

2008
Winning Lesson Plan
from Los Banos,
California

Arachnid Mania Lesson

by Sergio de Alba
R.M. Miano Elementary

Subject: Life Sciences

Grade Level: 4–6

Duration: Eight Month Long
Thematic Unit Lesson

Overview and Purpose

Arachnid-Mania will provide students with an enrichment opportunity that will improve understanding of several academic subjects by using scientific inquiry as the focus.

How This Lesson Is Innovative

The Arachnid Mania Lesson uses the inherent fascination children have of bugs to incorporate and gain knowledge in not only science, but, writing, research, oral communication skills, and in math.

Educational California State Standards Addressed

Science Standards

Life Science Standard 2.

- All organisms need energy and matter to live and grow. As a basis for understanding this concept:
 - b. Students know producers and consumers (herbivores, carnivores, omnivores, and decomposers) are related in food chains and food webs and may compete with each other for resources in an ecosystem.

Life Science Standard 3.

- Living organisms depend on one another and on their environment for survival. As a basis for understanding this concept:
 - a. Students know ecosystems can be characterized by their living and nonliving components.
 - b. Students know that in any particular environment, some kinds of plants and animals survive well, some survive less well, and some cannot survive at all.

Investigation and Experimentation Standard 6.

- Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations. Students will: differentiate observation from inference (interpretation) and know scientists' explanations come partly from what they observe and partly from how they interpret their observations.
 - a. Measure and estimate the weight, length, or volume of objects.
 - d. Construct and interpret graphs from measurements.
 - f. Follow a set of written instructions for a scientific investigation.

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Educational Standards Addressed (Cont'd)

Research and Technology Standard

- 1.5 Quote or paraphrase information sources, citing them appropriately.
- 1.7 Use various reference materials (e.g., dictionary, thesaurus, card catalog, encyclopedia, online information) as an aid to writing.

Using the writing strategies of fourth grade outlined in Writing Standard 1.0, students:

- 2.1 Write narratives:
 - a. Provide a context to enable the reader to imagine the world of the event or experience.
 - b. Use concrete sensory details.
 - c. Provide insight into why the selected event or experience is memorable.
- 2.3 Write information reports:
 - b. Include facts and details for focus.
 - c. Draw from more than one source of information (e.g., speakers, books, newspapers, other media sources).

Listening and Speaking Standards

- 1.0 Listening and Speaking Strategies
 - Students listen critically and respond appropriately to oral communication. They speak in a manner that guides the listener to understand important ideas by using proper phrasing, pitch, and modulation.

Comprehension Standards

- 1.1 Ask thoughtful questions and respond to relevant questions with appropriate elaboration in oral settings.
- 1.2 Summarize major ideas and supporting evidence presented in spoken messages and formal presentations.
- 1.4 Give precise directions and instructions.

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Organization and Delivery of Oral Communication Standards

- 1.5 Present effective introductions and conclusions that guide and inform the listener's understanding of important ideas and evidence.
- 1.6 Use traditional structures for conveying information (e.g., cause and effect, similarity and difference, posing and answering a question).
- 1.7 Emphasize points in ways that help the listener or viewer to follow important ideas and concepts.
- 1.8 Use details, examples, anecdotes, or experiences to explain or clarify information.
- 1.9 Use volume, pitch, phrasing, pace, modulation, and gestures appropriately to enhance meaning.
- 2.0 Speaking Applications
 - Students deliver brief recitations and oral presentations about familiar experiences or interests that are organized around a coherent thesis statement. Student speaking demonstrates a command of standard American English and the organizational and delivery strategies outlined in Listening and Speaking Standard 1.0. Using the speaking strategies of grade four outlined in Listening and Speaking Standard 1.0, students:
- 2.2 Make informational presentations:
 - a. Frame a key question.
 - b. Include facts and details that help listeners to focus.
 - c. Incorporate more than one source of information (e.g., speakers, books, newspapers, television, or radio reports).
- 2.3 Deliver oral summaries of articles and books that contain the main ideas of the event or article and the most significant details.

