

## RESOURCES

### TITLE | BACKWARDS PLANNING, THE LEARNING CYCLE, AND LESSON ADAPTATION

CATEGORY | Garden Educator Training

SUB-CATEGORY | Learning & Teaching Outdoors

OVERVIEW | This document outlines a series of trainings for new garden educators on lesson planning. Key topics covered include the concept of backwards planning, understanding the learning cycle, and adapting existing curriculum.

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#### Training Rationale:

This training teaches the basics of lesson planning so that educators can create engaging lessons that build upon each other. Lesson planning is critical for creating consistency and content flow for students, helps educators reinforce learning objectives over time, and forms the backbone of any educator's teaching skill set.

#### Suggested Time of Year:

We suggest beginning this series of trainings early in the school year, around September or October. We also suggest leading this around the same time as a training on **Next Generation Science Standards (NGSS)** so those concepts can be referenced throughout.

#### Suggested Workshop Length

9 hrs, at least 3 workshops of 3 hours each.

#### Training Objective

Educators will learn how and why to lesson plan. They will gain an understanding of key concepts including: the learning cycle, backwards planning, how to read, adapt and create lesson plans, mapping out a scope and sequence, and the creation and assessment of learning objectives.

#### Training Overview:

This training defines the key aspects of lesson planning. By the end of these workshops, educators should understand that their planning is critical to student outcomes. Key questions throughout include:

- What are the guiding questions, primary learning goals and objectives, key experiences, and expected student outcomes of a lesson?
- How does an educator consider timing, classroom management, contextualizing for space and community, and objectives and outcomes in this lesson?
- How does an educator create a lesson plan with all five stages of the learning cycle?

Key terms and concepts are described here, and relevant activities for each are below:

- *The Learning Cycle* conceptualizes how people learn from experience. The main steps of the Learning Cycle consists of the following stages: Invitation, Exploration, Concept Invitation, Application, and Reflection. (The Learning Cycle is explained further in *Lesson Planning Resources*, available in the Table of Contents.)
- *Backwards Planning* is a process by which educators start with the desired outcomes and objectives for students, then craft a scope and sequence of unit(s) and lesson(s) to meet those. The training should stress the importance of effective backwards planning as students will only be as successful as the educator’s plan allows.
- A *Lesson Plan* is a detailed guide for teachers on what will be covered conceptually, the objectives that will be met, and the order of operations and materials needed during the lesson. It also includes timing, student prior knowledge required, prep needed, activities, and an evaluation. Multiple lessons make up a unit.
- A *Scope and Sequence* summarizes what is to be taught and the sequence in which it will be taught. A scope and sequence shows the order of the units within a year or defined time period and the outcomes that each unit addresses. A scope and sequence is an important step in the design of effective teaching and learning programs.
- *Learning Objectives* are clear statements of what students will have learned by the end of the lesson, unit or semester. Asking the question: “How will I know if my students have learned X?” will guide assessment techniques. These could include exit tickets, demonstration, a formal quiz or test, or asking students to summarize or explain what they’ve learned by answering a question or writing a response.
- *Focus Questions (or Guiding and Essential Questions)* are questions that help students learn by stimulating inquiry. Essential questions are questions that help students push their thinking, ask questions, and draw from previous knowledge. They are usually posed at the beginning of a lesson and are open-ended; there won’t necessarily be a right answer. An example of this would be “How does water affect life on earth?” Guiding questions are questions that educators can pose throughout a lesson in order to further students’ thinking on a topic or draw their attention to something they perhaps hadn’t considered. They usually are more closed questions and guide students to one particular answer. Examples of these include “How does water move through the water cycle? Does water stay in the same state of matter throughout the water cycle?”

## Activity Ideas:

- *Learning Cycle*
  - See the BEETLES professional learning overview<sup>1</sup> and conduct this training. (Please note that this training is a 3.5 hour training and should be adequately planned for).
  - Practice the Learning Cycle: Take an existing lesson and cut up the steps into strips. Have educators practice the learning cycle by placing the strips in order and explaining their reasoning.
  - Reference “Using the Learning Cycle to Write Outdoor Science Lessons” in *Lesson Planning Resources*, available in the Table of Contents. Use this document to practice adding the Learning Cycle to a lesson plan.
- *Backwards Planning*
  - To invite discussion about the importance of planning, have educators react to the Grasshopper and the Ant fable from Aesop.<sup>2</sup>
  - Read and discuss “**Thirteen Basic, Indispensable Decisions**” from *The Skillful Teacher*<sup>3</sup> or another preferred resource. What might be some of the considerations in each decision? Which of these decisions feels easiest for you (as an educator) and which feel the most difficult?
  - Review this outline of Backwards Planning and apply the process to specific units or lessons:
    1. Decide on desired outcomes.
      - This considers both the unit-level and lesson-level outcomes and objectives for students.
      - What are the big picture ideas students should walk away having incorporated?
      - What are the experiences and skills students should have and master?
      - What are some essential questions to ask students?
    2. How will you know that students have learned these ideas/concepts/skills?
      - What will checking for understanding look like?
      - What will students need to do/create/say/act/think in order to demonstrate that they have met the objectives?
    3. What activities will produce the desired outcomes for students?
      - List out specific activities.

