Red Butte Garden
THE UNIVERSITY OF UTAH

ETHNOBOTANY: PEOPLE AND PLANTS

Lesson 8: A New Era

Utah Core Curriculum Alignment 4th Grade Social Studies Standard 2:	Intended Learning Outcomes: Science
Students will understand how Utah's history has been shaped by many diverse people, events and ideas.	• Use instruments to measure length, temperature, volume, and weight using appropriate units. • Voluntarily read or look at books and other materials about science. • Record data accurately when given the appropriate form and format. • Use available reference sources to obtain information.

Enduring Understanding

Seeds are dispersed naturally by different means (wind, water, animals and gravity) to give plants more opportunities for survival. Humans are a part of each dispersal system. We introduce new plants into a habitat, sometimes accidentally, and sometimes intentionally.

Essential Questions

What are short-term and long-term effects of various species introduced into an area by man? How could humans create a positive long-term effect on an environment?

Background Information

Purposeful seed/plant dispersal by man is usually well intentioned and is meant to be beneficial to man. Often, many of these plants can integrate into the ecosystem without negative consequences if managed thoughtfully. Cultivars are plants that humans grow for food and other necessities, and also as ornamentals. These plants need human care, or cultivation, to survive.

Sometimes introduced species have negative effects on the ecosystem, even though they may have been introduced with the best of intentions. Plants considered noxious or invasive are highly adaptive and are able to reproduce quickly in many conditions. This often crowds out native plants. When the native plants are displaced, it results in decreased habitat and forage for birds and other wild animals, decreased diversity in an ecosystem, and decreased forage in rangelands for domestic animals. In addition, it can contribute to erosion of soils and thereby, cause more flooding. Some of these plants can be poisonous to various animal species as well. The effects on agriculture, forestry, fisheries, and on our natural ecosystems is wide-ranging. It is clear that the benefits of cultivating native species rather than non-native species could have a tremendous impact on our ecosystems.

This lesson will help students synthesize the information they have been learning in the previous lessons about people and plants. It requires students to use higher order thinking skills to problem solve, to be creative, to use critical thinking and to demonstrate comprehension of previous lessons. And, if the garden is actually planted, it involves the use of a real-life lesson.

Materials

BB = Materials included in Botany Bin

- BB list Native American Uses of Plants Indigenous to Utah, List Only
- graph paper
- plant books on Utah native plants from library
- various garden design books from library
- various home and garden magazines (western states) from library
- Optional: BB *The Shaman's Apprentice*, Lynne Cherry and Mark Plotkin
- Optional: BB Blackline: Opinion/Facts Graphic Organizer
    - poster board
    - 2" x 11" strips of paper – one per student
- Optional: BB Book, *How to Draw Wildflowers*
    - paper
    - artist quality sketching pencils or black gel pens
- Optional: BB plant press
    - newsprint or blotting paper
    - cardstock for framing
- Optional: Soil Test Kit from Utah State Extension: https://extension.usu.edu/yardandgarden/htm/soils/soil-testing/
- Optional: BB Immigrant Uses of Plants: Native and Introduced
- Optional: Noxious Weeds of Salt Lake County

Lesson Plan

Plan / Plant a Native Garden

Teacher Directions and Information

The use of native plants as ornamentals, to provide shade, for beauty or aesthetics and to conserve water is becoming more common in Utah. Some of the benefits are obvious: less care required, more natural appearance, unusual textures and leaf colors, water conservation in the second driest state, and money-saving water bills. And an added benefit - it may provide habitat for interesting birds and butterflies!

The native plant garden should be maintained in as natural a way as possible, without harsh or toxic chemicals. Visit the Utah Native Plant Society's website at www.unps.org for ways to manage your garden in this manner.

Meet with students to decide if their garden(s) will actually be planted, either at the school or at another site. If you have a site already picked out for a garden that will actually be planted, the class can be divided into committees or groups to accomplish each of the tasks. The progress of each student should be monitored at every step. Once the plans are completed, the planting can begin! If the gardens are not going to be planted, the students will complete each of the steps and submit their completed pages to you for assessment.

How to Plan / Plant My Garden
Directions for Students

Step One – Planning
Create a Mission Statement:
The garden should serve a purpose and a mission statement will help to articulate and guide its development for the student.

