections on the predicament — all can be successfully used in the planetarium classroom and theater.

Project STARWALK

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Project STARWALK is an Earth/space science program, developed for elementary students in grades 3 and 5 or 4 and 6. The program is designed around the teaching of some basic earth science concepts (Earth's rotation, revolution, and axial tilt), and their consequences. Classroom lessons are designed to both prepare and follow-up student visits to a planetarium facility. The planetarium is used as an instrument to display models to help the students understand the concepts. There are three visits to the planetarium (fall, winter, and spring).

The role of the teacher is to prepare the students for a laboratory experience at the planetarium. This is done by way of the materials provided, and whatever other strategies the teacher deems necessary. There are a variety of activities designed for both pre- and post-reinforcement of the concepts.

An integral part of Project STARWALK is the teacher preparation. This is done by way of a two-day inservice workshop, one day for each grade involved, and is conducted at a planetarium facility. Administrators and other grade-level teachers are welcome to attend as well. The participants are introduced to the teacher materials and the concepts and objectives of the program. They will be involved with the same activities as their students. Emphasis will be placed on understanding basic astronomy and earth-science concepts as they relate to the objectives of the program. The use of models, visual aids, and computers as aids in enhancing student comprehension are also part of the teacher workshop.

Project STARWALK is one of many programs within a nation-wide network known as the National Diffusion Network. It is funded by a dissemination grant from the US Department of Education. Within the National Diffusion Network are state contact people who help in coordinating efforts between projects like STARWALK

and interested educators.

Project STARWALK is currently in use by elementary schools in fifteen states. Some of the schools use the services of the staff at fixed-base planetariums for conducting the student planetarium lessons. Other schools, in more rural areas, have purchased a portable planetarium system for use with STARWALK lessons. In these situations, the teachers have been trained to teach the planetarium lessons as well as the classroom lessons.

Teaching Astronomy at School in a Planetarium

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1. Introduction

In some countries, such as the U.S.A., there are quite a lot of major planetariums and an enormous number of small fixed-operating planetariums. In France, the situation is not as good. There are only three planetariums with domes in excess of 15 meters across, six with diameters between six and nine meters, and ten transportable ones. For these last — five EX3s, three Starlabs and two of personal design — the inflatable domes are between four and five meters in diameter, providing a dedicated astronomy teaching facility significantly large to accommodate a typical class.

The principal advantages of these transportable planetariums are:

- easy transportation
- installation inside the school
- quickly erected in less than 20 square meters of space
- capacity of six to eight sessions per day
- low cost: less than \$30 per class and often free
- good contact between the instructor and the students, who sit on the ground or on small stools in a confined space.

Balancing these great advantages, the main deficiency is the limited program: only stars, planets, star clusters, galaxies, and the fundamental circles can be projected. Another difficulty is the manual control of the apparent motions of the planets. In any case, the facilities are not a place for entertainment; they are a place for pedagogic experiences.

Ten years ago, almost no astronomy was taught in French schools. A small group of teachers decided to begin extensive training of their colleagues. Thanks to their enormous efforts, different programs in astronomy are now included in both primary and secondary curricula.