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- To create a lesson plan, bucket the activities by student knowledge level, gradually increasing in depth as students grow in their comfort with the material.

- *Lesson Plans*

- Review **Reading & Adapting a Lesson 101** below, then practice reading through and adapting a lesson from the Education Outside Curriculum.
- Have instructors draw topics out of a hat and practice writing a new lesson plan using Education Outside Curriculum format as a guide.
- To learn about adapting a lesson to an educator's specific site, create an activity around the question "How does this lesson, unit or scope and sequence take my particular context into account?"
- Have educators write sample lesson plans based on the same prompt or essential question and compare and contrast. Make sure individual attention and feedback is given to each educator so they know how to improve.

- *Scope and Sequences*

- Examine and interpret an **example scope and sequence** and have educators create one of their own.
- Review a lesson plan and a unit plan. You can find lesson plan samples for K-5 on the California Academy of Science's website<sup>4</sup> and unit samples on the California Education and the Environment Initiative's website<sup>5</sup>. What do you see as the main objectives of the unit? How about the lessons within the units? How does a unit plan compare to a lesson plan? How can I tailor the unit plan to meet my teaching needs? What overarching questions guide this unit, and what are some relevant student responses?
- Write unit descriptions based on relevant lesson plans.

- *Learning Objectives*

- Given a list of sample learning objectives, have educators rank them on quality and compare answers to promote discussion of effective and clear learning objectives.
- Discuss some of the questions pertaining to objectives in **Reading & Adapting a Lesson 101**.

- *Focus or "Guiding" and "Essential" Questions*

- Read and discuss the following two articles:
  - Scholastic Readers: What Are Essential Questions<sup>6</sup>
  - Scholastic Readers: Essential Questions<sup>7</sup>
- In small groups, develop questions for different lessons. Have at least two people develop questions for the same lesson and have them compare and contrast.

## Assessing Understanding:

- Exit Ticket: Have educators describe backwards planning and define a scope and sequence. Have educators explain the difference between a lesson description and a lesson plan. Have educators describe best practices for lesson planning.
- *Education Outside's Best Practices for Teaching*, available in the Table of Contents, relies heavily upon the foundation of using an effective lesson plan. We suggest using the Best Practices Rubric as a tool for a manager during lesson observations to assess whether or not the educator is implementing this framework. Lesson plans should be received ahead of time to best assess an educator's ability to create and then accurately follow the lesson plan.

## References:

1. Regents of the University of California. **BEETLES**. Lawrence Hall of Science at UC Berkeley: Accessed April 2019.
2. Pinkney, J., & Aesop. (2015). *The grasshopper & the ants*.
3. Saphier, Jon. *The Skillful Teacher: Building your Teaching Skills*. Acton, MA: Research for Better Teaching Inc, 2008. Can be retrieved from <https://www.siprep.org/uploaded/ProfessionalDevelopment/CDRP/Planning.pdf>
4. California Academy of Sciences, 2019. Science Lesson Plans. Retrieved from <https://www.calacademy.org/educators/lesson-plans>
5. California Department of Resources Recycling and Recovery (CalRecycle), 2019. Science Units. Retrieved from <https://www.californiaeei.org/curriculum/science-units/>

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6. Wilson, Leslie Owen (2019). What Are Essential Questions. The Second Principle. Retrieved from <https://thesecondprinciple.com/teaching-essentials/essential-questions/>
  7. Wilhelm, Jeffery D. (2019). Essential Questions. Scholastic. Retrieved from <https://www.scholastic.com/teachers/articles/teaching-content/essential-questions/>

### Additional Resources:

- Lemov, Doug. *Teach Like a Champion 2.0 : 62 Techniques That Put Students on the Path to College*. San Francisco: Jossey-Bass, 2015
- Literacy Solutions. (2016). Retrieved from <http://www.literacysolutions.net/2017/03/26/what-are-essential-questions/>

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## Thirteen Basic, Indispensable [planning] Decisions (From *The Skillful Teacher*<sup>3</sup>)

This list from *The Skillful Teacher*<sup>3</sup> shares decisions that every teacher should consider in lesson planning.

