

FITCHBURG STATE COLLEGE

Lesson Plan

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Grade: 4

Age: 9/10

Lesson Focus: Designing & Creating a Hand Pollinator

- I. **Goal:** The goal of this lesson is for students to take prior knowledge of insects, pollination, properties of materials and the Engineering Design Process to design and improve a hand pollinator for a model flower. In doing this they will practice brainstorming, planning, designing and reaching an ultimate goal.

- II. **Objectives: What students will be able to do by the end of the lesson.**
 1. Identify and use the steps of the Engineering Design Process.
 2. Ask questions about how they should design their hand pollinators based on different model flowers.
 3. Brainstorm ideas for designing their hand pollinators.
 4. Make detailed plans for the hand pollinators, including labeled diagrams and material lists.
 5. Create hand pollinators from their plans and test their designs using the model flowers.
 6. Analyze their hand pollinators for strengths and weaknesses based on observations made during testing.
 7. Imagine ways to improve their designs and implement some of their improvement ideas.

- III. **State Frameworks/Professional Standards**
 - 2.2 Describe different ways in which a problem can be represented, e.g., sketches, diagrams, graphic organizers, and lists.

 2. Structures in plants that are responsible for food production, support, water transport, reproduction, growth, and protection.

- IV. **Connections across the Curriculum:**
 - 2.N.2 Students will pose questions, listen to the ideas of others, and contribute their own information or ideas in group discussions or interviews in order to acquire new knowledge.

2.N.4 1.1 Follow agreed-upon rules for discussion (*raising one's hand, waiting one's turn, speaking one at a time*).

Key Questions: What do you need to know before you begin to design your hand pollinator? What makes a good hand pollinator? What will your hand pollinator look like? How will you create your design? What materials will need to create your design? How will you fix a problem to improve your design? Which materials work best to pick up the pollen? Which materials drop off pollen well? How are models useful? Is your model straight or curved? Where is the pollen located on your flower design? How will you attach the material that will pick up and drop off the pollen to your handle? What shape will your hand pollinator need to be? Does your hand pollinator need to be flexible? How might you know if your redesigned hand pollinator is improved? Do you think you spent enough time on your design? Which parts worked best on your design? & Least? How did you use your background knowledge to create the hand pollinator?

V. Materials and Time

1. 65 minute lesson
 - Building background – 10 minutes
 - Review Vocabulary– 6 minutes
 - Brainstorm – 14 minutes
 - Plan/layout design & create prototype – 15 minutes
 - Fix & redesign - 7 minutes
 - Reflect on your redesign – 3 minutes
 - Completing the worksheet – 10 minutes or finish later
2. Each pair of students will be provided with a large bag full of useful materials to create a hand pollinator. Materials include items such as: baking soda, spoons, tape, erasers, aluminum foil, pompoms, pipe cleaners, marbles, straws, scissors, wire and string. The teacher will also write the vocabulary words and definitions on the white board.

Plan for instruction

Source of motivation:

“Good afternoon friends, now that we are back from lunch and recess we will begin our science activity. First we will discuss background knowledge on what we already know about insects, pollination, materials and the EIE design, then we will brainstorm, plan, design, redesign and reflect on our lesson.”

Source of reading students:

Students will come to the class open-minded about the science designing. Then the teacher will explain what we will design and create in class.

Source of Research Based Teaching Strategies (Choice of Strategies)

Young children love to work together in groups (Yardstick, 2007)

Teaching of terms/vocabulary Student will learn vocabulary such as design, Engineering Design Process, goal, hand pollinator, model, prototype, redesign, teamwork, and test. Vocabulary words and definitions will be written on the white board for students to reference.

Design - to prepare the preliminary sketch or the plans for a work to be executed
Engineering Design Process – a detailed process that requires attention and persistence. This process also includes specific steps.

Goal - the result or achievement toward which effort is directed; aim; end

Hand Pollinator – is a design of a flower that picks up and drops off pollen.

Model –an example: a representation, generally in miniature, to show the construction or appearance of something

Prototype - the original or model on which something is based or formed

Redesign – design anew, make a new design for

Teamwork - cooperative or coordinated effort on the part of a group of persons acting together as a team or in the interests of a common cause: work done with a team

Test - the trial of the quality of something: a particular process or method for trying or assessing

Adaptations for diverse student needs

Visual students will get to participate in the activity right in front of them.

Auditory students will listen to the teacher's instructions. Kinesthetic students will enjoy creating the design. Any student with English as a second language will learn from planning and labeling the design. All other accommodations that come up will be taken care of by the teacher to the best of her ability. Student who are hard of hearing or cannot see well will sit in the front of the class.

Transitions:

Students will be at the front of the room for a building background and vocabulary discussion as a class. Then the teacher will pair off students. The teacher will try to put one strong student with a weaker student. Students will get to choose an area in the room to create their design. Then the teacher will call students back to their seats, one pair at a time.

Outline the Lesson Process

1. Group discussion as a class: Ask the children what they already know about insects, pollination and designing a pollinator. Explain the process and design of creating a pollinator and all the steps that go with it.

2. Review the vocabulary words as a group, put them on the white board. Also the teacher will read the directions on the worksheet and complete number one.
3. Then the teacher will pair off students, by trying to match a strong and weak child in a pair.
4. Have the students brainstorm and choose the flower they will try and recreate. Have them explore different options
5. Have the student's layout and label their design.
6. Have the students create their prototype.
7. Have students think of how they can improve their design and try it on their hand pollinator.
8. Finally reflect on your design and complete the worksheet.

VI. Assessment

Formative Assessment: (group activity) The instructor will assess the pairs by walking around and looking at their planning and labeling. The instructor will also assess the students individually by looking at their contribution to the hand pollinator and redesign. Please see attached rubric.

Rubric	
3	Student is fully participating, completely involved in the group and understands most of the concepts.
2	Student is partially participating, some what involved in the group and understands some of the concepts.
1	Student is rarely participating, not very involved in the group and does not understand the material.

Summative Assessment:(1 worksheet) The instructor will review the directions to the worksheet and complete problem number one on the worksheet with the students. The instructor hopes to find that the students can define the following vocabulary words.

9/10 accuracy is expected on the vocabulary worksheet.

VII. Communication Standard

Students should listen respectfully when others are speaking. Children should use correct language at discussion time.

VIII. Reflection

I hope to see that the students create a great prototype and figure out a way to make it better in their second design. I hope to see 9/9 accuracy on the worksheets.

Vocabulary Worksheet

Designing & Creating a Hand Pollinator

Name _____

Directions: Match a term from the word bank to its corresponding definition.

Word Bank	
Engineering Design Process	Redesign
Test	Goal
Model	Teamwork
Prototype	Hand Pollinator
Design	

- _____ To prepare the preliminary sketch or the plans for a work to be executed
- _____ A detailed process that requires attention and persistence. This process also includes specific steps.
- _____ The result or achievement toward which effort is directed; aim; end
- _____ Is a design of a flower that picks up and drops off pollen.
- _____ An example: a representation, generally in miniature, to show the construction or appearance of something
- _____ The original or model on which something is based or formed
- _____ Design anew, make a new design for
- _____ Cooperative or coordinated effort on the part of a group of persons acting together as a team or in the interests of a common cause: work done with a team
- _____ The trial of the quality of something: a particular process or method for trying or assessing

10. Briefly Reflect on your design and redesign of creating a pollinator? Did your second design work more efficiently? Would you change anything you did?
