

## Web Unit Plan

**Title:** Pond Water and Pollywogs

**Description:** Primary students rear frogs from eggs and share their expertise in an informative brochure for visitors at a new amphibian exhibit at the local zoo.

### At a Glance

**Grade Level:** K–2

**Subject sort (for Web site index):** Science

**Subject(s):** Life Science

**Topics:** Frogs, Biology

**Higher-Order Thinking Skills:** Analysis, Investigation

**Key Learnings:** Diversity, Habitat, Interdependence, Life Cycle, Metamorphosis

**Time Needed:** 12–15 weeks, 45-minute lessons, daily

**Background:** [From the Classroom](#) in Maryland, United States

### Unit Summary

The local zoo has a new amphibian exhibit and needs a newsletter to help visitors understand and appreciate frogs. On their way to becoming frog experts, students investigate the universal features of habitats, observe frogs in their natural environment, and raise frogs from eggs in an artificial habitat. Students record their observations and reflections in words and pictures in a science log, and use a spreadsheet to record their data collection. They show their understanding of habitats in general and the specific features of a frog habitat in a slideshow presentation. Students create a newsletter illustrating the frog life cycle and habitat, both natural and man-made, and give specific details about the frog exhibit.

### Curriculum-Framing Questions

- **Essential Questions**

Why do people say, “There is no place like home”?

- **Unit Questions**

How do frogs fit into where they live?

How does a frog’s classroom home compare to its home in the wild?

- **Content Questions**

What is the life cycle of a frog?

What is *pH*, and what can it tell us about the health of a pond?

What is needed for a healthy frog habitat?

### Assessment Processes

View how a variety of student-centered [assessments](#) are used in the Pond Water and Pollywogs Unit Plan. These assessments help students and teachers set goals;

monitor student progress; provide feedback; assess thinking, processes, performances, and products; and reflect on learning throughout the learning cycle.

## Instructional Procedures

### In Preparation for the Unit

To introduce the project-based learning scenario, prepare a [letter](#), addressed to the class, describing the zoo's frog exhibit. This will appear to have been written by someone at the zoo (or you could actually have someone at the zoo write a letter on official letterhead) requesting students' help.

If collecting frogs from the wild, determine rules for collection and release of animals in the area (the state department of fish and wildlife is a good starting place). Arrange for frog eggs to be collected or delivered.

Get an aquarium (approximately 20 gallons) and materials necessary for a tadpole/frog habitat (see the [Resources](#) section for habitat requirements). Gather frog videos, books, printed materials, and electronic resources, and line up an amphibian's expert to visit the classroom.

### Introduce the Project

On the first day of the unit, "deliver" a letter from the local zoo to the class. Read and discuss the letter, and develop the scenario. Discuss frogs, and start a Know-Wonder-Learn (K-W-L) chart to record prior knowledge and questions about frogs. Chart ideas as well as thoughts on steps students can take to answer their questions. Present and discuss the Essential Question, *Why do people say, "There is no place like home"?* Have students discuss the question as a whole group, covering topics such as why they like their homes, what activities they do at their homes, and why homes are important. Record student responses on chart paper. Students could draw pictures of their homes and write words to represent why their homes are important to them. This could be the first entry in their frog observation journals.

In their journals, students record ideas and thoughts, using writing and drawing. [Observation journal questions](#) are used to probe understanding throughout the course of the unit, with students writing, drawing, or dictating responses. In a discussion, compare what frogs and people need to grow. Record similarities and differences on a T-chart. Introduce the term *habitat* as the concept that encompasses comparisons among homes, diets, air and water usage, and so forth.

Have students record what they believe to be the necessary features of a frog habitat in their journals. Share ideas and chart them on chart paper for students to refer to throughout the unit. For homework, challenge students to come up with a list of essential features of a frog habitat.

### Learning about a Frog's Habitat

At the end of the first week, visit a local pond as a class and observe a natural frog habitat. Have students gather the evidence they need to begin to address the Unit and Content Questions:

- *How do frogs fit into where they live?*
- *How does a frog's classroom home compare to its home in the wild?*
- *What is pH, and what can it tell us about the health of a pond?*

- *What is needed for a healthy frog habitat?*

Have students photograph the site and features of the pond to refer back to when setting up the aquarium at school. (Digital images are also useful for later projects and presentations.) Using various instruments, have students measure and record water quality. The pH (alkalinity/acidity), temperature, and dissolved oxygen are three factors of water quality that can be measured. Kits for testing pH and dissolved oxygen can be found at many pet stores.

