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Curriculum Project:
Predicting the Weather

Introduction

A good science curriculum project gives students the opportunity to engage in rich, multi-disciplinary learning that has applications that extend beyond the context of the science classroom. Our curriculum directs students to use information obtained in the classroom in addition to their own observations to make both predictions and judgments about the weather. They will use the internet to gather data, work in groups to synthesize and analyze that data, and will then evaluate their own work and reflect upon their journey. Journals kept over the course of the weather unit will prompt students to use scientific language and think critically about the world around them—a skill that is important in the field of science but that will also help students become more advanced, enlightened thinkers.

Within the field of science, we wanted the topic of our curriculum project to be one that has relevance to the students' every-day lives. In this case, weather is a factor which affects our lives and decisions on such a daily basis that it is easy to overlook its importance. Thinking critically about the weather will help students gain an appreciation for all of the ways that it impacts them. Additionally, thinking about weather on a local as well as regional level will give students a new perspective on the ways that weather affects those living in different areas of the country.

Context:

This curriculum project is designed to take place in an eighth-grade science classroom. It will be taught over the course of five days, each consisting of one 80-minute period (as in HMMS), and including a hypothetical four-day weekend that will allow students to make a prediction about weather one week in advance, as illustrated by this calendar:

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			Day 1	Day 2	Day 3	
			Day 4	Day 5		

It can be taught in any Connecticut classroom since its objectives correspond to the Connecticut Framework: K-12 Curricular Goals and Standards (1998), but would benefit students in any state because it teaches students to use different levels of thinking about the weather.

Objectives:

1. Students will employ different research methods and write a lab report (C INQ5: Use appropriate tools and techniques to make observations and gather data).
2. Students will evaluate the relative reliability of various scientific information. (C INQ2: Read, interpret and examine the credibility of scientific claims in different sources of information.)

3. Students will estimate possible flaws in their research methods and propose alternatives. (C INQ8: Draw conclusions and identify sources of error. C INQ 9: Provide explanations to investigated problems or questions.)
4. Students will communicate using science vocabulary, supportive evidence, and clear logic to express their ideas (C INQ10: Communicate about science in different formats, using relevant science vocabulary, supporting evidence and clear logic).

Activities:

Prior Knowledge:

Our project assumes that students will have read Chapter 3 of Science Explorer: Weather and Climate and are familiar with basic information about weather: vocabulary, tools for reading/predicting, etc.

Day 1, Introduction to Weather and Research:

At the beginning of the period, students will participate in a guided discussion as a class. They will brainstorm all of the resources that are at their disposal for observing, evaluating, and predicting the weather around them as well as in other areas of the country. Students will discuss their ideas and give examples of how they and their families observe, evaluate and predict the weather around them using these tools each day. The teacher can list these resources on the chalkboard.

At the end of the discussion, the teacher can suggest ideas that the students may not have come up with. The final list might include the following: reading a thermometer outside their home, reading a barometer, simple observation, using the internet to search

for daily forecasts and regional weather maps, collecting weather-related data from previous years to make predictions about the future, watch weather forecasts, newspapers and archives thereof, radio broadcasts, phoning someone in another region to ask about the weather, and using search engines to find online resources about the weather.

Students will briefly discuss the relative effectiveness and reliability of these various methods before employing some of their ideas by working online. With the help of the teacher, they will learn to distinguish between the characteristics of a reliable and non-reliable web page, search the internet for credible sources to use in their research about weather, and record their searches using their worksheet titled Weather Related Online Resources (see attached).

Homework, Day 1:

For homework over the course of the unit, students will write in a Weather Journal. Each night, students will watch the local weather forecast and any weather-related news. Their entries will be guided by an assignment sheet titled My Weather Journal Assignment Guidelines (see attached). At the beginning of class each day, they will use classroom tools to make observations about the current weather. Then they will evaluate the accuracy of the weather report they watched.

Day 2, Regional Weather Research Project:

At the beginning of class, groups of two or three students will be assigned to research weather in one of ten major cities across the United States: New York, Nashville, Miami, Chicago, Santa Fe, San Francisco, Seattle, Juneau and Honolulu. Students will employ the resources that they discovered and recorded on their worksheets, especially those that they deemed to be the most rich and appropriate, to aid

in their formation as a group of a weather forecast in that region for day 5 (one week from today). If students get stuck, the teacher might suggest that they go to

www.wfsb.com/Global/link.asp?L=15246 or

http://www.weather.com/newscenter/fcstsummary.html?from=wxcenter_news.

Homework:

In addition to their normal journal assignment, students will be asked to record their group's methods for researching online and answer the following questions: What resources were more beneficial to your group? What criteria did your group employ to determine a credible website? A non-credible one? What information do you think will be most helpful in making your weather prediction?

