



Harvard LTER Schoolyard Program

Teacher Developed Lessons and Documents that integrate Harvard Forest Schoolyard Ecology Themes into curriculum.

- **Presentation Title:** Okay, I've gathered the data. What do I do with it?
- **Description of Presentation:** Shannon shared how she engaged students in graphing their data to prepare for creating scientific posters.
- **Teacher/Author:** Shannon Meehan
- **School:** Dr. Elmer S. Bagnall Elementary School
- **Level:** 5th Grade
- **Date:** April 13, 2011

First Year



**OKAY, I'VE
GATHERED THE
DATA.**

**WHAT DO I DO
WITH IT?**

My First Year Approach: Unit Plan of Study



- Unit of Study

- Harvard Forest Long Term Ecological Research Schoolyard Program: Buds, Leaves and Global Warming
- This is a study that students have been participating in since September of 2009.
- In the fall, students observed and recorded when leaves changed color and when they fell of the trees.
- In the spring, the students observe and record when buds located on the same branches of the same trees begin to become puffy and then burst.
- This is the first year of a multiyear study.
- The immediate goal is to determine when the leaves fall and when the buds burst.
- The long term goal is to figure out how long the growing season is at our field site.
- The information that we gathered is submitted to the Harvard Forest Phenology Study on how global warming effects the growing season.

Massachusetts State Standards



- ELA Framework: Language Strand
 - GENERAL STANDARD 3: Oral Presentation
 - ✦ 3.12 Give oral presentations to different audiences for various purposes, showing appropriate changes in delivery (*gestures, vocabulary, pace, visuals*) and using language for dramatic effect.

Massachusetts State Standards



- **Mathematics Framework: Patterns, Relations, and Algebra Strand**
 - **5.P.4** Represent real situations and mathematical relationships with concrete models, tables, graphs, and rules in words and with symbols, e.g., input-output tables.
- **DATA ANALYSIS, STATISTICS, AND PROBABILITY STRAND**
 - **5.D.1** Given a set of data, find the median, mean, mode, maximum, minimum, and range, and apply to solutions of problems.
 - **5.D.2** Construct and interpret line plots, line graphs, and bar graphs. Interpret and label circle graphs.

Massachusetts State Standards



- **Science Frameworks: Life Science (Biology), Grades 3-5**
 - 3. Recognize that the plants and animals go through predictable life cycles that include birth, growth, development, reproduction and death
 - 5. Differentiate between observed characteristics of plants and animals that are fully inherited (e.g., color of flower, shape of leaves, color of eyes, number of appendages) and characteristics that are affected by the climate or environment.
 - 9. Recognize plant behaviors, such as the way seedlings' stems grow toward light and their roots grow downward in response to gravity. Recognize that many plants and animals can survive harsh environments because of seasonal behaviors, e.g., in winter some trees shed leaves, some animals hibernate, and other animals migrate.

Goals of the Unit



ESSENTIAL QUESTIONS:

LONG TERM: (UNABLE TO BE DETERMINED THIS YEAR) HOW LONG IS THE GROWING SEASON IN GROVELAND?

IMMEDIATE GOAL: WHEN DID THE LEAVES FALL OFF THE TREES THIS FALL? WHEN DID THE BUDS BURST THIS SPRING?



Assessment Strategies

Pre-Assessment

Formative

Summative

- **Pre-assessment:** This study has been conducted throughout the school year. Student notes and observations have served as pre-assessments
- **Formative:** The study has been conducted throughout the school year. Student notes and observations have served as formative assessments. Class discussions and teacher observation has served as formative assessments also.
- **Summative:** Students will use their notes and observations to create a scientific poster that demonstrates their knowledge of the research project.

Student Assignment

Scientific Poster

Name _____
Date _____

Role: You are a citizen scientist
Audience: Other citizen scientists
Format: Scientific Poster
Topic: Leaf drop and bud burst
Strong Verb: communicate, analyze

Your fellow citizen scientists have heard about your leaf drop and bud burst study. They have invited you to share a scientific poster at a conference about global warming.

They would like you to clearly analyze your data and communicate your findings. The conference organizers have sent the criteria for posters that will be included in the conference; please see the attached pages.

Dear Fellow Scientists;

Thank you for accepting our invitation to be part of our conference about how global warming effects the growing season. We have heard wonderful news about your research and cannot wait to see your scientific poster.

As you know, all scientific posters must meet certain criteria. When all scientists use a similar format, it is much easier for people unfamiliar with your particular study to read and understand your information. Please see below for the specific criteria.

If you have any questions, please feel free to contact us.

Sincerely,

The organizers

Scientific Poster Criteria



Title: The title should be centered at the top of the poster. The title should clearly indicate your essential questions

Introduction: The introduction is there to allow people who are unfamiliar with the study a chance to get a basic understanding of what it is that you studied

Materials and Methods: This section is here to provide the audience with a brief description of what you studied and how you studied it. You should indicate the steps you have taken with your observations and your recordings.

