Earth Sciences Trek

Grades: K-2

Time: a pre-visit session of 30-45 minutes and a post visit session of 20-30 minutes (*Note: Time for either session can be adapted. For instance the pre-visit session can consist of a 10 minute preview of the exhibits.)*

Rationale and Context:
This trek is organized around the NGSS crosscutting concepts patterns and stability and change. (Links to videos explore each concept.) To help maximize their ECHO experience, students will be introduced to ECHO exhibits that relate to Earth sciences before their classroom visit. They will make predictions about natural phenomena and connect their personal experiences to scientific concepts. At ECHO, students will explore exhibits more deeply with the help of suggested questions and tasks. After their visit, students will process their learning as a group and draw conclusions about Earth's systems, Earth and human activity, patterns, and stability and change. Teachers may choose to continue to explore these concepts using additional resources provided.

Teacher Background Information:
The primary learning goal of ECHO's Awesome Forces exhibit gallery is to help visitors understand the physical laws that govern the natural phenomena we experience everyday on the Burlington Waterfront. Through hands-on physical science interactive exhibits students will delight in discovering the amazing processes that have shaped the Lake Champlain Basin and our Earth.

Learning/Behavioral Objective(s):
1. Students will engage with ECHO exhibits with a sense of purpose.
2. Students will connect the phenomena they observe with Earth science concepts.
3. Students will draw conclusions about Earth science concepts and connect their learning to a broader cross cutting science concept.

Essential Questions:
What is the relationship between patterns and natural phenomena? How can something appear stable when it's actually changing?

Focusing Questions:
How and why is Earth constantly changing?
How does water shape Earth's surface?
What is weather? What makes a weather pattern?
Where is water found on Earth?
How do humans change the planet?

How do communities use science ideas to protect the environment?

Vermont Standard(s): Next Generation Science Standards

Standard	**Description**
Crosscutting concept	Patterns; Stability and Change
K ESS2-1	Use and share observations of local weather conditions to describe patterns over time.
K ESS3-3	Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.
2 ESS1-1	Use information from several sources to provide evidence that Earth events can occur quickly or slowly.
2 ESS2-3	Obtain information to identify where water is found on Earth and that it can be solid or liquid.
Science and Engineering Practice	Developing and Using Models Obtaining, Evaluating and Communicating Information

Vocabulary: Students may gain an understanding of certain vocabulary words through active participation and explanation.

Environment
Erosion
Fog
Landscape
Liquid
Meteorologist
Pattern
Resource
Solid
Vegetation

LEARNING PLAN:

Resources/Materials:

1. Optional free admission for teacher walkthrough visit
    - contact ephillips@echovermont.org
2. Slide presentation of selected exhibits
3. Museum Map
4. ECHO Exhibit Preview sheet
5. ECHO Exhibit Exploration sheet
6. Links to extension activities

Before your ECHO trip:

Introduction

1. *When our class visits ECHO, you will have a chance to explore many science exhibits. Today we're going to preview a few of them and start thinking about some of the ways you might explore them when we are there.*
2. *At many of the exhibits, you'll be able to think about patterns and also about stability and change.* If necessary, introduce or review these crosscutting concepts.
3. Hand out the ECHO Exhibit Preview sheet.

Exhibit Preview

1. Begin slideshow. Show Lake News Studio slide, then discuss:
    a. *What do you notice in this picture?* Take several responses. If no one identifies it as a weather reporting studio, point this out. Then ask:
        i. *Who works in a weather reporting studio?* Meteorologist, weatherman/woman
        ii. *What do they do?* Tell people about the weather so they can prepare for it
        iii. *If appropriate to the group, you may also choose to tell how green screens work to explain why one wall in the studio is painted green.*
    b. *What types of weather might meteorologists report?* Rain, snow, extreme heat or cold, etc. Record answers on a board or chart paper where students can see them.
    c. *Meteorologists probably notice patterns in the weather at different times of the year. Think about a pattern you've noticed and record it on your worksheet.* To help students get started, review seasons or months of the year as appropriate.
    d. Allow students time to record ideas on their worksheet. Share and discuss.
2. Show Flowing Streams slide, then discuss:
    a. *What do you notice in this picture?* Take several responses. If no one comments on the faucet above the cup, call students' attention to it.
    b. *You will be able to make water flow out of the faucet and it will run out a hole in the cup onto the landscape. But in the real world, water doesn't pour out of a cup the size of a house! Where does it actually come from?* Rainwater, snowmelt
    c. *How can this model help us investigate the effect flowing water has on the landscape?* It can show the effect more quickly than in real life; you can control the amount of water flowing; You can see what's happening to a large amount of land.
    d. *How do you think flowing water affects a landscape?*
    e. Allow students time to record ideas on their worksheet. Share and discuss.