Day 3, Predictions:

In their city groups, students will assemble the information gathered the previous day and collaborate to synthesize an in-depth prediction of the weather in their region on day five. Each group will type these predictions in a formal report about their hypothesis, detailing the following: humidity, high and low temperature, wind, precipitation, visibility, pressure, and severe weather. They should support their prediction with evidence from their research, being careful not to overestimate their level of certainty. Students will use the assignment sheet titled Regional Weather lab report: Part I (see attached) to guide the creation of their prediction and lab report, which they should complete as a group by the end of the class period.

Day 4, Local Weather:

Students will travel to a nearby Hartford news station such as Eyewitness News, Fox News, or NBC 30 for the class period. They will get a tour of the facilities and hear a

short lecture about meteorology. They will gain perspective on how real meteorologists predict the weather such as the sophisticated instruments used, but they will also draw connections and notice similarities between their own research methods/tools and those of professionals. At the end of the lecture, students will be encouraged to ask questions. They will fill out a worksheet titled News Station Field Trip Worksheet (see attached) about what they learned, which they can use while reflecting in their journals that night. It will require students to discuss the methods/tools for weather prediction and to evaluate their relative reliability/usefulness according to the lecturer. The news station field trip will utilize community resources and give students an opportunity to learn in a different kind of setting.

Day 5, Results:

At the beginning of class, students will evaluate the accuracy of their predictions by checking the weather in their city on www.weather.com. Students will then be reorganized using Robert Slavin's Jigsaw II method. In new groups, they will name, compare, contrast, and evaluate the resources/methods that each of their city groups used to predict the weather. They will discuss the accuracy of their group's different predictions—which resources/methods seemed to work for most groups? Which didn't work? Which did most people use? After a period of discussion, students will return to their original groups with the new knowledge to complete their formal reports (see Regional Weather lab report: Part II attached) by creating a results, conclusion, and discussion section. They discuss what they learned in their jigsaw groups and will judge the value of their resources, materials and methods based upon the accuracy of their own

predictions and those of the entire class. They will draw general conclusions and try to explain possible sources of error.

Homework:

The final journal assignment will urge students to synthesize all of their thoughts about weather for the week. For example, students will answer the following questions in their final journal entry: How accurate were the weather forecasts you watched over this week? Was the meteorologist %100 correct every day? What did s/he correctly predict? Incorrectly predict? Were you surprised by anything? What are the benefits and limitations of relying on weather forecasts? What general conclusions would you draw about the concept of weather prediction, its importance, and its usefulness? With your new knowledge, how will *you* predict the weather in the future?

Evaluation

Our main objective as project creators was to incorporate activities in which students could demonstrate the highest levels of mental activity as described by Benjamin Bloom's taxonomy of educational objectives, such as analysis, synthesis, and evaluation. Each of our project objectives also corresponded with specific Connecticut Curricular Goals and Standards for 6-8th grade science students. We also incorporated several different types of intellectual thinking, as defined by Gardner, such as naturalist, linguistic, and logical/mathematical.

We have incorporated several methods for evaluating the students over the course of the unit to determine whether these goals were met. The first of our methods for evaluation is with the students' Weather Journal entries. We will determine whether our

goals were met based upon the richness and thoroughness of journal entries, as well as their thought and detail. Also, we assigned worksheets such as the Internet Source worksheet and the Field Trip worksheet, both of which can be graded in order to determine whether students were meeting the specific goals of that day's lesson. Finally, the students' lab reports will be the most important basis for evaluating whether our goals were met.

The following chart illustrates how each specific objective was met by an activity throughout the course of the unit.

Objective:	Evaluation:
1. Employ different research methods & synthesize a weather prediction. (C INQ5)	Accuracy of predictions & quality of lab reports.
2. Communicate using scientific vocabulary, supportive evidence, & clear logic to express their ideas. (C INQ10)	Richness of journal entries– level of thought & detail. How well students followed the assignment guidelines.
3. Evaluate the relative reliability of various scientific information. (C INQ2)	Worksheets (see attached) and final journal entry.
4. Estimate possible flaws in their research methods and propose alternatives. (C INQ8)	Discussion/Conclusion section of lab report.

Resources

“Grades 6-8 Core Scientific Inquire, Literacy and Numeracy.” *The Connecticut Framework: K-12 Curricular Goals and Standards*, p. 2. Connecticut State Department of Education.
<http://www.state.ct.us/sde/dtl/curriculum/science/framework/Framework6-8-2004.doc> (Retrieved May 13th 2005)

Science Explorer: Weather and Climate, (Boston: Prentice Hall, 2000).

“Today’s Forecast Summary.” *The Weather Channel*.
http://www.weather.com/newscenter/fcstsummary.html?from=wxcenter_news
(Retrieved May 13th 2005)

Ed 200 Course Packet, 2005. *Bloom’s Taxonomy* (1956).

Ed 200 Course Packet, 2005. *Gardner’s Multiple Intelligences* (1983).

Ed 200 Course Packet, 2005. *Slavin’s Jigsaw Method*, p. 6.