- **Here are some questions to consider:**
    - What biome is your garden in?
        - What is the average rainfall?
        - What is the elevation?
        - What kind of light is there in the garden space?
        - Is there access to additional water?
    - Do you want to replace a weedy area?
    - Do you want to have a demonstration water wise garden?
    - Do you want to conserve water?
    - Are you trying to replace a lawn with water wise plants?
    - Do you want to create a mood or an enjoyable space?
    - Would you like to name the garden?
    - Do you want to have a "theme" garden, such as traditional medicines and herbs, edible native plants, etc.

Step Two – Math
Measure the area designated for the garden:
1. Draw a diagram of the garden space to scale on graph paper. Create a legend showing the ratio of measurement. For example, one box on the graph paper = 2 feet.

2. If raised boxes are going to be used, determine the size of each box and how many you will want. Then determine how much topsoil you will need to purchase to fill each one. Calculate the cost by looking online for prices of topsoil.

If you are planning to actually plant this garden you will complete these next two steps. If you are not planning to plant at this time, you may skip these steps for now.

3. Test the soil with a soil kit ordered from Utah State Extension Services (see website).

4. When the soil test is returned, order and add amendments (fertilizer) as recommended. Calculate the amount and cost. Record all measurements and costs. Don't forget to include delivery charges if necessary.

Step Three – Art

Research and Creative Design:

1. **Research:** Take some time to look for the plants you would like to include. Look at the enclosed Native American Uses of Plants Indigenous to Utah, various websites and books on Utah native plants. Consider the following as you are making your choices:

    - Do you want to include trees, shrubs, and herbaceous flowering plants?
    - What are the bloom dates of the plants?
    - What textures and shapes of the plants do you like?
    - What will be their full-grown height and width?
    - What are the water, sun and special soil needs of the plants?
    - Plan to group the plants in the garden according to their needs.

2. **Design:** Browse the garden design books and the native plant books to decide on some key features you want to include:

    - pathways,
    - raised beds
    - rock features
    - water features
    - benches or other seating
    - quiet, meditative space

3. **List the plants** by genus and species and common name that you want to purchase. Record their water, sun and soil, and any other special plant needs. An example is Indian paintbrush (Castilleja sp.). It is difficult to grow and can survive on its own, but is somewhat parasitic and does better if it has a host plant from which to draw nutrients and water.

4. **Check the prices** of plants by visiting various nurseries in person or go online and list the plant name, its price and the quantities you need on another sheet. Extend and total each plant (price x the quantity) and add the entire sheet for your grand total. Be sure to include shipping prices and tax if applicable.

5. On another sheet of paper **sketch your garden**. Using the research you have completed about the plants, arrange your garden plants considering their full height, width, sun, water and soil needs. You might want to consider bloom dates, textures and colors to make the garden as aesthetically pleasing as possible.

Step Four – Completion

Final drawing and cost sheets

1. Once you have come up with the final design, transfer your drawing onto the master garden plot you made on graph paper at the beginning. Make sure to follow your measurement legend. Either label the plant name on each sketch, or use a number key with a list of plants attached to the master plan.
2. Attach cost sheets with specific items (include your calculations).
3. Attach your plants lists.
4. Include any special directions or requirements in your notes.

Step Five – Signage *(This step is for actual planted gardens)*

1. Create signs for each plant.
2. Include the following:
    a. Genus, species and common name
    b. Short description of plant
    c. Water and sun needs (create icons for these)

Extensions - Writing:

Procedure

Warm-up

Read *The Shaman's Apprentice* picture book (enclosed in Botany Bin). Although this book is about the tropical rainforest, we can draw some parallels to our biomes. Ask students for examples of how early humans were able to survive their different environments. Brainstorm ways humans relied on their resources for survival in the past; compare with the current ways we utilize resources (global manufacture and transport, specialized industries, etc.). In the book, explorers, gold miners, missionaries, other tribes, and a modern botanist visit South American natives. Explore the effects these visitors had on the Native American traditions and way of life. Can we draw connections or parallels with the various immigrants to Utah? As the students discuss the malaria brought to the tribes by foreigners, remind them that malaria is caused by a type of living organism and that man can transport all kinds of organisms (microorganisms, bacteria, plants, animals) to a new region, either by accident, or intentionally. Then, the missionaries also brought the cure, quinine pills – ironically, the

quinine having been derived from the bark of a rainforest tree! Discuss the outside botanist coming into the rainforest to document and maintain the native knowledge in written form. How was that beneficial to the native people?

Activity

Teacher defines 'opinion' and 'fact.' Give students some of the Background Information that discusses various noxious plants introduced by man, and remind them of past lessons or reading, especially the Shaman's Apprentice. Use the 'Noxious Weeds in Salt Lake County' to show the students some of the plants that we are trying to eradicate. Describe the human intent and results with some of the plant species for the students.