Results: You should clearly tell us the results of your study. You should clearly answer your essential questions. This is not a time to speculate, this part just shows your hard data.

Conclusions: remind your audience of the essential questions and your results. This is your chance to speculate about your results. You need to clearly support your conclusions with data. This is a place where you can discuss further studies that you will do concerning this topic.

Please see the attached samples of poster layouts to see where you should place your information.

Please see the attached rubric to see the essential criteria that must be included in each section of the poster, it also contains the criteria for the layout of the poster.

Why a Scientific Poster?



- Scientific posters are an easy way to access information about a study
- Professionals in the science field actually use these types of posters at conferences
- Wanted to expose students to real life experiences. It is a possibility that students will use these types of posters in real life
- Graphing was important because it exposed students to Excel, how to enter data and how to use that data to make graphs that can be analyzed.

Graphing the Data



**GRAPHING THE DATA WAS ONE
OF THE MAIN GOALS OF THIS
UNIT**

Graphing



- Our graphs allowed students to analyze the data in a non-judgmental way
- Graphs were executed in a scatter plot fashion. This is because the leaf drop and bud burst observations were not completed in a linear fashion
 - We were unable to visit our leaves everyday and therefore did not have data as to the exact day that the leaves fell or when the buds burst.
- Students graphed the information for their trees only
- Following Data is for the class as a whole

Sample Fall Data

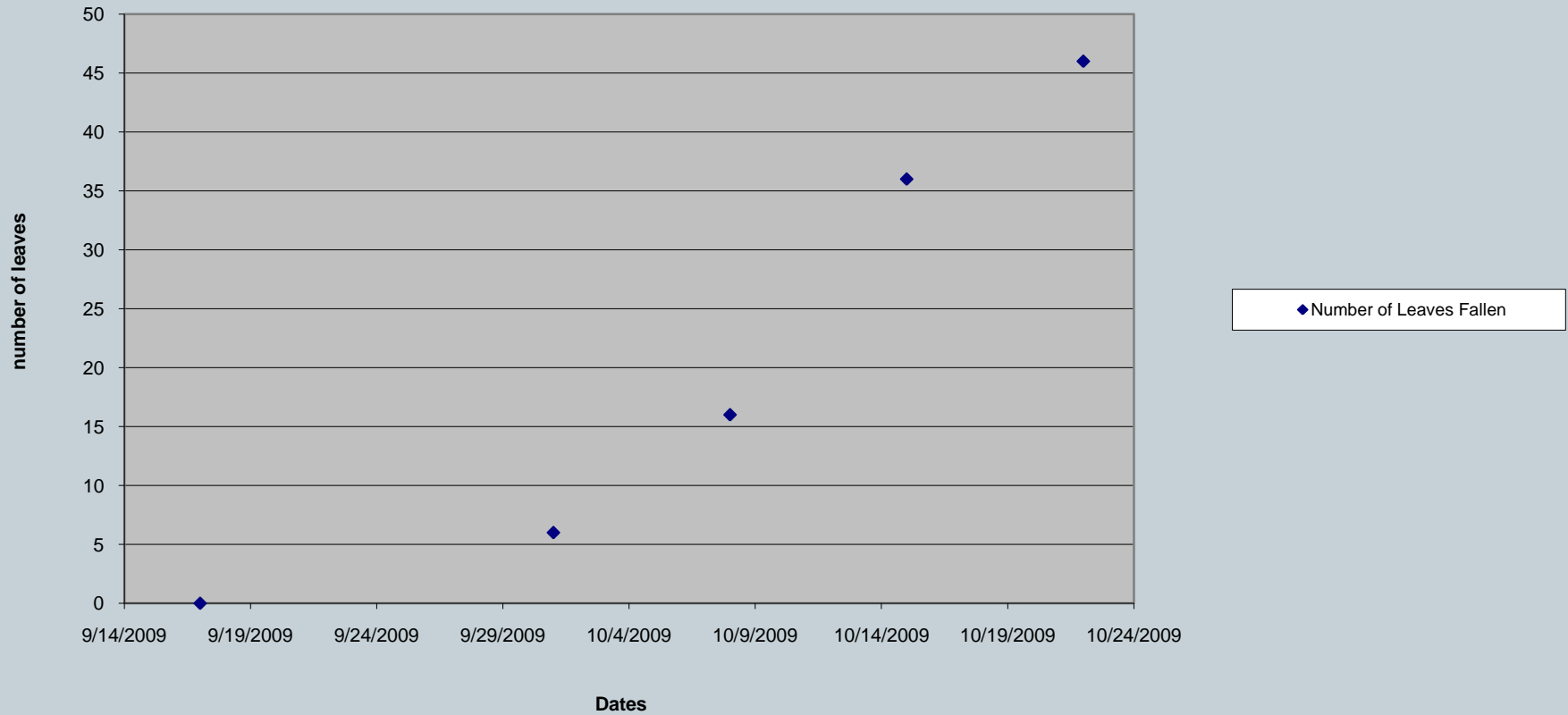


Date	Number of Leaves Fallen	
9/17/2009		0
10/1/2009		6
10/8/2009		16
10/15/2009		36
10/22/2009		46