1. Check in with the curriculum, the standards you're working on, and particularly the big idea (enduring understanding) that's on the table to be sure the lesson you're planning connects explicitly to it.
2. Articulate the mastery objective of this lesson (or series of lessons) to yourself fully. Say exactly what the students will know or be able to do, or do better, at the end of the lesson. Dig into the content to examine its nuances and central ideas before arriving at this statement.
3. Plan how to communicate the objective to the students with unmistakable clarity in language they will understand. How are you going to get them clear about what they're trying to learn? Will you generate essential questions and criteria, give exemplars, or share assessments you will be using?
4. Decide what evidence you will use as confirmation of student mastery. (They may not meet it tomorrow, but having this end in mind is the fulcrum of good planning.)
5. Give careful attention to the evidence from yesterday (or...whenever else is relevant) about who "has it" and who doesn't. Also look carefully at those who have it so well they're ready for an extension or deepening activity.
6. In light of the evidence from yesterday's work (or from your pre-assessment if this is the first lesson in the series), plan the pace and grouping or subgrouping if appropriate for differentiation of instruction. This includes the size of the bite (how big an increment of learning) you will aim for in this lesson. It also includes whether you need to do some pre-teaching for some students and some reteaching for some students who didn't get it yesterday. It means coming up with extensions and challenges for those who got it quickly.
7. Pick up materials, including exactly what manipulatives, pictures, diagrams, pieces of text, equipment, and media will best make the learning accessible to the students.
8. Anticipate confusions especially about vocabulary and concepts to be used, and pre-teach if necessary. Anticipate misconceptions, and plan how to surface them and contradict them.
9. Choose student learning experiences:
  - Instructional strategies you will use...(e.g., demonstration, modeling, thinking aloud, mini lecture with graphic organizer). Pay particular attention to how you can embed reading strategies in your routines for engaging text.
  - Tasks, exercises, and activities the student will do.
  - Hooks that will engage student interest.
  - The sequence of student tasks and teacher-guided strategies within the lesson most likely to develop the concept, skill, or understanding.
  - How to pre-teach essential vocabulary or concepts that some students may lack.
10. Check that doing the task will logically lead to learning the intended skill or concept.
11. Decide when and how you will gather the evidence of student learning during or after the lesson.
12. Create time when students will make their thinking and understanding visible to others.
13. Select a strategy for getting students cognitively active in summarizing and assimilating their new learning.

## Reading and Adapting a Lesson 101

Lesson Description: Read the Lesson Description, then read it again.

### 1. Overview--orients you to time, description, key terms, objectives, materials & prep, and student prior knowledge.

- Time: This is the amount of time for the lesson described. You may have more or less time available and will need to make some decisions about how to modify the lesson to fit your schedule.
  1. Are the time requirements of the lesson descriptions aligned with the time you actually have to teach this lesson? If the lesson description is longer or shorter than the time you have available, how will you modify the timing? How will you keep track of time during the lesson?
- Description: This is a brief narrative description of the lesson.
- Objectives: This describes what students should know and/or be able to do by the end of the lesson. Your end-of-lesson assessment should measure students' success with these objectives.
  1. What is your objective for your students in this lesson? What will they do/say/show that will indicate to you that they have learned what you intended them to in this lesson? Are the objectives activity objectives (measures whether students complete an activity) or mastery objectives (measures what kids know or can do)?
- Materials/Prep Work: This list will help you determine whether you have the necessary supplies to complete this lesson, and whether there is any work you need to do in advance to prepare.
- Student Prior Knowledge: This is information that students are expected to have before you teach this lesson. It is worth checking for understanding to ensure that students know this at the beginning of the lesson, and having a quick way to teach anything in this space in the event that students do not know it. Failure to ensure requisite prior knowledge will cause problems later in the lesson.

### 2. Lesson Steps--Provides the step-by-step agenda for executing the lesson. For each step, consider whether this is the best choice for your kids and your space.

- Introduction: Provides a recommended activity for how to begin the lesson.
- Activity Description: Provides a description for an activity within the lesson. Some Activity Descriptions are highly detailed and leave little to choice, others are very drafty and need a great deal of work on the teacher's part ahead of implementation.
- Closing: Provides a possible activity for closing the lesson.
- Additional Information: Provides information related to the Next Generation Science Standards (NGSS) applicable to this lesson.

