**LABORATORY EARTH OBJECTIVES**

- Improve K-12 teacher's knowledge, understanding of context connections, ability to teach science in the context of the Earth as a system.
- Enhance and accelerate the transfer and utilization of data, information, and high-quality educational curriculum materials from NASA's Earth Science Enterprise to educators.
- Increase the sense of community using various levels of networking.

**LABORATORY EARTH**

A part of NASA's on-going effort to provide professional development for K-12 Education.

**EARTH AND ITS SYSTEMS**

- Weather and Climate
- Earth in Space

**EARTH'S NATURAL RESOURCE SYSTEMS**

- Natural Resources and Civilization
- Rock and Mineral Resource Systems
- Soil Resource Systems

**EARTH'S CHANGING SYSTEMS**

- From the Universe to the Earth and Everything in Between
- The Environment: Forests, Air, and Water
- Changes Through Geologic Time
- Coming-in the Earth System

**STUDENT ASSESSMENT**

<table>
<thead>
<tr>
<th>Bloom's Taxonomy</th>
<th>K-12</th>
<th>AP</th>
<th>IB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Comprehension</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Application</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analysis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Synthesis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evaluation</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**PROJECT TYPE**

- Power Point
- Newspaper Article
- Brochure
- Game

**COMPONENTS OF A CONTENT MASTERY ACTIVITY**

- Problem Scenario, Issue, Question
- What are Content Mastery activities?
- Enhance and accelerate the transfer and utilization of data, information, and high-quality educational curriculum materials from NASA's Earth Science Enterprise to educators.
- Increase the sense of community using various levels of networking.
- Provide opportunities for students to use creativity.
- Provide at end of each module.
- Feedback/revision process focuses on learning.
- Feedback to students provide framework for modification and resubmission.
- Based on learning outcome for each module.

**WHAT ARE CONTENT MASTERY ACTIVITIES?**

- Document students ability to synthesize and apply knowledge and understanding learned in module.
- Provide opportunities for students to use creativity.
- Provided at end of each module.
- Feedback/revision process focuses on learning.
- Feedback to students provide framework for modification and resubmission.
- Students choose presentation format.
- Based on learning outcome for each module.

**EXAMPLES**

1. Intrinsically motivate participants to learn and enhance their learning skills and intellectual abilities.
2. Motivate participants to learn and enhance their learning skills and intellectual abilities.
3. Intrinsically motivate participants to learn and enhance their learning skills and intellectual abilities.

**CONTENT MASTERY PROJECT SUMMARY - Lab Earth 2**

**PRE-TO POST CONTENT MASTERY TEST COMPARISONS**

<table>
<thead>
<tr>
<th>Project Type</th>
<th>N</th>
<th>%</th>
<th>Mean</th>
<th>SD</th>
<th>Z</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Point</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Newspaper Article</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brochure</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Game</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**CONTACTS**

David C. Gosselin - School of Natural Resources, University of Nebraska-Lincoln, 106b Holland Hall, Lincoln, NE 68583-0931, dgosselin2@unl.edu, 402-472-8816

Ronald J. Bonnstetter - Teaching, Learning, and Teacher Education, University of Nebraska-Lincoln, 215A HENZ, Lincoln, NE 68588-0395, rbonnstetter@unl.edu, 402-472-2443

Sara Yendrodia - School of Natural Resources, University of Nebraska-Lincoln, 1400 Hawks Hall, Lincoln, NE 68583-0561, syendrodia@unl.edu, 402-472-6823

**MODULAR COURSE DESIGN**

- Modular Course Design
- Aims to enhance the learning experience for students.

**NATURAL RESOURCES AND CIVILIZATION**

- River and Mineral Resource Systems
- Soil Resource Systems

**INSTRUCTIONAL DESIGN**

- Use Multiple Learning Strategies
- Group Discussions
- Kitchen Labs
- Group Projects

**ENVIRONMENTAL CHANGE**

- Consider the impact of human activities on the environment.
- Explore the concept of sustainability.

**CULTURAL HERITAGE**

- Examine the role of cultural heritage in shaping the environment.
- Understand the importance of cultural diversity.

**SUSTAINABLE DEVELOPMENT**

- Analyze the challenges and opportunities for sustainable development.
- Develop strategies for environmental stewardship.

**SOCIAL JUSTICE**

- Examine the role of social justice in environmental decision-making.
- Understand the impact of environmental policies on marginalized communities.

**SCIENCE AND SOCIETY**

- Explore the relationship between science and society.
- Understand the role of science in shaping public policy.

**CITIZEN SCIENCE**

- Engage in citizen science projects to address environmental issues.
- Learn how to contribute to scientific research.

**ECOLOGICAL SYSTEMS**

- Study the interactions within ecological systems.
- Understand the importance of ecosystem services.

**HUMAN CONTRIBUTIONS TO CHANGE**

- Examine the role of human contributions in shaping the environment.
- Understand the impact of human activities on the environment.

**HUMAN Impact ON CHANGE**

- Analyze the impact of human activities on the environment.
- Understand the role of human behavior in shaping the environment.

**RESOURCES AND RESIDUES**

- Explore the role of resources and residues in shaping the environment.
- Understand the importance of resource management.

**WATER LANGUAGE JOURNEY**

- Use the terms from the Water Language Journey and your understanding of the hydrologic equation, to what extent do you think water resources can be used sustainably.

**SURE.**

- Ultimately, Betsy, I am the product of interactions between the atmosphere, lithosphere, hydrosphere and geosphere. ... transported by water wind and ice. Glaciers, for example, transport a lot of material that becomes part of a soil series.