Sample Fall Data Graph



Number of Leaves Fallen



Sample Spring Data

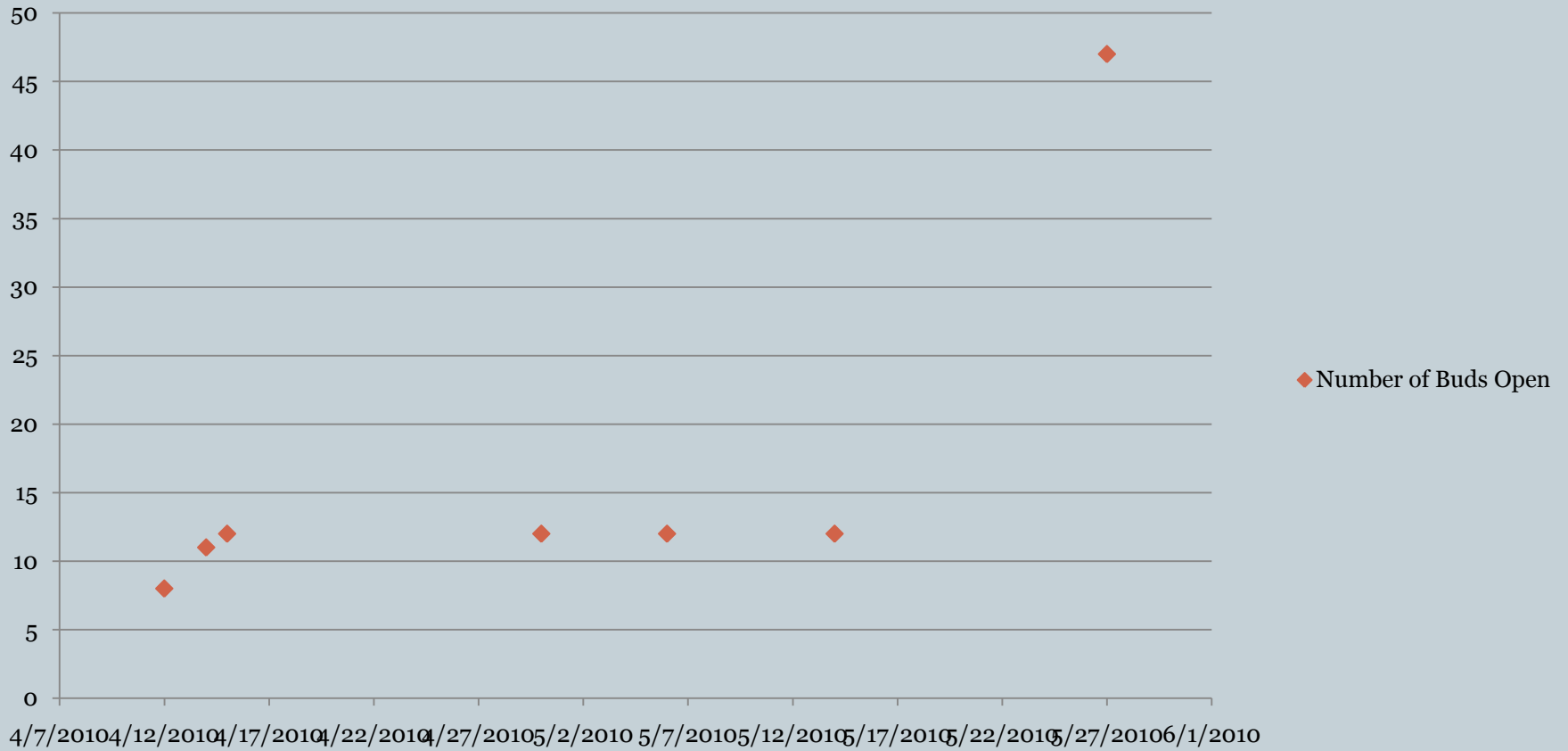


Date	Number of Buds Open	
4/12/2010	8	
4/14/2010	11	
4/15/2010	12	
4/30/2010	12	
5/6/2010	12	
5/14/2010	12	
5/27/2010	47	

Sample Spring Data Graph



Number of Buds Open



Graphing Conclusions



- Our Fall graphs showed us that our observations were not always accurate. We noticed that some fallen leaves miraculously jumped back onto trees after they had already been observed to have fallen off!
- Our spring graphs look as though leaves suddenly burst on one day, but in reality, we ended up switching branches on a couple of trees because our original branches did not burst at all

Want more information?



If you are interested in having me e-mail you the unit of study please feel free to contact me at:

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