Garden Learning Engagement

LE 7 Summarizing Data to make a Decision

Background

The goal of LE 7 is to give learners the opportunity to make sense of the data that they gathered from the garden across settings (garden methods research, community interview, investigation questions, daily observation and data collection) in order to find answer to their investigations to answer their "Should We" question(s) and ground their decision-making practices in community and field-based evidence.

Purpose

Summarizing and visualizing data is an important part of making sense of our data. Through analysis, data becomes evidence to support patterns that learners find in the garden. In this learning engagement learners will summarize the investigation question data from LE 6 and visualize the data in a graph. Learners will then incorporate these findings with the patterns found from community interviews, garden methods and daily observations. This is an important process that leads to sensemaking, deliberating, and making decisions about socio-ecological phenomena.

Connections to family and community gardening knowledges and practices

LE 7 provides another opportunity for learners to engage in science learning with their families and members of their community by analyzing and making sense of the data they collected from family observations and community-based research.

MATERIALS

- IAll of the data from your community-based investigations, research into garden methods and data from your field-based investigation and/or daily observation protocols
- Revised models
- Summaries of patterns found in garden methods and community interview (Table 2: Summarizing Your Data in LE 4 and 5)
- Some paper and markers to tables, maps, etc.
- LE 7.a, 7.b and 7.c Learner Tools

LEARNING GOALS

Learners will...

- Learn how to find patterns across different datasets: family data, garden data, community-based research, and garden methods research.
- Understand how data becomes evidence for answers to the "should-we" question(s).
- Learn how to visualize their data to foster sensemaking in the garden across data sets

Centering equitable practices

Like other activities, deliberation and decision-making are powered and historicized (see the Power & Historicity Framework), and your role is not to judge or evaluate families' decisions and decision-making practices but rather to use them as foundations for learner and community-centered learning. Remember that the goal of this learning engagement is to help learners better understand, through their analyses and discussions, complicated decisions (like those that complex socio-ecological "Should We" questions motivate) and how different people engage in deliberation and decision-making about those decisions.

Encourage learner idea generation, wonderings, questions, comments, and suggestions. Avoid a rush to judgment that any learner's ideas, wonderings, questions, comments, and/or suggestions are silly, misinformed, nonsensical, or off target. Kids make sense of things in many different ways. Instead, ask clarifying questions. Ask how other learners would incorporate whatever was said into ongoing discussions (other learners might have perspective on peers' commentary and questions that you don't). Assume a sense-making stance, and a 'desire to participate' stance, and let those guide your actions as a teacher and facilitator.

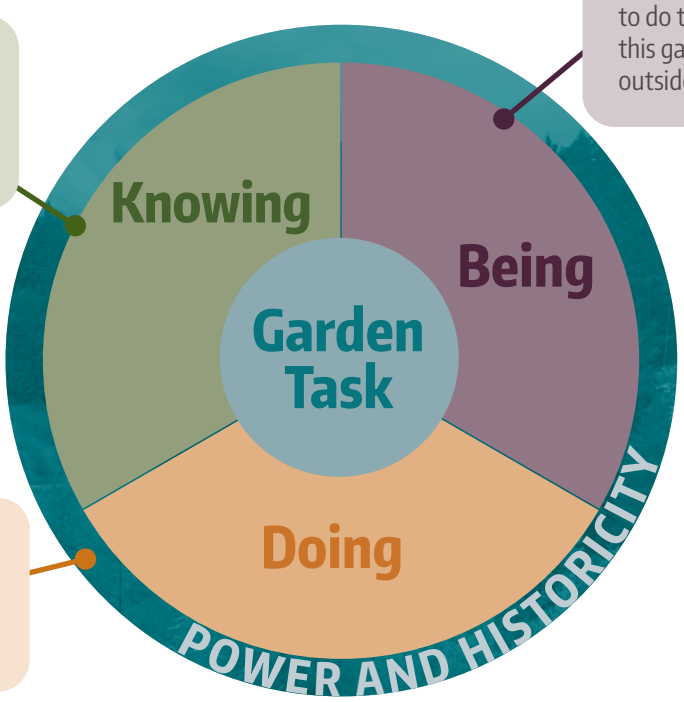
Throughout the instructional sequence we call out moments that tie into the knowing, being and doing of garden practices.

Importance/Intent

Why does it matter to me/my family/our broader community to do this garden task? How does this garden task affect people outside of my community?

Connections to Science Content

What do we need to know in order to do the garden task?



