

The Great Salt Lake



EDUC 342

Fall 2004

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Jen Riekhof

Nikki Paulson

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Unit Introduction

As a unit introduction students will participate in a presentation presented by “The Friends of the Great Salt Lake”. The presentation celebrates the biological, economic and recreational attributes of the western hemisphere's largest saline lake. Featuring the work of more than 30 area photographers, this dramatic color slide-based experience introduces the wealth of interrelationships, interdependencies and diversity among humans and all life, and between this life and the Great Salt Lake environment. After the presentation students will go on a field trip to the Great Salt Lake. The lessons following are only two which could be components of a year long unit on the Great Salt Lake. Different slide and script versions exist to accommodate four audience categories: Professional/Informed Adult, General Adult Audiences, Young people in grades 7 – 12, and Young people in grades 3-6. We feel that presenters could easily accommodate for younger grades.

Slide show information available at <http://www.fogsl.org/education/slideshow.html>

Weather Tracking

Abstract: In this lesson students will become familiar with the use of the internet in order to obtain data such as the weather. Weather conditions in Salt Lake City, Boise (ID), Syracuse (UT) and Denver (CO) will be tracked for 2 weeks. Students will be sharing and comparing data collected.

Grade : 2nd

Content Core Standard III: Students will develop an understanding of their environment.

Objective 2: Observe and describe weather.

Time: short length of time each day for 2 weeks (possibly used as a computer center)

Materials: internet site www.weather.com, science journals, Cloudy with a Chance of Meatballs by Judi Barrett, pictures that show low and high visibility weather, pictures that show dry weather and rain/snow

Terminology: forecast- to predict the weather; humidity- the amount of moisture in the air; moisture- small amounts of liquid that cause things to become wet; precipitation- the amount of water that falls to the Earth as hail, mist, rain and snow; temperature- the degree of hotness or coldness of something (air, water...etc.), visibility- the degree of clearness of the atmosphere; lake effect- temperature differences between air above land and air above water which cause thermal instability and heavy precipitation.

Background Information:

The weather.com website is fairly simple to use. If you enter city name or zip code into the “local forecast” field on the top of page it will take weather information for that city. For younger grades we recommend giving the students zip codes for easier use.

Lake Effect Information: During the fall and spring, because of major seasonal changes in weather patterns, there are often large differences between the temperatures of the water of the GSL and the air above the lake. This air-lake temperature contrast causes thermal instability, and often leads to extremely heavy precipitation events. There are three major contributing factors to these so-called “lake effect” storms. Besides the temperature contrasts, which appear to be the most important factor, there is a great deal of extra moisture in the air from evaporation off the lake. Also, the wind associated with storms picks up salt crystals from the nearby salt flats, as well as from whitecaps in the lake itself. These airborne salt crystals serve as hygroscopic nuclei—that is, they absorb moisture from the air and form especially large raindrops which increase the amount of precipitation. The snow pack at the nearby ski areas in the canyons has been shown to have a higher than average salt content.

Intended Learning Outcomes:

1. Students will use the internet to locate weather reports.
2. Students will present data collected to the class through poster presentation.

Prior Assessment:

1. Read aloud the book Cloudy with a Chance of Meatballs by Judi Barrett. Ask students questions about the book’s weather compared to our weather.
2. Brainstorm with students why weather is important, and how weather affects us.

Procedures:

1. Have students individually write a short paragraph in their science journals to begin this unit on weather.
2. Model the center activity, by logging on to www.weather.com and typing in city name to retrieve information.
3. Write on the board the temperature, humidity, visibility and precipitation for SLC. Inform students that these will be the 4 things they need to write along with the date and city.
4. Show pictures of weather to students; discuss the definitions of precipitation and visibility.
5. Ask students about humidity, and if they have experienced it (ie-traveling to a humid area). If students don’t have experience give them the example of taking a bath with the door closed and seeing the mirror fog up. This is humidity, moisture in the air.
6. Have students create a data sheet in science journal for recording this information.
7. As students complete their data sheet allow time for students to practice using the internet and finding their city.
8. Assign student groups giving each group a different city. Explain that for 2 weeks this group will work together to track weather data for their city.

9. At the end of 2 weeks have each group make a poster presenting their findings to the class. This poster can include pictures printed off the computer, drawings, words, graphs, and anything else the students can think of.
10. Have groups present their posters, and display posters after presentations.
11. Compare and contrast results from each city. Emphasize the results between cities that have a nearby lake opposed to those which don't. Have students predict reasons for the differences (possible lake effect).

Modifications and Accommodations:

- Student groupings will be heterogeneous to help students with special needs.
- Teacher will be available for individual assistance during data collection and designing of poster.
- Charts for data recording can be created.
- For students needed extra time or help, this could be done at home with further support.

Assessment:

- Students used the internet in order to obtain weather data about their location.
+ = communication, participation, and respect with group
v = some communication, participation, and respect with group
- = unwillingness to work with group, or lack of participation
- Students displayed and presented their groups' weather data to the class through a poster presentation.
+ = communication, participation, and respect with group
v = some communication, participation, and respect with group
- = unwillingness to work with group, or lack of participation
- Students recorded data as assigned in science journals.
+ = effort and quality work is presented
v = some effort and quality work is presented
- = little effort and attention to quality are presented

Resources: <http://www.fogsl.org> (Friends of the Great Salt Lake), www.wordcentral.com (student dictionary)

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Lake Effect Experiment

Abstract: This lesson will provide hands on inquiry based learning to help students recognize and understand that the Great Salt Lake is a unique ecosystem, which affects their weather.