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Math Standards

Mathematical Reasoning

- 1.0 Students make decisions about how to approach problems.
- 2.0 Students use strategies, skills, and concepts in finding solutions.
- 2.1 Use estimation to verify the reasonableness of calculated results.
- 2.2 Apply strategies and results from simpler problems to more complex problems.
- 2.3 Use a variety of methods, such as words, numbers, symbols, charts, graphs, tables, diagrams, and models, to explain reasoning.
- 2.5 Indicate the relative advantages of exact and approximate solutions to problems and give answers to a specified degree of accuracy.
- 2.6 Make precise calculations and check the validity of the results from the context of the problem.
- 3.2 Note the method of deriving the solution and demonstrate a conceptual understanding of the derivation by solving similar problems.
- 3.3 Develop generalizations of the results obtained and apply them in other circumstances.

Objectives

Students will gain greater understanding of several California State standards through a year long unit that teaches how to make connections through various academic subjects.

Materials Needed

| | | |
|---|---------------------------|------------------------|
| Arachnid Specimens | Microscopes | Humidity Gauges |
| Thermometers | Measuring Tools | Maps of the Continents |
| Posters with the Scientific Method | Science Research Journals | |
| Books On Arachnids and Animal Research Projects | | |

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Procedures

Each student chooses a few arachnid specimens to research and to do a scientific experiment with. Once students have completed their research and are at the midpoint to completing their scientific experiments they begin to create short stories about their specimens to allow them to share with students from other classes. When my kids are well prepared we invite students from other classes to participate in an informative and educational experience that includes an oral presentation of our arachnids, the research that my kids have done, the science experiments (using science and math reasoning standards) that they are conducting, and they share the short stories that they have written. The class is then divided into groups based on the continent of origin of their arachnid (five continents are represented). This also helps students find learning about the continents and geography more interesting. Guest classes have an opportunity to visit the different groups and have a chance to ask questions about the arachnids.

Students are allowed to choose the experiment that they would like to conduct with their chosen arachnid from a list of possible experiments. Once students have chosen what their experiment will be, they research basic information about their specimen in the research books and in the internet. These books allow them to gain background information necessary to understand the needs of their specimen and also understand their origin.

The five-step scientific method will be used for their experiments. A microscope, humidity/temperature gauges, and measuring tools are used to give students a chance to better conduct their experiments.

Each student will have an opportunity to share the progress of their experiment to their “continent” group biweekly (group work). Once a month students will have an opportunity to present the progress of their experiment to the entire class (whole class work). Having many opportunities to present their information will improve their oral communication skills and make them feel that their research is important and valued. During this time students are also producing books about their specimens. The books will be creative short narratives that they will share with visiting classes.

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Procedures (Cont'd)

By the middle of the year my students are well researched about their specimen and their scientific experiment will be at its midpoint. At this time we prepare the classroom into five presentation sections using the continent maps and prepare to present our information to two visiting classes each week. One student is chosen to be our “Featured Presenter” for each presentation. The Featured Presenter goes in front of the class and has an opportunity to showcase their knowledge to the visiting classes. After a brief introduction to our rules and an introduction to the continent groups the visiting class is allowed to visit the different continent groups and ask questions about the arachnid and science experiment that they find most interesting.

To conclude the presentation students are allowed time to share their short stories with students from the visiting class.

Several assessments are used to insure that the goals we have set are accomplished. My kids each have a science journal in which they write their weekly findings from their experiments. This information is used to prepare presentations that they give to their continent group, to the whole class, and to visiting classes. All presentations are observed by me and are used as an assessment to monitor their level of understanding. Visiting classes should be engaged and eager to listen to what my students have to say in order for my students to receive full credit for their presentations. Visiting students are also assessed by using a test that we give to visiting teachers and we will also be placing it on our future Arachnid-Mania website. Teachers from visiting classes will give this test to their students after their own class’ thematic unit has concluded. Students that score well on our test are invited back during their recess time to participate in a guest researcher program for students that are interested in our program. That has been a very popular part of this program.

Our overall goal with the Arachnid Mania lesson is to provide these low-income and minority students the opportunity to do long term experiments using arachnids. This program benefits not only my students, but the rest of our school. The most powerful statement that this program makes is that a research program of this magnitude can be accomplished by other students that are just like them in this small rural farming community.