Canoe Plants

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HCPS Science Standards Addressed: 1.1 & 2.3

Grade Level: 6–8
Project Time Span: 3 weeks (9 classes), including 1 field trip

To the Teacher:
This lesson includes a field trip to Harold L. Lyon Arboretum, University of Hawai‘i at Mānoa, 3860 Mānoa Road, Honolulu, HI 96822. To set up the field trip or for more information on Lyon, contact (808) 988-0456, or visit their website: http://www.lyonarboretum.com.

Goals of the Lesson:
- To be able to name various canoe plants and describe their uses
- To learn the cultivation techniques of canoe plants
- To have the background and ability to start and maintain a canoe plant garden at school

Student Learning Objectives (Benchmarks):
This lesson addresses Grade 6–8 benchmarks for HCPS Science Standards:

1.1 Doing Scientific Inquiry. Students demonstrate the skills necessary to engage in scientific inquiry.
- Develop questions and hypotheses that can be answered through scientific investigations.
- Design and conduct scientific investigations to answer questions or to test hypotheses.

2.3 Mālama I Ka ʻĀina: Sustainability. Students make decisions needed to sustain life on Earth now and for future generations by considering the limited resources and fragile environmental conditions.
- Give scientific inferences regarding environmental and societal issues stemming from agriculture and manufacturing technology.
Resources and Materials:

Books and Websites
• Lyon Arboretum http://www.lyonarboretum.com

Materials
• Different canoe plants specified by the students to start a canoe garden
• Appendix 1: Canoe Plant Project Sheet

Instructional Procedures:

Day 1: Introduction
• Break up the class into groups of four students. Ask the students, in their groups, to make a list of ten things they would take if they had to move to another country for the rest of their lives, and why they would bring each item (5 min).
• Have a representative from each group write their list on the board and explain their choices. Teacher will point out similarities between the lists. Have the class vote on the five most useful items (20 min).
• Move students back into their groups. Ask the students to now imagine that they are Polynesian voyagers migrating to the newly discovered land of Hawai’i. Have them repeat the activity with their new roles (15 min).
• Teacher will ask students about differences in perspectives on what was important then vs. now. Introduce the different canoe plants the ancient Hawaiians brought with them on their voyages to Hawai’i. Discuss their uses.
• Wrap up, let the students know they will soon be visiting the gardens at Lyon Arboretum to learn more about canoe plants.

Day 2: Field Trip
• Hand out Canoe Plant Project Sheet (Appendix 1).
• Tour the native plant garden at Lyon Arboretum. Arrange for a guide to take the students through the garden and to give a brief introduction to the different types of canoe plants and their uses.
• Instruct the students to take notes on the different types of plants to aid them in choosing which plant they will focus on in their project.
• Have the students also do sketches on three of the plants that interest them the most. Inform them to concentrate on sketching the leaves, fruits and flowers, which will make their plant sketches easier to identify.
• At the end of the field trip have the students write a quick reflection of the day (three things they learned, three things they liked, and three things they did not like.)
Day 3: Choosing Plants
• Have the students meet in their groups. Each group in turn will announce one type of canoe plant and one use for the plant. Teacher will record information on the blackboard. Keep cycling through the groups until they can name no more plants.
• For the rest of the class, students will work in their groups to decide which canoe plants they would like to do their project on. They can choose any plant from the list on the blackboard. One person from each group will write down the group’s top three choices of canoe plants on a piece of paper. Under each choice they will write down the reason they want to research that plant for their project.
• Wrap up: Collect the groups’ choices. Inform the groups that the teacher will go through the groups’ choices and will assign one plant to each group to research based on how well the group justified their plant choice (if two or more groups pick the same plant).

Day 4: Library/Computer Research
• Announce to each group which plant they will focus on during their project.
• Take the class down to the library to do book and computer research on their plants.

Day 5: Computer Room/Planning Presentations
• Students will meet in the computer room to work on their PowerPoint presentations for their projects.
• Go over the basics of PowerPoint, such as: starting a new project, slide layout, slide design, cutting and pasting pictures.

Day 6: Lab Design
• Students will meet in their groups and list the various uses of their plant. Ask the groups choose one use for their lab projects.
• Have the students come up with a hypothesis on what properties of the plant at the cellular or chemical level make it suited for that particular use.
• Students will then develop a procedure to test their hypothesis.
• Remind students that the two best experiments will be chosen for the whole class to do, and those groups will get extra credit.

Days 7 and 8: PowerPoint Presentations
• Students will share their PowerPoint presentations on their plant research, and field questions from the class or teacher.

Day 9: Reflection
Have the students reflect on the project they just completed.
• Five things they liked about the project?
• Five things they learned?
• Five things they disliked?
• Suggestions for improvement?
• Are you (student) confident in what you learned to grow and care for your plant species?

Student Learning Activities:
• Students will sketch different plants and write a reflection on the field trip.
• Students will conduct research on their chosen canoe plant.
• Students will produce a PowerPoint presentation on their research findings and will present their slide show to the class at the end of the project.
• Students will design a laboratory experiment to explore the special properties of their plant that enabled it to be selected as a canoe plant.

Assessment:
• Completion of reflections and drawings (participation).
• Quality of the information provided during their PowerPoint presentation.
• Overall look of their presentation.
• Ease of following the procedure of their experimental design.

Extension:
• I would like to use this lesson as an introduction into growing or maintaining a native Hawaiian or canoe plant garden on the campus of the school. Because different groups would become "experts" on specific types of plants they might lead the class in helping to cultivate their particular plants. At the end of the project during the reflection I will ask the students' opinions about starting and caring for a canoe garden.

Evaluation of Lesson:
• I think this lesson is pretty good. I am hoping that the class will get a better appreciation for how sophisticated the ancient Hawaiians were in terms of the knowledge of plant biology and agriculture. I'd like to give them an appreciation of how the native way of propagating plants is much more sustainable and environmentally friendly than most modern agricultural techniques. Also if I get to start or upkeep a school garden, I hope the students will get a sense of responsibility or a deeper connection to the land they live on.
• If the lesson is successful, I would hope to see greater participation from students within their community. I would also like to provide service learning opportunities for my students as extra credit on the weekends. Hopefully this lesson will also make them want to participate more in those weekend activities. The lesson's effectiveness could also be gauged by how well the students upkeep the school's garden.
Appendix 1: Canoe Plant Project Sheet

Now that you have seen some of the different types of plants that the first Hawaiian people brought with them to these islands, your group will study one of these plants in depth. We will spend one day in the library so your group can do additional research.

1. Your group is required to pull together all of your findings and create a PowerPoint presentation and to share that presentation with the class. You will have one day in the computer lab to start work on your presentation.

PowerPoint presentations must at least include:

- Common name of plant
- Hawaiian name of plant
- Scientific Name of plant
- Uses of plant
- Parts of plant used
- Cultural significance
- Legends or stories about plant
- Hawaiian cultivation techniques
- Compare/contrast with modern agriculture techniques
- Any other information your group deems important

2. Through your research, you should have determined the different uses for your plant. Choose one of these uses and develop a hypothesis on what physical/chemical properties of your plant make it well suited to that use.

3. Once you have formulated your hypothesis, design an experimental procedure to explore the properties that you describe at the microscopic or chemical level.

For example, why does hau make such good rope? How can we explore hau at the cellular or chemical level to learn why it makes good rope?

Note: The two best experiments will be given extra credit and may be selected to be performed later in the quarter.