

# CASTLE COMPLEX EDP PHASE 2 PROJECT (2018-2021)

## UbD STEM UNIT PLAN TEMPLATE (adapted from ONR Engineering Success in STEM Project)

Teacher's Name: Dayna Hironaka Kelly Asato	School: Kahalu'u Elementary	Grade Level: 2
Content Area: Science	Course Name: Pollinators	Period: Afternoon
Unit Title: Pollinators - <b>Refer to the EiE Boston Engineering Kit resource on the STEM Pre-Academy website</b>		Approximate Time Frame: 1 Week
<p><b>Essential Vocabulary:</b>  <b>Content Vocabulary</b>  Insect (pollinator)- bees, butterflies, Mammals- bats  - A pollinator is an animal that moves pollen from the male anther of a flower to the female stigma of a flower.  Pollen- Pollen is a fine to coarse powdery substance comprising pollen grains  Seeds  Flower  Nectar  Reproduce</p> <p><b>Engineering Vocabulary:</b>  Ask  Imagine  Plan  Create  Improve</p>		

### STAGE 1: DESIRED RESULTS

<p><b>NGSS Standard(s)</b>  <b>Content Standard</b>  2-LS2 Ecosystems: Interactions, Energy, and Dynamics</p> <p><b>Engineering Standards</b>  2-ETS1-3 Engineering and Design</p>
<p><b>Performance Expectation(s)</b></p> <p><b>Content Standard</b>  2-LS2 Ecosystems: <b>Students who demonstrate understanding can:</b>  Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.*</p> <p><b>2-ETS 1 Engineering and Design: Students who demonstrate understanding can:</b>  Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.</p> <p><b>2-ETS 2 Engineering and Design: Students who demonstrate understanding can:</b>  Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.</p> <p><b>2-ETS 3 Engineering and Design: Students who demonstrate understanding can:</b></p>

Analyze data of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

Dimension	Name and NGSS code/citation	Matching student task or question directly from the activity
<b>Science and Engineering Practices (SEPs)</b>	<p><b>Content Standard</b>  <b>2-LS2 Ecosystems: Interactions, Energy, and Dynamics</b></p> <p><b>Engineering Standards</b>  <b>2-ETS1-3 Engineering and Design</b></p>	<p><b>2-LS2 Ecosystems: Students who demonstrate understanding can:</b>            Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.*</p> <p><b>2-ETS 1 Engineering and Design: Students who demonstrate understanding can:</b>            Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.</p> <p><b>2-ETS 2 Engineering and Design: Students who demonstrate understanding can:</b>            Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.</p> <p><b>2-ETS 3 Engineering and Design: Students who demonstrate understanding can:</b>            Analyze data of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.</p>
<b>Disciplinary Core Ideas (DCIs)</b>	<p><b>LS2.A: Interdependent Relationships in Ecosystems</b></p>	<p>Plants depend on animals for pollination or to move their seeds around.</p> <p>ETS1.B: Developing Possible Solutions</p> <ul style="list-style-type: none"> <li>- Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for problem/ solutions to other people.</li> <li>-</li> </ul>

		[Clarification: Look for these core ideas in the associated PE above. These should be embedded in the PE as one of the three dimensions.]
<b>Crosscutting Concepts (CCCs)</b>	<p>Language Arts RI 2.2</p> <p>SL.2.5</p> <p>Math 2.MD.D.10</p>	<p>Read about bats as pollinators. Answer questions in regard to the main topic and supporting details.</p> <p>Create audio recordings of experiences; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings.</p> <p>Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories.</p>
<b>Learning Goal (Student Learning Objectives):</b> (Skills, content knowledge and understandings, values, etc.) <i>Students will be able to...</i>		Students will be able to apply their understanding of pollinators to design a simple model that mimics the function of pollinating plants through the use of the engineering design process.
<b>Essential Question(s):</b>		<p>How do plants grow and reproduce?</p> <p>How can we help the dwindling bee population?</p>
<b>Enduring Understandings (Big Ideas):</b> (Broad understandings that are not tied to place, time, specific people, etc.)		<p>Plants need sun, soil/nutrients, water and air to grow. They use these things to go through photosynthesis (producing their own food).</p> <p>Plants depend on pollinators to pollinate their seeds in order to produce fruits/flowers and to reproduce more plants.</p> <p>Following the engineering and design process to develop technology we can help pollinate flowers to make up for less bees in the world.</p> <p>*This should be the answers to your EQs above. Think big, broad, timeless, and applicable across groups of people, places, etc.</p>
<b>Other Standards/Benchmarks:</b> Common Core Literacy Standards/Mathematical Standards C3 Framework for Social Studies Fine Arts Standards		Writing Extension: W.2.7: Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations).

