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Curriculum Connections

Developing Young Scientists

Like real scientists, your students must learn keen observation to take in information and record details of what they see. After all, it's only after someone has really seen something that he or she can make sense of it. Photography can be a great learning and assessment tool for capturing observations, documenting experiments, and revealing student understanding. Here are some ideas to spark your thinking:

Investigative Eyes

Early in a science exploration, invite students to use a camera to document fascinating features and phenomena – a ladybug feeding on an aphid, a bold pollen-laden bloom, earthworms at work in a compost bin (via time lapse photography). When questions arise that students can answer through routine observations or experiments, they can use photos along with written descriptions to document and compare different treatments (e.g., plant growth and health in different types of soils). As students make sense of their experimental data and present their findings, they can use photos along with verbal or written explanations to illustrate and defend their conclusions.

Picturing Learning



Photo by Laura Bauersfeld, Middle School Student

Garden Changes and Cycles

The concept of change over time is a foundation of curriculum frameworks and standards, even for the youngest students. By capturing a plant or location at various points during a life cycle, season, or year, students have a chronological record they can draw on to practice sequencing, predict changes, grasp concepts (like how a flower becomes a bean), and so on. They might train their lenses on the garden cycle, the life cycle of a particular plant, the process of decomposition (e.g., by taking shots every few days of a squash left outdoors in the heat), stages of a Monarch butterfly, or seasonal changes in a tree or meadow.

Create a Photo Field Guide

Field guides are publications designed to help people identify living things outdoors. Plant field guides typically rely on drawings or photographs of plants, so using cameras to create a vibrant schoolyard resource makes good sense. You can begin by having students peruse and use published field guides, and pick out elements that make them useful. (Plant and flower guides are generally arranged according to physical characteristics, such as flower type, size, and color; leaf arrangement; and plant height.)

Another alternative is to have students determine how they want to organize guides based solely on their observations, garden or schoolyard plant types, and the intended use of the resource. For instance, they might organize plants by flower color or the types of pollinators they attract, or sequence them to coincide with stops on a self-guided habitat tour. If you have a computer database that accepts digital photos, students can sort by different fields so they can print out different types of guides (e.g., organized by flower color or plant family). They can then invite peers or community members to try different versions and decide which systems they prefer.



At the end of a unit on a particular science topic or concept, such as adaptations or decomposition, challenge your youngsters to take and annotate photographs to explain what they've learned. For instance, to show their grasp of the concept that flowers have evolved adaptations (colors, designs, shapes) to attract specific pollinators, students might get shots of a variety of flower types (and if they're lucky, capture pollinators to boot!). Their annotations could explain how and why different flower features allure specific types of pollinators (and "trick" them into transferring pollen).

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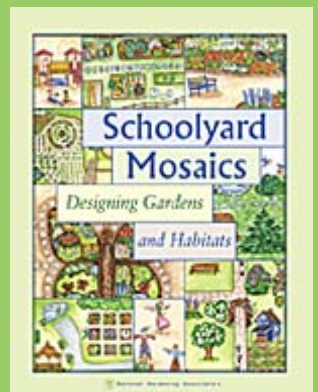
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New for Teachers!



We've just published this new book filled with actual school garden

Capturing Garden Design Ideas

Before digging into designing a schoolyard or habitat, youngsters can use cameras as planning tools. Here are a few ideas to spark your thinking:

- Students take photos of compelling features or plantings in public or neighborhood gardens; they use these to inspire their own design visions.
- The class photographs different areas of the schoolyard to document existing features. They piece these together and post them so they can take in the "big picture" and/or use them to create baseline map. (By doing the same once they've transformed the area, they can create an impressive "before and after" display.)
- Young shutterbugs capture what's flowering or fruiting in the schoolyard at different times of the season or year. This can help them plan an oasis that has visual interest year-round and better meets the needs of a variety of wildlife.



Photo courtesy Texas Parks & Wildlife Department
(c) 2003, John Herron, TPWD

plans, stories of how students participated in the design process, how-to information, and resources. You'll find details in our [Gardening with Kids Store](#).

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Writing About Images

Schoolyard images that grab youngsters' attention can be excellent springboards for practicing writing and vocabulary. Lay the groundwork by having students select schoolyard photos they've taken. These might be intriguing images snapped for fun or those taken to illustrate a particular concept or theme. Next, ask individuals or small groups to examine a photo and brainstorm descriptive words, phrases, and analogies. These lists should inspire write creative captions or short stories that say something about the importance of what students captured.



Another option is to have the class choose and sequence a group of photographs taken over time during an exploration. Use these to prompt a brainstorm, as above, and write stories describing the experience depicted. You may want to discuss strategies for drawing in the reader, employing analogies, weaving in facts related to what they learned, and other writing techniques. Display the projects in a hallway or publish them in another form (see next activity).