Now, discuss some of the introduced species that have benefitted man (cultivars such as corn, beans, squash, chocolate, etc.) Ask for their opinions on the effects these species have had on Utah's biomes and its people.

Give students each a strip of paper (2" x 11"). Ask them to write an opinion on what mining, industrialization, population growth, agriculture and ranching have had on Utah's biomes and people. Label a large poster board with four headings: Mining, Industrialization, Population Growth, and Agriculture and Ranching. Have the students post their opinions on the board, under one of these headings, one at a time. Read opinions and discuss briefly. Keep the poster up for students to use as a reference during their writing. Use the Background Information to clarify their ideas.

Tell them they will use this information and their background knowledge accumulated throughout the lessons in this module to write an opinion essay of the benefits and detriments of introducing new species to an area. They should specify an intentional or an accidental introduction, and they should support their opinions with facts from the previous lessons and/or the supplemental texts and materials in the Botany Bin.

To demonstrate how to begin, project the graphic organizer, "Opinion and Facts" onto the board. Ask students to state an opinion about an effect of an introduced plant species. Write it under "Opinion." Ask students for facts to support the opinion and write each fact in the box labeled 'Fact'. They will use this graphic organizer to outline, and then write their papers.

Assessment

Create a Writing Assessment Rubric. Some elements to consider:

- Final product demonstrated attention to detail and neatness
- Writing demonstrated the use of student's background knowledge
- Writing demonstrated higher level thinking skills
- Opinions were well supported with facts

Have students complete the Writing Assessment Rubric. After each student scores him/herself on the rubric, complete the rubric in a different colored pen according to how you perceive their efforts. Compare the scores and discuss with students individually. Make adjustments as necessary.

Extensions - Art:

- Students will make a traditional botanical sketch with binomial nomenclature label. Plants from the rikers or from the photos can be used. The enclosed book, *How to Draw Wildflowers* has step-by-step instructions for making beautiful botanical drawings.
- Students will use one of the plants in the rikers or one of the laminated photos to make a blind contour drawing. This exercise is from Betty Edwards, *Drawing on the Right Side of the Brain*. The purpose of this exercise is to focus attention on contour, defining lines, and to utilize intuitive perceptions of an object. It also helps strengthen eye-hand coordination. It will help students focus attention on the details of the plant's anatomy.
    - Blind Contour Instructions: Black gel pens or soft sketch pencils work well for this activity. This activity will help train your hand to copy the movement of your eyes and pay attention to the contour or edges of your subject.
    - Choose a plant or plant photo to sketch.
    - Place the subject off to the side of the table where you will be working (left side for right-handed person, right side for left-handed person). You will study the subject closely, and never take your eyes off it until you are finished drawing.
    - Place your drawing paper off to the opposite side of your table. You may want to tape it down. Pick a spot to begin. You will keep your eyes on the subject at all times. Begin drawing the outline and any edges you feel are important to your subject. If you come to a dead-end of a line, simply backtrack on the same line until you feel you have reached the main contour line again. Continue on, keeping constant contact between your pen and the paper until you have finished. The outcome will usually look somewhat abstract, but becomes more refined as it is repeated. (For an interesting sketch, you can repeat this process over the first image as many times as you like to add additional abstract line design.)
- Students will use a hand magnifying glass to zero in on a square inch of the plant and draw the details they see. They will be able to see veins and patterns that might otherwise be missed with the naked eye.

Plant collections and pressing:

- Use newsprint and follow the directions on the press.
- To collect ethically:
    - If you are collecting from the school grounds, be sure to get permission from your teacher or the principal.
    - Make sure there are sufficient numbers from which to collect.
    - Take only 5% of each plant species

- Take only 5% the plant material – leave enough flowers that can go to seed and reproduce. Do not pull up by roots.
- If you wish to collect from a private residence or vacant lot, be sure to have an adult with you and get permission from the owners beforehand!
- Tag your plants with the plant's Latin name
- Do not collect from wetlands or sensitive areas
- Collect only what you will be able to use
- Do not collect plants, seeds, or cuttings of rare or endangered species
- A special permit is needed to collect on public and private land (BLM, USFS, USFWS)

- Be sure you know which plants are safe and nontoxic to collect; never collect anything that you are unsure of.

Pressed plants can be mounted on card stock and put into glass frames to present as an art piece.

NOTE: *Any of the above art projects could be framed with the cardstock, or made into bookmarks, refrigerator magnets, covers for handmade books, etc.*