Garden Methods

What are the **methods** we use to do this garden task?

Instructional Sequence

TIME

45 minutes

Part 1: Summarizing and Visualizing your Garden-Based Data (10-20 minutes)

1. You have collected your data using the various tools in LE 6 and/or the Daily Garden Observation Protocols. The next step is to summarize it so you can see patterns in it. This part involves making a chart or graph that will help you see patterns in your data..

2. Depending on your learners' backgrounds and prior knowledge of graphs, this activity can be done individually, in small groups or as a whole group. See table 1 for examples.

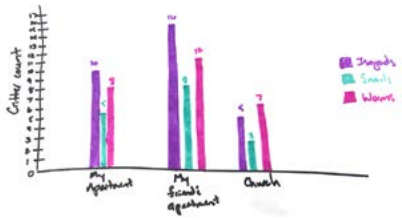
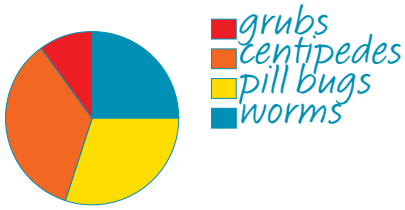
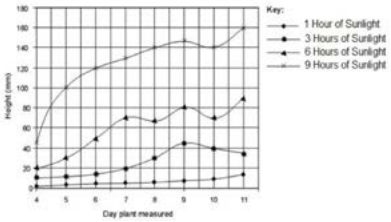
   - **For older learners:** have learners complete Step 1 of LE7.a individually, in pairs or a small group around a data set. For this option, learners can graph different types of data collected (their family data, or different class data or both). At the end of this option, there will possibly be several different graphs from different data sets. Learners can share their graphs in front of the whole group, or you can display the graphs and have learners walk around to observe.
   - **For younger learners:** For learners with less experience graphing, you may construct one or more graphs of your data as a whole group activity to model what these practices look like. Choose a data set to graph as a whole group, and ask learners to think about which type of graph(s) are the best fit for the data. Co-construct the graph, inviting learners to participate as you draw the graph on the board::
     - "Can someone tell me how many ___ we observed?"
     - "Where should I write that number on our graph?"
     - "How should I label this?" etc.
     - Learners can take turns adding to the group graph
     - Optional: Learners can draw the graph on their LE7.a tool as you draw the graph in front of the group.

Part 2: What data have we collected so far? (10 minutes)

Using the Data Summary Tables (or any other data visualization) from LE 4 and 5, engage learners in a whole group discussion on the data they have collected so far. Be sure to share from:

- The garden methods (Table 2: Data Summary from LE 4)
- The community interview (Table 2: Data Summary from LE5)
- Investigation Questions (from part 1)
- Daily observations (if those data were graphed)

Table 1: Examples of types of Graphs

BAR GRAPHS	CIRCLE GRAPHS	LINE GRAPHS
Compare data between groups (species, sites, etc) 	Shows how the whole is divided into different parts. 	Show how data changes over *time*. 
***Example**: Comparing the number of worms found in 3 different sites (i.e. 5 worms in the compost bin, 1 worm on the path, 3 worms under the leaf pile)*	***Example**: Species abundance in space- out of the 20 species we observed in the compost how many were worms, pill bugs, centipede, grubs? 25% worms, 30% pill bugs, 35% centipedes, 10% grubs: shade and label circle to match percentages.*	***Example**: Daylight hours by month, temperatures over time, plant height over time, etc.*

Part 3: Making Evidence-Based Decisions (10-15 minutes)

Now that we have reviewed the data we collected and the patterns we noticed, we are ready to combine these patterns to see if we are ready to make a decision about our "Should We" question(s).

» **For older learners:** Have learners work in small groups to use LE 7.b "Initial decision around our 'Should We' question" to help learners gather all of the evidence into one place, to guide their discussions and decision-making.

- What did we find in our field-based research that makes you think we should/should not do that?
- How did our community-based research help you think about this?
- What did you find in our garden methods research that helps you decide that?
- Is there anything else that we're not considering yet? What else would you want to know?

» **For younger learners:** have learners draw and share what they think we should do using LE 7.c or their garden journals. Learners can also act out their answers. As learners share, be sure to ask them for reasons for why they think we should or should not do a certain action. Ask learners: why do you think that? What did our evidence from our research tell us?