### 3. Other Considerations

- Classroom Management
  1. What routines, systems, and other management strategies do you use? Where in the lesson plan should you include them? Which part(s) of the lesson will present management challenges? Why? How can you proactively plan to minimize potential disruptions? Are there parts of the lesson that you need to modify so they are more appropriate for what you are prepared to manage?
- Contextualizing for Space and Community
  1. Is the lesson description possible in your space? If so, are there any changes you need to make to the space or the lesson in order to make it work? If not, are there other spaces available to you that might be more appropriate for this lesson? Are there topics or themes in this lesson that are particularly germane to your students and/or school community? How can you incorporate them? How about topics or themes that are relevant to your school community that aren't included but that you can consider incorporating (e.x. natural disaster, news items, etc)?

## Sample Scope and Sequence

|           | <b>Week Of</b>  | <b>Unit</b>              | <b>Lesson</b>                     |
|-----------|-----------------|--------------------------|-----------------------------------|
| Kinder    | Aug 29          | Intro                    | <i>Garden Agreements</i>          |
|           | Sept 5          | Intro                    | <i>Garden Jobs</i>                |
|           | Sept 12         | 5 Senses                 | <i>Intro</i>                      |
|           | Sept 19         | 5 Senses                 | <i>Sight</i>                      |
|           | Sept 26         | 5 Senses                 | <i>Smell</i>                      |
|           | Oct 3           | 5 Senses                 | <i>Hearing</i>                    |
|           | Oct 10          | 5 Senses                 | <i>Touch</i>                      |
|           | Oct 17          | 5 Senses                 | <i>Taste</i>                      |
|           | Oct 24          | 5 Senses                 | <i>Planting</i>                   |
|           | Oct 31          | Celebration              |                                   |
|           | Nov 7           | Worms & Decomposition    | <i>Worm Observation</i>           |
|           | Nov 14          | Worms & Decomposition    | <i>Worm Habitat</i>               |
|           | Nov 21          | Worms & Decomposition    | <i>Worm Friends</i>               |
|           | Nov 28          | Worms & Decomposition    | <i>Decomposers</i>                |
| Dec 5     | Celebration     |                          |                                   |
|           |                 |                          |                                   |
| 1st Grade | Aug 29          | Intro                    | <i>Garden Agreements</i>          |
|           | Sept 5          | Garden Jobs              | <i>Plant Needs</i>                |
|           | Sept 12         | Plant Structure          | <i>Roots</i>                      |
|           | Sept 19         | Plant Structure          | <i>Leaves</i>                     |
|           | Sept 26         | Plant Structure          | <i>Stems 1</i>                    |
|           | Oct 3           | Plant Structure          | <i>Stems 2</i>                    |
|           | Oct 10          | Plant Structure          | <i>Flowers</i>                    |
|           | Oct 17          | Plant Structure          | <i>Fruit</i>                      |
|           | Oct 24          | Plant Structure          | <i>Seeds</i>                      |
|           | Oct 31          | Plant Structure          | <i>Plant Parts Recipe</i>         |
|           | Nov 7           | Plant Structure          | <i>Plant Parts Recipe</i>         |
|           | Nov 14          | Celebration              |                                   |
|           | Nov 21          | Weather & Tools          | <i>Measuring in the Garden</i>    |
|           | Nov 28          | Weather & Tools          | <i>Weather Intro</i>              |
| Dec 5     | Weather & Tools | <i>Rain &amp; Clouds</i> |                                   |
| Dec 12    | Celebration     |                          |                                   |
|           |                 |                          |                                   |
| 2nd Grade | Aug 29          | Intro                    | <i>Garden Agreements</i>          |
|           | Sept 5          | Life Cycles              | <i>Plant Parts Review</i>         |
|           | Sept 12         | Life Cycles              | <i>Flowers and Seeds</i>          |
|           | Sept 19         | Life Cycles              | <i>Plant Life Cycle</i>           |
|           | Sept 26         | Life Cycles              | <i>Plant Life Cycle Salad</i>     |
|           | Oct 3           | Life Cycles              | <i>Worm Life Cycle</i>            |
|           | Oct 10          | Life Cycles              | <i>Insect Anatomy</i>             |
|           | Oct 17          | Life Cycles              | <i>Insect Life Cycle</i>          |
|           | Oct 24          | Celebration              |                                   |
|           | Oct 31          | Soil and Decomposition   | <i>Decomposition Experiment 1</i> |
|           | Nov 7           | Soil and Decomposition   | <i>Soil Composition 1</i>         |
|           | Nov 14          | Soil and Decomposition   | <i>Soil Composition 2</i>         |
|           | Nov 21          | Soil and Decomposition   | <i>Soil Stir Fry</i>              |