After the field trip, revisit the Content Question, *What is needed for a healthy frog habitat?* Ask students to respond to the question in their frog journals by illustrating and labeling the features of the frog habitat they observed. In groups, have students discuss the characteristics of the frog habitat and develop a list of criteria for their artificial frog habitat. Develop the K-W-L chart further. Using a book on amphibian husbandry, elaborate on habitat requirements that may not have been developed thus far, and have students record new information in their journals.

Instruct students to complete either or both of the following activities:

- Using the frog habitat criteria developed by the students, have students paint murals of frogs in their natural habitat. Have students label the illustrations, and post the murals around the room.
- Using field guides and illustrations for reference, have students paint or draw frogs indigenous to the region. Have students add captions that synthesize what they learned about the frogs.

The drawings become a dynamic part of the project as students add to them throughout the course of the unit.

Help students apply their knowledge of natural habitat by working as a class to create the aquarium habitat for the frog eggs. After the new habitat is constructed, revisit the Unit Question, *How does a frog's classroom home compare to its home in the wild?* Construct a Venn diagram to depict similarities and differences between the two habitats.

## Data Gathering and Organization

Help students address and answer the Content Question, *What is the life cycle of a frog?* Students experience the developmental process firsthand, from egg to frog. Have students use the [frog life cycle spreadsheet](#) to record observations every few days. Students can use the spreadsheet either by printing it and writing their observations in the spreadsheet cells, or by entering data into the spreadsheet directly on the computer. The first entry occurs when eggs are first placed in the aquarium. The first page of the spreadsheet is used to record data from their observations of the eggs. As the frog develops, have the students use the next four pages of the spreadsheet—tadpole, tadpole with legs, froglet, and adult frog—to record their observations. Guide students as they draw their observations of frog development, record dates of entry, and write, if possible, about the changes they see. Water quality (pH, temperature, and dissolved oxygen) should be tested and recorded daily, and modified as needed.

Periodically, have students demonstrate their understanding by having them answer questions in their journals (see the [observation journal questions](#)).

## Student Multimedia Presentation

Have students create a class [slideshow](#) on habitats in general and a frog habitat in particular to share with the another class at school. Tell students the presentation must answer the following questions:

- *How do frogs fit into where they live?*
- *How does a frog's classroom home compare to its home in the wild?*
- *What is pH, and what can it tell us about the health of a pond?*
- *What is needed for a healthy frog habitat?*
- *Why do people say, "There is no place like home"?*

Also tell the class that the presentation must include the following components as supporting evidence for the questions:

- Title slide
- Introduction to the frog project
- Explanation of elements of a healthy frog habitat
- Description of the creation of an artificial frog habitat
- Description of observations
- Comparison of natural and artificial habitats
- Description of why a home is important to a frog

Have students collaborate in small heterogeneous groups, and assign one of the preceding components of the presentation to each group. Then, assign a role to each member of the group, with roles rotating among members. The timekeeper, the typist, the supply gatherer, and the supporter are sample roles that can be used. Pass out the [presentation self-assessment](#) and review requirements. Model using the assessment with students, so they are aware of expectations, and then check for understanding. Have students develop a rough draft of group work on a storyboard planning sheet prior to creating the slideshow. Use a template to structure the presentation. Slide details, sequence, transitions, and timing can be determined by class consensus as slides are organized into a class show.

## Research Activities—Frog Life Cycle

Using the Curriculum-Framing Questions to focus learning, have students gather more information about the frog life cycle. Make sure students continue writing questions that arise in their journals. These are used as the basis for class discussion. As students study, tell them to record interesting information in their journals.

Introduce the frog life cycle in a puzzle format. Using the [life cycle diagram](#), create enough puzzle packs for pairs of students to share. To make the puzzles, cut the diagrams apart, and separate pictures from labels. To re-create the puzzles, have students put the diagrams in order, and match the diagrams to the correct labels. After completing the puzzles, encourage students to read the captions aloud to one another.

Students can document the frog life cycle on a large poster as they watch their frogs develop. Throughout this research period, enlist adult helpers or upper-grade buddies to assist students with reading, writing, and computer use.

### Student Newsletter

Have students summarize the unit content and apply it to create a newsletter for zoo visitors. Working in groups, have each group develop one component of the newsletter. When rough drafts are complete, arrange for students to meet with another group, so students can get feedback and suggestions for improvement. When revisions are complete, have students submit their contributions. Enlist the help of an adult to assemble the [newsletter](#). Make sure the newsletter includes the following components:

- Introduction explaining the Pond Water and Pollywogs Unit Plan study
- Planning process by which a habitat was created for the developing frogs
- What a frogs eats in the wild and how frogs gather food
- What a frog is and whether it makes a good pet
- Book review
- Comparison of frogs and toads
- Life cycle of a frog, with pictures and captions
- "About the authors" information and resource information
- Digital pictures, graphics, or scanned artwork

### Revisiting the Essential Question and Wrapping Up

Have students look back at the K-W-L chart created at the beginning of the unit. Discuss the questions they posed, and then begin to fill out the LEARN section with student ideas. Point out how exciting it is that they have learned so much information about habitats and frogs! Pose the Essential Question, *Why do people say, "There is no place like home"?* again to students. Have students share their ideas in small groups and then discuss with the whole class, reminding them to use examples from their frog study.