» **Extension activity:** Use the Table 2: Graphic Organizer for Group Decision Making as a prompt for you to ensure the discussion is covering all the important aspects of the "Should We" questions. You don't need to ask all of the questions if time is limited.

Being

Opportunity to connect to community and family knowledge when making decisions in the garden.

Doing

Opportunity to connect to the "doing" of the garden and how those methods affect various beings in the garden

» **Final Decision or Revisions:** explain to learners that it seems like we have some evidence telling us that we should take certain actions, and some evidence telling us that we should NOT take other actions. Are we ready to make a final decision? Do we have more questions? Gardeners often will need to make decisions based on the evidence they have, even if it is partial information.

- **If the group feels ready to make a decision,** move on to LE8 and apply the garden practice that you chose!
- **If the group needs more information**, Return to your model to revise it. Evaluating the state of one's knowledge and deciding on next steps of an investigation are key scientific practices. Remind the group of four kinds of revisions:

1. **Digging Deeper:** Sometimes we revise our models to get more specific about our phenomenon or questions. For example, the specific plants that we put in our "pollinator" garden will attract some species of birds more than others.
2. **Changing Perspective:** We can often shift our thinking when we observe the same phenomenon from a different perspective. For example, a fruit trees may be a habitat and food sources for many species but from a different perspective we see that the tree shades out other plants and attracts undesired bugs or wasps.
3. **Adding New Ideas:** we want to add new information learned from our various resources; such as what plants attract different species of pollinators, what we learned about snags from an arborist, or from our tally observations, the different kinds of animals that use cone trees.
4. **Building Connections:** our models can help us answer our "Should We" questions. We can ask ourselves "what would happen to different components in our model if we did _____? If we decided not to do ___, what would happen?"

Table 2: Graphic Organizer for Group Decision Making

Being

Identifying the values that the group is using when making a decision is an important connection to the "being" of the garden task.

Being

Encourage learners to consider how this decision affects people outside of their community.

Being

Consider the lasting impacts of the garden method (5 years, 20 years, 100 years).

We should...						
Why do we need to decide?	What values are we using?	How do places we live in impact our decision?	How does the natural world impact this decision? How is the natural world impacted by this decision?	What options did we consider? Why was this the best decision to make?	Who else is impacted by the decision? How are they impacted?	How does the decision impact us in the future?
What data and evidence are we using to decide?						
Who has the power to make this change? Why?						
What questions do we have now? What do we need to know more about in order to make our decision? Are we ready to make our final recommendation?						

Knowing

Identify if there are additional things you need to know before making a decisions.

LE7 Educator Backpocket Field Guide

TIME	ACTIVITY
10-20 min	Summarize and Visualize your Garden-Based Data
10 min	Review Data
15 min	Make an Evidence-Based Decision

Connections to family and community:

- What data did we collect from our family observations and community-based research?
- How does the decision impact our families and communities into the future?

Focus on evidence-based decision making: There are many different and important ways to engage with data and evidence collected with both people and the natural world.

- What do you think we should do? What do you think we should NOT do?
- What did we find in our field-based research that makes you think we should/should not do that?
- How did our community-based research help you think about this?
- What did you find in our garden methods research that helps you decide that?
- Is there anything else that we're not considering yet? What else would you want to know?

As learners share, ask their reasons why they think we should or should not do a certain action.

- Why do you think that?
- What did our evidence from our research tell us?

Revise our model:

Evaluating the state of one's knowledge and deciding on next steps of an investigation are key scientific practices.

Digging Deeper:

Get more specific about our phenomenon or questions.

Changing Perspective:

Observe the phenomenon from a different perspective.

Adding new ideas:

add new information learned from our various resources.

Building Connections:

our models can help us answer our "Should We" questions.

- We can ask ourselves "what would happen to different components in our model if we did _____? If we decided not to do ___, what would happen?"

Centering equitable practices:

- Assume a sense-making stance, and a 'desire to participate' stance, and let those guide your actions as a teacher and facilitator.
- Encourage learner idea generation, wonderings, questions, comments, and suggestions.
- Avoid a rush to judgment that any learner's ideas, wonderings, questions, comments, and/or suggestions are silly, misinformed, nonsensical, or off target.
  - Instead, ask clarifying questions. Ask other learners how they might incorporate what was said into the discussion. Other learners might have perspective on peers' commentary and questions that you don't.
- Deliberation and decision-making are powered and historicized. As an educator in a powered position, your role is not to judge or evaluate families' decisions and decision-making practices. Instead, use them as foundations for learner and community-centered learning.