My Weather Journal

Assignment guidelines

First:

-Using the scientific vocabulary learned in the previous classes, write up a rich summary of what the meteorologist on television provides as a forecast for tomorrow's weather in Hartford.

-Try to use as many different terms from the word bank and symbols from the Weather Symbol Chart (below) as possible in your journal entries.

-If you want, you can also collect the weather maps from your newspaper to supplement your journal entries. Glue or staple the map into your journal and be sure to include a rich description of what is included in the map.

Word Bank

Warm front – Occluded front – Cold front – Stationary front – High temperature - Low Temperature – Pressure – Humidity – Dew Point – Precipitation – Visibility – Wind speed and direction -

Weather Symbols				
Rain	Drizzle	Snow	Freezing Rain	Miscellaneous
☐ Light	☉☉ Light	×× Light	☉☉ Light	△ Ice Pellets
◻ Moderate	☉☉ Moderate	×× Moderate	☉☉ Moderate	↔ Ice Crystals
◼ Heavy	☉☉ Heavy	×× Heavy	Freezing Drizzle	★ Snow Grains
Rain Showers	Thunderstorm	Snow Showers	☉☉ Light	↕ Blowing Snow
☉ Light	☉☉ Light	× Light	☉☉ Moderate	— Fog
☉ Moderate	☉☉ Heavy	× Moderate	Tropical	∞ Haze
	☉☉ Lightning		☉ Hurricane	☉ Smoke
			☉ Storm	D Dust

Second:

-The next morning before going to school note the current weather (by observation of the world around you- use a thermometer, barometer, and any other weather tools you have at your home to do this in addition to your senses) and record an entry in your journal.

-In the first five minutes of class there will be time for you to again observe the current weather. Be precise in the details of your observations and remember to use scientific vocabulary.

-(These entries may be anywhere from a few sentences to a paragraph in length depending on your observations. Clear and precise entries that are short are better than long elaborate entries that do not use scientific vocabulary)

Third:

-In the evening look back to the entry concerning the forecast you watched on television and compare and contrast it to the weather you observed throughout the day. Make observations on where the meteorologist succeeded in predicting the weather. This entry should be no less than a full paragraph in length.

-Also, repeat the first step in the process for tomorrow's weather.

Be sure to record time (including a.m. or p.m.) & date for each entry

New Station Field Trip Worksheet

Name: _____

Date: _____

During the course of the fieldtrip pay close attention and be ready to fill out the following questions.

1.) List and describe 4 pieces of weather equipment used by meteorologists:

2.) Which piece of equipment did you think was most useful in obtaining data about weather? Why?

3.) What are the different types of jobs at the weather station?

4.) Diagram the process of observation, data collection, analysis of data, and synthesis of weather forecasts.

5.) What are three things you learned today that you did not know before?

6.) List two questions you still have after listening to today's lecturer.

Regional Weather lab report: Part I

to be completed on day 3

Heading format:

Names of people in group

Date (MM/DD/YY)

Class

Teachers Name

Title:

Include a short, descriptive title for your report.

Introduction:

What is your city? Describe the elevation, air quality, annual precipitation (rainfall/snowfall), record high and low temperatures. Describe typical seasonal patterns in your city and region.

Hypothesis:

A hypothesis is like an educated guess about what will happen in the future. What do you predict will happen in your city on the following Thursday? Describe humidity, high and low temperature, wind, precipitation, visibility, pressure, and severe weather. Why did you predict this?

Data Collection:

Chart out the data you collected in making this prediction. (See pages 160-164 in Science Explorer for ideas about organizing your information.)

Methods and Materials:

Describe in detail your method of gathering and analyzing your data. Discuss trends you noticed in performing your research.

Works Cited:

Here is a sample citation for a website (APA format)

Electronic reference formats recommended by the American Psychological Association. (2000, October 12). Retrieved October 23, 2000, from <http://www.apa.org/journals/webref.html>

Regional Weather lab report: Part II

To be completed on day 5

Heading Format:

Names of people in group

Date (MM/DD/YY)

Class

Teachers Name

Results:

What was the actual weather in your city today? Describe humidity, high and low temperature, wind, precipitation, visibility, pressure, and severe weather.

Discussion:

Did your hypothesis match the actual weather? Which resources seemed to work for your group which didn't? Why and why not?

Conclusion:

Which resources seemed to work for all of the groups in the class? Which methods did most people use? Try to explain possible causes of error in your predictions. If you were to do this assignment again, how would you reform your hypothesis? What different resources would you have used?

Name _____
Date _____

Weather Related Online Resources

Try to look for websites that are informative and reliable academic resources. Be thorough in your descriptions because these worksheets will be a resource to you for your upcoming project.

Name of website:				
URL:				
Date Accessed:				
Information provided:				
Rating:				

Name of website:				
URL:				
Date Accessed:				
Information provided:				
Rating:				