## Stage 2: ASSESSMENT EVIDENCE

<b>Summative Assessment/ Performance Task</b>	<p>*Write a scenario here first (a brief narrative to draw students in) that is focused on the problem (problem statement). Make it relevant and engaging.</p> <ul style="list-style-type: none"> <li>Go to Kalo Park and observe pollinators. Fill out the “Ask, Ask, Ask” portion of the engineer notebook.</li> <li><a href="#">Watch a video</a> (phenomena). Discuss the dwindling bee population.</li> </ul> <p><u>Problem Statement-</u> Grade 2 students need to <u>design and build a handheld pollinator</u> to transfer pollen from one flower to another,</p>
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	because of a bee declining population to help the declining bee population.
<b>Rubric(s) for Summative Assessment/Performance Task:</b> (Attach documents)	<p>*Attach any rubrics for products and presentations, team work, individual work, etc.</p> <p>(Refer to EiE Boston Engineering Kit for Rubrics)</p>
<b>Formative Assessments:</b>	<p>*Explain any informal, formative assessments (i.e. discussion participation, group participation, visual observations), and also attach any worksheets (could be the pages in the Engineering Notebook). Quizzes? Exit slips for the day? Reflection questions in a Journal?</p> <p><b>Class Discussion of topics:</b></p> <ul style="list-style-type: none"> <li>• Brainstorm pollinators</li> <li>• class discussion of the pollinators "job"</li> <li>• class discussion on the relationship between plants and pollinators</li> </ul> <p><b>Visual Observations:</b> garden observations- How many different pollinators can you find? Draw and label the pollinator and what they are pollinating.</p> <p><b>Engineering and Design Notebook:</b></p> <ul style="list-style-type: none"> <li>• Circle map</li> <li>• informational journal entries 2-3 (on topics of class discussions above)</li> <li>• Observation notes, drawings/ entries</li> </ul> <p><b>K-W-L:</b></p> <ul style="list-style-type: none"> <li>• K-W-L chart to be completed in increments</li> </ul>
<b>Engineering Notebook</b>	<p>*Attach templates for the engineering notebook and any rubrics or criteria checklist to assess the notebook and evidence of meeting the Performance Expectations of the NGSS (Stage 1) and the student learning objectives (Stage 1)</p> <p><a href="#">GR2 Hand Pollinator Engineering Notebook</a></p>

**Stage 3: LEARNING PLAN:** (Each unit should have a minimum of SIX activities which includes and overtly addresses the five EDP components (ASK, IMAGINE, PLAN, CREATE, IMPROVE) and the communication/sharing/hō'ike\*\* component of this unit.

Include brief narrative of activities, instructions, groupings, differentiated instructional and engagement strategies, and digital literacy tool(s).

The daily activities should address all aspects of the EDP, plus the communication/sharing\*\* process:

**Problem Statement (Scenario)**

**Ask:** Need Identification, Problem Statement, Client(s), Specifications

**Imagine:** Research, Brainstorm Solutions

**Plan:** Pugh Chart, Gantt Chart, Materials, Equipment, Procedures

**Create:** Prototype/Model, Test

**Improve:** Reflect, Improve/Modify, Test

### ASK (give a time frame for each activity)

Give a brief narrative (1-2 paragraphs of how an EDP stage is being addressed for this activity), and add in any essential questions for the lesson, instructions, groupings, differentiation, etc. if desired. This can

actually be in the individual teacher lesson plans which may differ from class to class, even in the same grade level.

Students will fill out the “K” from their KWL chart and answer prompts from their [notebook](#). Students will go to Kalo Park to observe pollinators and complete the Ask! Ask! portion. Through this activity, they will determine the problem backed by their evidence. We will review how to observe like a scientist. Students will watch a [video](#) and mystery science video parts 1 and 2 that discusses the decreasing bee population. They will complete the next page of Ask! Ask! to determine the problem statement and the specifications of their hand pollinator. Students will read texts about honeybees and other pollinators with the main topic in informational texts as their focus standard.

#### IMAGINE

In groups, students will choose a pollinator to research. One group will conduct their research on honeybees. They will learn how to find information online and through books of their choice from our school library. Students will develop research questions and answer them using a tree map to gather evidence. They will create Google Slides to present their project. Students will be taught how to add images to their slides. Students will present their knowledge with the class while others will take note of their new learning on their KWL chart. Students will watch mystery science video parts 3 and 4 and add their additional learning on their KWL chart.

#### PLAN

The class will review the Pugh chart to plan ahead of what their group needs to accomplish. Students will be placed into pairs. Students will develop their plan individually. They fill out a rubric to assess their plan. Pairs will collaborate and decide on one plan that met the Gantt rubric criteria to develop their prototype 1. Based on the plan, pairs will decide on the material they need. They will collect their materials in a bag and label the bag for the next CREATE phase.

#### CREATE

Pairs will make their flowers by cutting out the flower template and using double sided tape to collect pollen.

Pairs will create their prototype one and test their hand pollinator. Data will be collected using the Boston Museum of Science data collection sheet. Students will then reflect on what worked and didn't work.

#### IMPROVE

Pairs will read over their reflection from the previous lesson and discuss ways to improve their design. Pairs will draw and label their prototype 2 and will gather additional materials needed. Pairs will create their improved prototype and test it. Data will be collected using the Boston Museum of Science data collection sheet. Students will then reflect on what worked and didn't work.

#### COMMUNICATE\*\*

Students will reflect on their engineering and design project and if they met the criteria using the Pollinator's rubric. Students will share the process and their reflection with the EDP team, classmates, and parents. Students will test their hand pollinators at Kalo Park and share their experience. Students will take their project home and continue to make a difference helping bees to pollinate in the community.

#### Materials, Equipment and Resources Needed to Implement Unit

Double-sided tape  
Copies of Mystery Science flower templates  
Copies of Engineer notebooks  
Coffee grinds  
Cheese powder  
Pipe cleaners  
Pompoms  
Cotton balls  
Mini popsicle sticks