Instruct students to make one last entry in their frog observation journal about what they learned about habitat and frogs. Consider choosing one of the following final prompts:

- Using all you have learned, draw the life cycle of the frog. Label your drawing with important information.
- Draw a picture of a frog's natural habitat. Show everything a frog needs to be happy and healthy.
- Draw a picture of the frog's artificial habitat that we created in class. Show everything we included.
- *How are the two habitats the same? How are they different? How might one be better than the other, and in what ways?*

Adding pictures of students participating in the frog study would be a great addition to their journals.

Use the [science content scoring guide](#) to assess student work, participation, and understanding of science-related content.

### Prerequisite Skills

- Basic computer navigation skills (including using a mouse and keyboard)
- Reading
- Research using books and the Internet
- Writing

### Differentiated Instruction

#### Resource Student

- Arrange students in heterogeneous groups as described in the three projects to allow every student to experience success
- Give the student additional adult assistance, extra work time, and task modifications as needed

#### Gifted Student

- Allow the student to help others and serve as an expert in reading, writing, and technology use
- Encourage the student to do research on an aspect of frogs that is not focused on in class

#### English Language Learner (ELL)

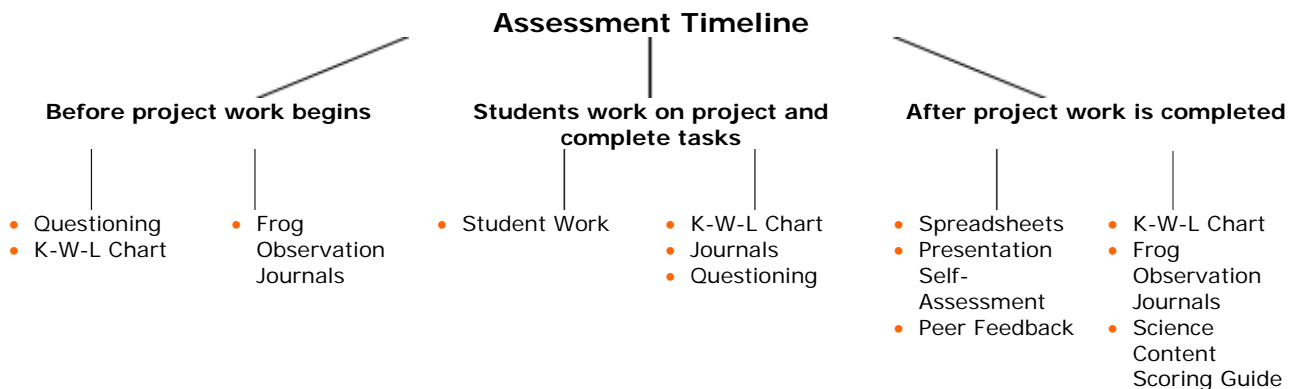
- Ask the ELL teacher to help the student translate basic terms into an English/first language glossary, and post translated terms around the room for all students to learn
- Have the ELL teacher explain difficult concepts to the student and help the student complete journal entries
- Pair bilingual students with nonnative speakers for tasks that require reading and writing
- Allow the student to complete journal writing in the student's first language for later translation
- Adapt assignments for the student
- Give the student additional time to complete tasks as necessary

### Credits

Lisa-helen Shapiro participated in the Intel® Teach Program, which resulted in this idea for a classroom project. A team of teachers expanded the plan into the example you see here.

## THINGS YOU NEED

### Assessment Plan



Prior knowledge of frogs and a frog's life cycle is assessed and built on using a K-W-L chart. Higher-order thinking is prompted throughout the unit through class discussions and use of the Curriculum-Framing Questions. Students demonstrate their learning on an ongoing basis as they respond to questioning within their frog observation journals. Use the [observation journal questions](#) as prompts for students to respond to through writing, drawing, and discussions. Frequent probing for understanding allows for monitoring and adjusting of instruction in a responsive way.

The students' understanding of science content is assessed using the [science content scoring guide](#). This scoring guide should be used to assess students' observational journal entries and student work, including homework, in class work, and newsletter. Student groups receive and offer peer feedback on their newsletter contributions and have an opportunity to self-assess their own work for the slideshow presentation using the [presentation self-assessment](#).

