



# Unpacking a DCI From Seed to Tree

*What does it look like?*

# Learning Goals



1. Construct an explanation of the meaning of core ideas.
2. Begin to develop a unit of study that models coherence in support of student understanding of selected phenomena.

# Essential Questions



- How can I study the standards to figure out what students are expected to know?
- How do I use phenomena to engage students in a three-dimensional learning experience?

# Why Three-Dimensional Learning?

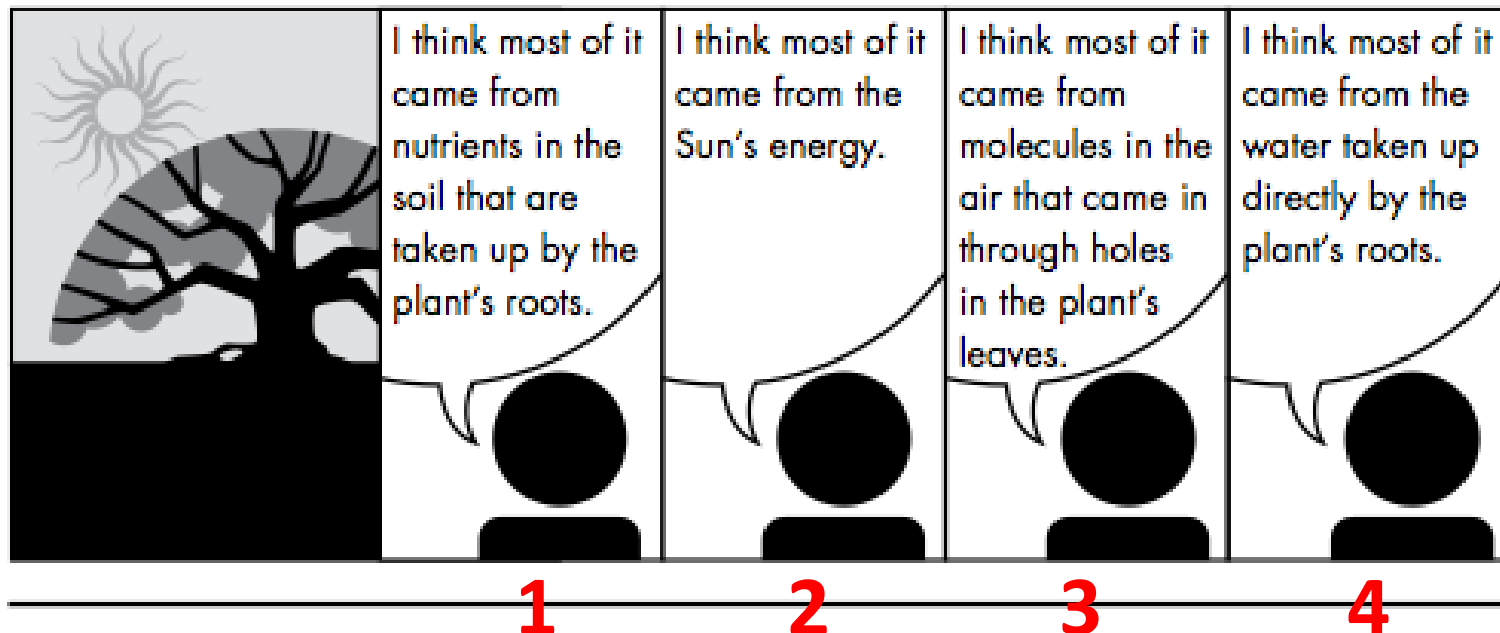
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Let's look at an example using a concept cartoon.

**Phenomenon:** This huge tree started as a little seed.

**Question:** What provided most of the mass that made the tree grow so large?



# Why Three-Dimensional Learning?

(2 of 2)



Consider what  
graduates  
know—or  
don't know ...

# Pause to Reflect



- Consider the concept cartoon we used.
- IF the Harvard/MIT grads had a middle school learning experience in which they explored these various explanations, would their responses in the video be the same? Why or why not?



# Unpacking a DCI

# Unpacking the *Standards*



## Identify Performance Expectations

### Unpack Practices

- Describe the practice and its components
- Identify the requisite knowledge and skills
- Specify evidence of high level performance

### Unpack DCIs

- Elaborate major ideas
- Define boundary conditions
- Describe prior knowledge
- Identify student challenges
- Brainstorm phenomena

### Unpack CCCs

- Describe essential features
- Identify substantive intersections with science practices and disciplinary core ideas



# Selecting standards



- Use the TN standards document provided for your grade band to locate the most relevant standards for the seed to tree phenomenon to respond to the question:
- What provided most of the mass that made the tree grow so large?
- \*Think about what is developmentally appropriate for your grade band on this topic.