Create a Photo-Rich Presentation or How-To Guide

The old saw is true: a picture is worth 1,000 words. Just think about how images can enrich presentations — by instructing, illustrating, telling a story, and delighting an audience. (What's more, jittery presenters find that visual aids give the audience another place to focus their eyes!) Teachers say they know students have made connections to learning goals when they are able to share what they've learned, be it the mystery of decomposition or the nutritional value and great flavor of homegrown produce. Teaching younger students or preparing a "how-to" publication inspires and requires students to develop a thorough understanding of their subject matter.

Photos can be used to enhance projects published on a Web site, in PowerPoint (or other presentation program), on posters, or in a print publication. Here are some ideas to consider:

Garden Tour

Take representative photographs of schoolyard gardens or habitats and use them to create a "garden tour" in PowerPoint or on the Web. Use these to spread the word about your project or about a particular concept — gardening for butterflies, growing native plants — to students in other schools, adult community members, and potential funders.

Art Connections

Have a garden photography display in a school room, hallway, or local library, complete with an "art opening" party for the school and neighborhood community. Be sure to include a short "bio" for each of the artists.

Make paintings from photographs. Or, make a collage of photos, paint, and other media.

Create photo note cards by using glue sticks or photo tape to attach images to heavy paper or card stock. Wrap batches in homemade paper or tissue paper and tie them with ribbons. Give them as gifts or sell them in the school or community to raise funds for a garden project or class trip.

Launch or enter a photo contest! [Click here](#) for details on

How-To Guide

Create an instructional guide about something students have mastered in the garden: building a compost pile, planting trees, transplanting seeds, raising butterflies, or making raised beds, for instance. Try to break down the process into the smallest number of simple steps you can and still get the message across clearly. Have students plan the project in advance so they can capture enough images to demonstrate important steps. Students might freely share the materials or market them to the school and community to raise money for the garden program.

Garden Scrapbook

Develop a print or electronic publication that features photo highlights from a year in the garden. Students might choose to brainstorm sections to include: garden creatures, funny moments, growing cycles, and so on; or they might organize the presentation to feature each type of resident plant, along with details on its colorful history, significance in the habitat, nutritional value, and recipes that feature it.

Garden Photo Alphabet Book

Very young students can create a garden or nature alphabet book by finding plants, critters, and other living and nonliving elements in the schoolyard. (Older students might also create one of these for younger classes.) They can photograph plants and other features that begin with each letter of the alphabet and/or those that visually resemble letters. "A" could be represented by an asparagus fern, "J" by a Johnny jump-up, and "W" by a wheelbarrow. A stalk of bent grass or pattern in the soil might just look like a "Z"!



Photo by Nathan Webel, Elementary School Student

Patterns and Math in Nature

When you have youngsters train their eyes on the shapes and patterns in the natural world, you enrich both artistic and mathematical thinking. If you teach young students, start by brainstorming basic shapes (e.g., circle, oval, triangle) and have them scour the schoolyard or garden for these forms. Encourage youngsters to "look" on micro- and macro-levels. For instance, they might first get very close to a plant and identify shapes — the circular center of a flower, a triangular leaf — and then step further back and take in larger shapes in the environment, such as a square garden bed. Make sure they also keep alert for shapes they hadn't yet considered (e.g., a star). After identifying shapes and comparing different variations on a given form (how different triangles can look in different contexts), have the class home in on some "shapes in nature" to photograph for a display.



Patterns (things that are repeated) in nature are another great entry point. After exploring the idea of patterns and brainstorming some examples, send students out, cameras in hand, on a hunt for natural patterns. They might uncover vein patterns in leaves, a repeated design on a flower petal, a spider's web, or the arrangement of seeds in a sunflower. You may want to pique their interest and understanding by having them visit this Patterns in Nature Web site created by British students http://www.hitchams.suffolk.sch.uk/patterns_nature/index.htm. Once they have photos in hand (or on screen), ask students to observe, compare, and describe different patterns and sort the photos as they see fit (e.g., symmetrical vs. asymmetrical patterns).

Extension: One pattern with a mathematical basis (Fibonacci numbers) occurs in many places in nature, from pine cones to sunflowers and seashells. Here's how it works: A "Fibonacci sequence" includes the numbers 1, 1, 2, 3, 5, 8, 13, 21, and so on (each number is the sum of the two preceding numbers). In nature, these values often show up in the form of a certain number of spirals around an object. For instance, pine cones usually have 8 spirals going around in one direction and 13 in the other (both Fibonacci numbers). You may want to share this pattern with students, have them guess which number comes after 21, and invite them to examine the seeds embedded in a sunflower head. (Younger students may just look for spirals and older ones might try to count the two opposite sets of spirals.) Can they find evidence of this pattern at work? Where else can they find and photograph evidence of spirals or patterns that link to these numbers (e.g., monocots, such as lilies, typically have petals in multiples of three).

the 2003 Kidsgardening Photo Contest.



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