



NASA/NSTA Symposium: Igniting the Flame of Knowledge: Human Space Flight Friday, October 19, 2007

1:30 PM – 1:55 PM

Welcome, Introductions, Goals for the Symposium

Al Byers, Assistant Executive Director of Government Partnerships and e-Learning, NSTA

Flavio Mendez, Symposia and Web Seminars Director, NSTA

- About NSTA Symposia
- Agenda/Goals
- Forms/Logistics/Introductions

Dr. Robert Morrow, Senior Scientist, Orbital Technologies Corporation

Marty Gustafson, Project Manager, Orbital Technologies Corporation

Jonathan Neubauer, Education Specialist, Teaching From Space Office, NASA

Marge Marcy, NASA Explorer Schools Workshop Coordinator, NASA

1:55 PM – 2:10 PM

Overview Presentation

Marge Marcy, NASA

Learning Outcomes:

After participating in the presentation,

- Participants will describe NASA's research with plants to other educators.
- Participants will describe to their students the challenge of design that engineers face throughout their careers.

2:10 PM – 2:55 PM

Plant Science in Space

Bob Morrow, Orbital Technologies Corporation

Learning Outcomes:

After participating in the presentation,

- Participants will make a list of space-based plant research goals and objectives.
- Participants will utilize educational plant growth kits and lighting systems in the classroom to simulate space-based research on plants.

2:55 PM – 3:40 PM

Classroom Activities with Space Garden and Lunar/Mars Simulants

Marty Gustafson, Orbital Technologies Corporation

Learning Outcomes:

After participating in this presentation and activity,

- Participants will explain NASA's need and application for lunar and Martian soil simulants.
- Participants will do a hands-on activity with Space Garden, recently flown on STS-118 to the International Space Station.
- Participants will utilize NASA's new simulant student activities in the classroom.



3:40 PM – 3:55 PM

Break

3:55 PM – 5:25 PM

NASA Engineering Design Challenge: Lunar Plant Growth Chamber

Jonathan Neubauer, NASA

Learning Outcomes:

After participating in this presentation and activity,

- Participants will identify the educational component to STS-118.
- Participants will explain the NASA Engineering Design Challenge: Lunar Plant Growth Chamber.
- Participants will access NASA resources through the STS-118 Educator Resource Website.
- Participants will create a model lunar plant growth chamber using common materials.
- Participants will register for the NASA Engineering Design Challenge: Lunar Plant Growth Chamber to receive basil seeds which were flown onboard STS-118 and involve their students in the project.

5:25 PM – 5:40 PM

Closure Presentation

Marge Marcy, NASA

Learning Outcomes:

After participating in the presentation,

- Participants will explain the engineering design process.
- Participants will describe the Engineering Design Challenge Opportunity with the Lunar Plant Growth Chamber to other interested educators.
- Participants will assess the importance of NASA's research with plants.
- Participants will apply real world science to the classroom.

5:40 PM – 6:00 PM

Final Words

- Post-assessment form
- Evaluation form/Survey/Credit info
- NSTA Web Seminars
- Raffle of door prizes

National Science Education Standards Addressed: Content Standards, 5-8

Content Standard A: Science as Inquiry

**As a result of their activities in grades 5-8, all students should develop an understanding of
UNDERSTANDINGS ABOUT SCIENTIFIC INQUIRY**

- Current scientific knowledge and understanding guide scientific investigations. Different scientific domains employ different methods, core theories, and standards to advance scientific knowledge and understanding.
- Mathematics is important in all aspects of scientific inquiry.
- Technology used to gather data enhances accuracy and allows scientists to analyze and quantify results of investigations.
- Scientific explanations emphasize evidence, have logically consistent arguments, and use scientific principles, models, and theories. The scientific community accepts and uses such explanations until displaced by better scientific ones. When such displacement occurs, science advances.

Content Standard E: Science and Technology

**As a result of their activities in grades 5-8, all students should develop an understanding of
ABILITIES OF TECHNOLOGICAL DESIGN**

- **DESIGN A SOLUTION OR PRODUCT.** Students should make and compare different proposals in the light of the criteria they have selected. They must consider constraints--such as cost, time, trade-offs, and materials needed--and communicate ideas with drawings and simple models.
- **IMPLEMENT A PROPOSED DESIGN.** Students should organize materials and other resources, plan their work, make good use of group collaboration where appropriate, choose suitable tools and techniques, and work with appropriate measurement methods to ensure adequate accuracy.
- **EVALUATE COMPLETED TECHNOLOGICAL DESIGNS OR PRODUCTS.** Students should use criteria relevant to the original purpose or need, consider a variety of factors that might affect acceptability and suitability for intended users or beneficiaries, and develop measures of quality with respect to such criteria and factors; they should also suggest improvements and, for their own products, try proposed modifications.
- **COMMUNICATE THE PROCESS OF TECHNOLOGICAL DESIGN.** Students should review and describe any completed piece of work and identify the stages of problem identification, solution design, implementation, and evaluation.

**Content Standard G:
History and Nature of Science**

**As a result of their activities in grades 5-8, all students should develop an understanding of
NATURE OF SCIENCE**

- Scientists formulate and test their explanations of nature using observation, experiments, and theoretical and mathematical models. Although all scientific ideas are tentative and subject to change and improvement in principle, for most major ideas in science, there is much experimental and observational confirmation. Those ideas are not likely to change greatly in the future. Scientists do and have changed their ideas about nature when they encounter new experimental evidence that does not match their existing explanations.
- It is part of scientific inquiry to evaluate the results of scientific investigations, experiments, observations, theoretical models, and the explanations proposed by other scientists. Evaluation includes reviewing the experimental procedures, examining the evidence, identifying faulty reasoning, pointing out statements that go beyond the evidence, and suggesting alternative explanations for the same observations. Although scientists may disagree about explanations of phenomena, about interpretations of data, or about the value of rival theories, they do agree that questioning, response to criticism, and open communication are integral to the process of science. As scientific knowledge evolves, major disagreements are eventually resolved through such interactions between scientists.