# Choosing a Standard



- You have 5-10 minutes to select your top choice for your grade band.
- Refer to the explanation of your standard in the TN Science Standards Reference guide.
- Discuss & defend your choice.

# Suggested Standards by grade band



- |   |   |
|---|---|
| <ul style="list-style-type: none"><li>• K-2<ul style="list-style-type: none"><li>– K.LS1.1</li><li>– 1.LS1.2</li><li>– *1.LS2.1</li></ul></li><li>• 3-5<ul style="list-style-type: none"><li>– 3.LS1.1</li><li>– *4.LS2.1</li></ul></li></ul> | <ul style="list-style-type: none"><li>• 6-8<ul style="list-style-type: none"><li>– *7.LS1.9</li><li>– 7.LS2.1</li></ul></li><li>• High School<ul style="list-style-type: none"><li>– EVSC.LS2.4</li><li>– *BIO1.LS1.8</li><li>– *BIOL.LS2.3</li></ul></li></ul> |
|---|---|

# Tools for Unpacking DCIs



1. Unpacking My Selected Disciplinary Core Idea handout
2. TN Science Standards Reference Guide (*in your notebook*)
3. Descriptions of the disciplinary core ideas and component ideas from *A Framework for K-12 Science Education*
4. *DCIs: Reshaping Teaching & Learning* Book.

Each chapter unpacks a DCI and the corresponding component ideas.

5. *Uncovering Student Ideas in Science* Probes (Page Keeley)
6. Your expertise as an educator on what students typically think about the topic.

# Unpacking Core Ideas

(1 of 2)



## 1. Elaborate major ideas.

- What is the intended meaning of the element of the core idea?
- Is there one idea or are there several separate ones in the statement?
- What terminology is explicitly used in the core idea?

## 2. Define boundary conditions.

- What peripheral ideas or terms are *not* essential for understanding the core idea?

## 3. Describe prior knowledge.

- What other knowledge and skills (both from this topic and from other topics) do students need to achieve an understanding of this core idea?

# Unpacking Core Ideas

(2 of 2)



## 4. Identify student challenges.

- Are there any commonly held ideas that differ in important ways from the scientifically accepted understanding?
- What methods can be used to determine students' current understandings?
- In what ways can instruction directly address or leverage students' current understandings?

## 5. Brainstorm phenomena.

- What phenomena would provide an example of this core idea?

# Activity: Unpacking Core Ideas



## Your Jigsaw Task

1. Complete the Unpacking Core Ideas handout using your assigned tool(s).
2. Everyone refer to the specific standard in the TN Science Standards Reference guide for your grade band to respond to prompts on page 1 of the handout.
  1. K-2 use \*1.LS2.1
  2. 3-5 use \*4.LS2.1
  3. 6-8 use \*7.LS1.9
  4. 9-12 use \*BIO1.LS1.8

# Jigsaw Reading – Teams of 4



*Person 1 - Framework DCI descriptions*

- LS1 (p. 143 intro) & LS1.C (p. 147-148)
- LS2 (p. 150 intro) & LS2.A (p.151-152) & LS2.B (p. 152-154)

*Person 2 - DCIs: Reshaping Teaching & Learning Book (focus on plant processes rather than animal processes) Chapter 6 – LS1*

- LS1C – p. 103-105;
- p. 107 (skim for phenomena)
- How does student understanding develop over time (read about LS1:C for your grade band!) – K-2 (p. 110); 3-5 (p. 11); 6-8 (p. 113); 9-12 (p. 114-115)
- Students commonly held ideas, p. 115-118

*Person 3 DCIs: Reshaping Teaching & Learning Book (focus on plant processes & photosynthesis rather than animal processes) LS1C continued & Chapter 7 – LS2*

- LS1C - Approaches to teaching, p. 118-120
- LS2 - K-2 & 3-5 grade bands read p. 131-133 &
- LS2 - 6-8 & 9-12 grade bands read p. 133-135

*Person 4 – Uncovering Student Idea Formative Assessment Probes*



# Reflect on the Process - Partners



1. What did you learn about the core idea itself?
2. What value do you see in unpacking the core ideas?
3. What are a few examples of phenomena and concepts that might work with this element?

# Sharing What We've Learned



- Create a grade-band poster set that shows a condensed summary of the following:
  - Major Ideas
  - Boundary Conditions
  - Prior knowledge
  - Student Challenges
  - Suggestions for Instruction
  - Potential Phenomena
- We will share out these ideas with the other grade bands at 2:30

# Poster Share



- Post your grade band poster in the designated area.
- “Stay and Stray” strategy
  - Several experts will stay at the poster and explain information to members from the other groups.
  - At a designated time a new set of experts will trade to allow everyone a chance to learn about the other grade bands.