3. Show slide of mural in the Lake Champlain Basin Program resource room.
    a. *Did you know scientists keep track of how healthy Lake Champlain is? Some problems in or near the lake are caused by so many people living near it. What might some of those problems be?* Responses will vary.
    b. *The Lake Champlain Basin Program works to protect the lake's water, animals and surrounding environment. They have a resource room at ECHO.* Show slide of the entrance to the Lake Champlain Basin Program Resource Room.
    c. *While we're at ECHO, I'd like you to visit the LCBP Resource Room and find out about one problem facing the lake and one way people are working to solve it.*
    d. Allow students time to record their ideas of possible problems on the worksheet. Share and discuss.
4. Show the next slide, then ask:
    a. *What do all the pictures in this slide have in common?* Take several responses. If no one mentions water, ask:
        i. *What keeps plants and animals alive but also shapes the land?* Water!
        ii. If you are in present mode and click one more time, a graphic of "WATER!" will appear.
    b. *Where are some different natural places you might see water on Earth?* Oceans, rivers, lakes, ponds
    c. *When do you see water in a solid form in nature?*
    d. Allow students time to record ideas on their worksheet. Share and discuss.

<u>Closure and Connections</u>

1. *What are you most excited about seeing, doing or learning on our ECHO field trip?*
2. *During our visit, you will get to discover many other exhibits. Some relate to physical sciences and lots of them include animals. If you are looking for more exhibits that explore Earth systems you can look for these exhibits.* Show slides of additional exhibits.

During your ECHO trip:

1. It may be helpful to have students identify which of the previewed exhibits they are most excited about. They can be split up into small chaperoned groups by their interest. We will help direct your groups to different areas of the museum to begin your ECHO explore time.
2. Give each student or partner group a copy of the ECHO Exhibit Exploration Sheet to guide them as they interact with the exhibits.

After your ECHO trip:

1. *Now that everyone has explored the exhibits at ECHO, let's hear what you thought.* Allow a quick share where everyone can share one favorite exhibit/experience/etc.

2. *Let's discuss what you've learned about Earth's systems, Earth and human activity, and patterns and stability and change.*
    a. At Lake News Studio
        i. *What type of weather did you report on?* Encourage discussion relating to patterns in the weather.
    b. At Flowing Streams:
        i. *What effect did the water have on the landscape?* Encourage discussion related to erosion.
        ii. *In real life, would these changes happen quickly or slowly?* Discuss both possible situations (sudden flooding event vs. the slow change a river can cause over time). If it's appropriate for the group, make a distinction between a 'slow' event that takes years compared to a 'slow' event that takes centuries, like the erosion of rock.
    c. *What problems are facing the lake and what solutions did you learn about by visiting the Lake Champlain Basin Program resource room?* Focus discussion on ways to reduce the impact of humans on the land, water or living things in the local environment.
    d. *Where is water found on Earth?* Encourage discussion that uses specific examples from ECHO exhibits and identifies whether water is in liquid or solid form. Examples are in the chart below.

Place on Earth	**Form**
Lake Champlain	Liquid most of the year, solid in winter (sometimes)
Steam devil over Lake Champlain Other fog over the lake as in the Foggy Harbor exhibit	Liquid*
Glacial ice sheet	Solid
Various rivers may be named, depending on student interaction with display maps	Liquid

**Steam devils are not actually steam. They are made of fog swirling through the air. Fog is a liquid form of water vapor; if it was steam (gas) it would not be visible.*

3. *How can understanding stability and change or patterns help us as scientists?*
    a. This may also be a logical place to make connections with the current science unit under study.

Extensions

Weather:

- Introduce your students to weather vocabulary with Gail Gibbons' book, *Weather Words and What They Mean.*
- Check the daily weather forecast using this kid-friendly weather site.
- Track the weather and look for patterns over time with weather journals.
- This video introduces the concept of weather journals to young scientists.

Earth events:

- Explore fast and slow changes on Earth's surface with this lesson from PBS Learning Media.
- Watch a dramatic mudslide caught on video as an example of a quickly occurring earth event.

Water on Earth:

- Illustrate where water is found on Earth with the Can You Spare a Drop? activity.
- Enjoy this 2016 slideshow of steam devils on Lake Champlain.
- Watch these steam devils on Lake Ontario caught on video.

Reducing Impact:

- Become Clean Water Rangers with this activity from the Lake Champlain Basin Program.
- Explore ways to use water wisely with this interactive resource from Project Wet.