Topic: Heat differences in soil and water and their connection to the “lake effect” phenomenon.

Grade : 2nd

Content Core Standard III: Students will develop an understanding of their environment.

Objective 2: Observe and describe weather.

Time : 1 hour

Materials: one small cup per student, one thermometer per student, 4 heat lamps (set up prior to experiment), soil samples from GSL, water samples from GSL, science journal, pencils

Terminology: heat- the condition of being hot, or to rise in temperature; absorb- to take in or suck; lake effect- temperature differences between air above land and air above water which cause thermal instability and heavy precipitation.

Intended Learning Outcomes:

3. Students will work with others to make decisions and problem solve.
4. Students will present experiment results to classmates, demonstrating their understanding of how the GSL affects weather.

Background Information:

Solar energy is absorbed by both land and water. Water absorbs more heat but more slowly and releases it at a slower rate. Land absorbs heat at a faster rate and also releases heat at a faster rate. The air above a large body of water is usually warmer during the winter, than the air above the adjacent land.

Lake Effect Information:

During the fall and spring, because of major seasonal changes in weather patterns, there are often large differences between the temperatures of the water of the GSL and the air above the lake. This air-lake temperature contrast causes thermal instability, and often leads to extremely heavy precipitation events. There are three major contributing factors to these so-called “lake effect” storms. Besides the temperature contrasts, which appear to be the most important factor, there is a great deal of extra moisture in the air from evaporation off the lake. Also, the wind associated with storms picks up salt crystals from the nearby salt flats, as well as from whitecaps in the lake itself. These airborne salt crystals serve as hygroscopic nuclei-that is, they absorb moisture from the air and form especially large raindrops which increase the amount of precipitation. The snow pack at the nearby ski areas in the canyons has been shown to have a higher than average salt content.

The large surface area of the GSL can absorb a great deal of solar energy during the hot summer days. During the nights, and during colder periods of the year, the surrounding land areas cool rapidly, but the heat stored in the lake water is given off slowly, keeping the temperatures in the area warmer than they would otherwise be. These differences in heating and cooling between land and water give rise to breezes. These breezes can lower afternoon temperatures in areas near the lake by as much as two to four degrees Fahrenheit during the late spring and early summer.

Invitation to Learn: Take class outside and have students feel objects, while thinking about the temperature of the object. Bring students back inside after 3 minutes and discuss as a class the observations.

Prior Knowledge Assessment:

1. Brainstorm what students have learned so far about the GSL. Create a whole group concept map.
2. Discuss what we have learned thus far about GSL effect on our environment.
3. Ask students to develop ideas which could be tested pertaining to the GSL.
4. Student ideas will be expanded upon to introduce experiment.

Procedures:

1. Introduce experiment and procedures. Review group expectations and experiment rules.
2. Pair students, and have them predict whether the GSL or the land surrounding it will heat up faster when exposed to the sun. Record predictions in science journal.
3. Explain to students the definition of absorb. Making sure to connect to students' prior knowledge (ie-paper towel and sponge). Also discuss examples of heating and cooling.
4. Distribute materials.
5. Have students fill one cup with soil and the other cup with water. Measure both substances to a depth of 3 inches.
6. Model for student insertion of thermometer into water and soil. Making sure that thermometer is not touching any sides of the container. Have both thermometers the same distance below the surface (as close as possible).
7. Students should take initial temperatures of both substances and record them in their science journals.
8. Have multiple pairs at each heat lamp. Have students place their samples under the heat lamps, paying particular attention that within the pair each cup is receiving the same amount of heat.
9. Have students' record temperature of both substances every 5 minutes, for 20 minutes. Record all temperatures in science journals.
10. After 20 minutes, turn off heat lamp and have students again check temperatures every 5 minutes, for 15 minutes. Record this data. (should show, soil cools more rapidly)
11. Students will conclude with their partner which substance heated up faster (soil), and which cooled faster. Record results in comparison to prediction.
12. Bring class together for whole group discussion.
13. Create 2 separate bar graphs on the board. One for which substance heated faster, and one for which substance cooled faster.

14. Have students record on the board the substance in bar graph, while presenting their results in comparison to their prediction.
15. Discuss class findings, and relate results back the GSL and the lake effect and our weather.

Modifications and Accommodations:

- Student pairs will be heterogeneous to help students with special needs.
- Teacher will be available for individual assistance during the experimentation.
- Provide written procedures for students that need it.
- Create a chart for data recording.

Assessment:

- Student presentations about data results, indicating completion of experiment.
 - + = all data was recorded and prediction was made
 - v = some data was recorded and prediction was made
 - = very little data was recorded and no prediction was made
- Student observations during experimental phase of lesson to evaluate their ability to work with others.
 - + = communication, participation, and respect with partner
 - v = some communication, participation, and respect with partner
 - = unwillingness to work with partner

Resources: This lesson was modified from Utah Museum of Natural History. (1997). [The Great Salt Lake Story](#). Salt Lake City, Utah. Found on the Westminster College Great Salt Lake Project website.