### Targeted Content Standards and Benchmarks

#### Maryland Content Standards

##### Skills and Processes:

- Students demonstrate the thinking and acting inherent in the practice of science.

##### Life Science:

- Students use scientific skills and processes to explain the dynamic nature of living things, their interactions, and the results from the interactions that occur over time.

##### Environmental Science:

- Students use scientific skills and processes to explain the interactions of environmental factors (living and nonliving) and analyze their impact from a local to a global perspective.

### Targeted National Content Standards

#### Science: Grades K-4

- Develop abilities necessary to do scientific inquiry
- Develop understanding about scientific inquiry

#### **Life Science: Grades K-4**

- Know the characteristics of organisms
- Know life cycles of organisms
- Know organisms and environments

#### **National Educational Technology Standards (NETS) Technology: Grades K-2**

- Use input devices (such as mouse, keyboard, and remote control) and output devices (such as monitor and printer) to successfully operate computers, VCRs, audiotapes, and other technologies
- Use a variety of media and technology resources for directed and independent learning activities
- Use developmentally appropriate multimedia resources (such as interactive books, educational software, and elementary multimedia encyclopedias) to support learning
- Create developmentally appropriate multimedia products with support from teachers, family members, or student partners
- Use technology resources for problem solving, communication, and illustration of thoughts, ideas, and stories

#### **Student Objectives**

Students will be able to:

- Understand a frog's life cycle and development by hatching frog eggs and observing tadpole growth and development
- Describe the characteristics of frogs and compare them to characteristics of toads
- Describe the characteristics of amphibians as contrasted to fish, reptiles, or mammals
- Describe a frog's habitat and how it supports the life of a frog
- Work cooperatively in small groups
- Document observations in a journal or learning log
- Ask questions, gather research, organize information, prepare data, and present findings in writing and on a spreadsheet



## Materials and Resources

### Printed Materials

- Bartlett, R. D. (1996). *Frogs, toads and treefrogs*. Hauppauge, NY: Barron's Educational Series, Inc.
- Gibbons, G. (1993). *Frogs*. NY: Holiday House.
- Lobel, A. (1970). *Frog and toad are friends*. New York: HarperCollins Publications.
- Pfeffer, W. (1994). *From tadpole to frog*. New York: HarperCollins and Let's Read-and-Find-Out.

### Supplies

- Aquarium and tadpole/frog habitat supplies
- Basic art supplies
- Butcher paper
- Poster paper
- Tempera paints
- Storyboards/templates for designing slideshows
- Water quality test kits, available at pet stores or [Carolina Biological Supply Company](#)\*

### Internet Resources

- All About Frogs for Kids and Teachers  
[www.kiddyhouse.com/Themes/frogs](http://www.kiddyhouse.com/Themes/frogs)\*  
Tips for creating a wildlife habitat in your own backyard
- Center for Global Environmental Education: A Thousand Friends of Frogs  
<http://cgee.hamline.edu/frogs>\*  
A resource for children, parents, educators, and scientists to study and celebrate frogs and their habitats
- Exploratorium: Frogs  
[www.exploratorium.edu/frogs](http://www.exploratorium.edu/frogs)\*  
From an Exploratorium exhibit, includes frog articles, interactive exhibits, and hands-on activities
- The Froggy Page  
[www.frogsonice.com/froggy](http://www.frogsonice.com/froggy)\*  
A frog resources site, includes a section of links to frog stories
- Froggyville  
[www.froggyville.com](http://www.froggyville.com)\*  
A frog resource site that includes directions for setting up an ideal frog habitat
- Frogs!  
[www.bry-backmanor.org/gardenfun/froggies.html](http://www.bry-backmanor.org/gardenfun/froggies.html)\*  
Includes free frog clip art  
Students can send in their work to this site
- Frogs at EnchantedLearning.com

[www.enchantedlearning.com/themes/frog.shtml](http://www.enchantedlearning.com/themes/frog.shtml)\*

Printouts for noncommercial, educational use

- The Frogs of New England  
<http://library.thinkquest.org/11034>\*  
Facts, anatomy, life cycle, and habitat information for 11 species of frogs in the New England area
- TrackStar  
<http://trackstar.4teachers.org/trackstar/index.jsp>\*  
Search for tracks already created on frogs and use as a resource in the classroom

### **Technology—Hardware**

- Computers to create slideshow and newsletter projects
- Digital camera to take pictures of the pond and of students participating in the project
- Internet connection to locate frog and habitat information
- Printer to publish newsletter to send to parents

### **Technology—Software**

- Encyclopedia on CD-ROM to research frogs and habitats
- Internet Web browser to research frogs and habitats
- Publishing software for newsletter publications
- Presentation software for slideshows