## Sample Scope and Sequence

|           | Week Of     | Unit                   | Lesson                              |
|-----------|-------------|------------------------|-------------------------------------|
| 2nd Grade | Nov 28      | Soil and Decomposition | <i>Decomposition Experiment 2</i>   |
|           | Dec 5       | Soil and Decomposition | <i>Solid &amp; Liquid Pollution</i> |
|           | Dec 12      | Celebration            |                                     |
| 3rd Grade | Aug 29      | Intro                  |                                     |
|           | Sept 5      | Plant Adaptations      | <i>Plant Parts Inquiry</i>          |
|           | Sept 12     | Plant Adaptations      | <i>Plant Parts Review</i>           |
|           | Sept 19     | Plant Adaptations      | <i>Seed Dissection</i>              |
|           | Sept 26     | Plant Adaptations      | <i>Seed Dispersal</i>               |
|           | Oct 3       | Plant Adaptations      | <i>Adapt-A-Seed</i>                 |
|           | Oct 10      | Plant Adaptations      | <i>Leaf Structure</i>               |
|           | Oct 17      | Plant Adaptations      | <i>Drought Tolerant Hunt</i>        |
|           | Oct 24      | Plant Adaptations      | <i>Invent a Plant</i>               |
|           | Oct 31      | Plant Adaptations      | <i>Field Journaling</i>             |
|           | Nov 7       | Celebration            |                                     |
|           | Nov 14      | Weather Tools          | <i>Thermometer Practice</i>         |
|           | Nov 21      | Weather Tools          | <i>Water Cycle</i>                  |
|           | Nov 28      | Weather Tools          | <i>Rainfall</i>                     |
|           | Dec 5       | Weather Tools          | <i>Cloud Observations</i>           |
| Dec 12    | Celebration |                        |                                     |
| 4th Grade | Aug 29      | Intro                  | <i>Garden Agreements</i>            |
|           | Sept 5      | Ecosystems             | <i>Living vs Non-Living</i>         |
|           | Sept 12     | Ecosystems             | <i>Habitat Interactions</i>         |
|           | Sept 19     | Ecosystems             | <i>Planting Producers</i>           |
|           | Sept 26     | Ecosystems             | <i>Food Chains</i>                  |
|           | Oct 3       | Celebration            |                                     |
|           | Oct 10      | Decomposition          | <i>Intro to Decomposition?</i>      |
|           | Oct 17      | Decomposition          | <i>Worms &amp; Castings</i>         |
|           | Oct 24      | Decomposition          | <i>Fungus Among Us</i>              |
|           | Oct 31      | Decomposition          | <i>FBI Hunt</i>                     |
|           | Nov 7       | Decomposition          | <i>Compost</i>                      |
|           | Nov 14      | Decomposition          | <i>Testable / Non-Testable</i>      |
|           | Nov 21      | Decomposition          | <i>Experiment Design</i>            |
|           | Nov 28      | Decomposition          | <i>FBI Pizza</i>                    |
|           | Dec 5       | Decomposition          | <i>Experiment Conclusion</i>        |
| Dec 12    | Celebration |                        |                                     |
| 5th Grade | Aug 29      | Intro                  | <i>Garden Agreements</i>            |
|           | Sept 5      | Plant Needs            | <i>Plant Parts &amp; Needs</i>      |
|           | Sept 12     | Plant Needs            | <i>Plant Food</i>                   |
|           | Sept 19     | Plant Needs            | <i>Soil Nutrients 1</i>             |
|           | Sept 26     | Plant Needs            | <i>Soil Nutrients 2</i>             |
|           | Oct 3       | Plant Needs            | <i>Testable / Non-Testable</i>      |
|           | Oct 10      | Plant Needs            | <i>Experiment Design</i>            |

Sample Scope and Sequence

|           | Week Of | Unit          | Lesson                             |
|-----------|---------|---------------|------------------------------------|
| 5th Grade | Oct 17  | Plant Needs   | <i>Plant Part Recipe</i>           |
|           | Oct 24  | Plant Needs   | <i>Experiment Conclusion</i>       |
|           | Oct 31  | Celebration   |                                    |
|           | Nov 7   | Water Systems | <i>Water in our Garden</i>         |
|           | Nov 14  | Water Systems | <i>How Water Flows</i>             |
|           | Nov 21  | Water Systems | <i>Where does water come from?</i> |
|           | Nov 28  | Water Systems | <i>Permeable Surfaces</i>          |
|           | Dec 5   | Water Systems | <i>Water Pollution</i>             |
|           | Dec 12  | Celebration   |                                    |