

# Using Issues as a Context to Enhance Students' Three-Dimensional Learning

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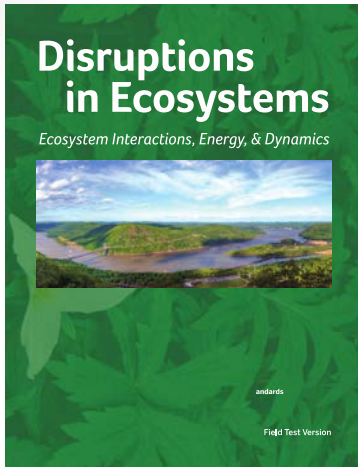
NSTA, Nashville, April 1, 2016



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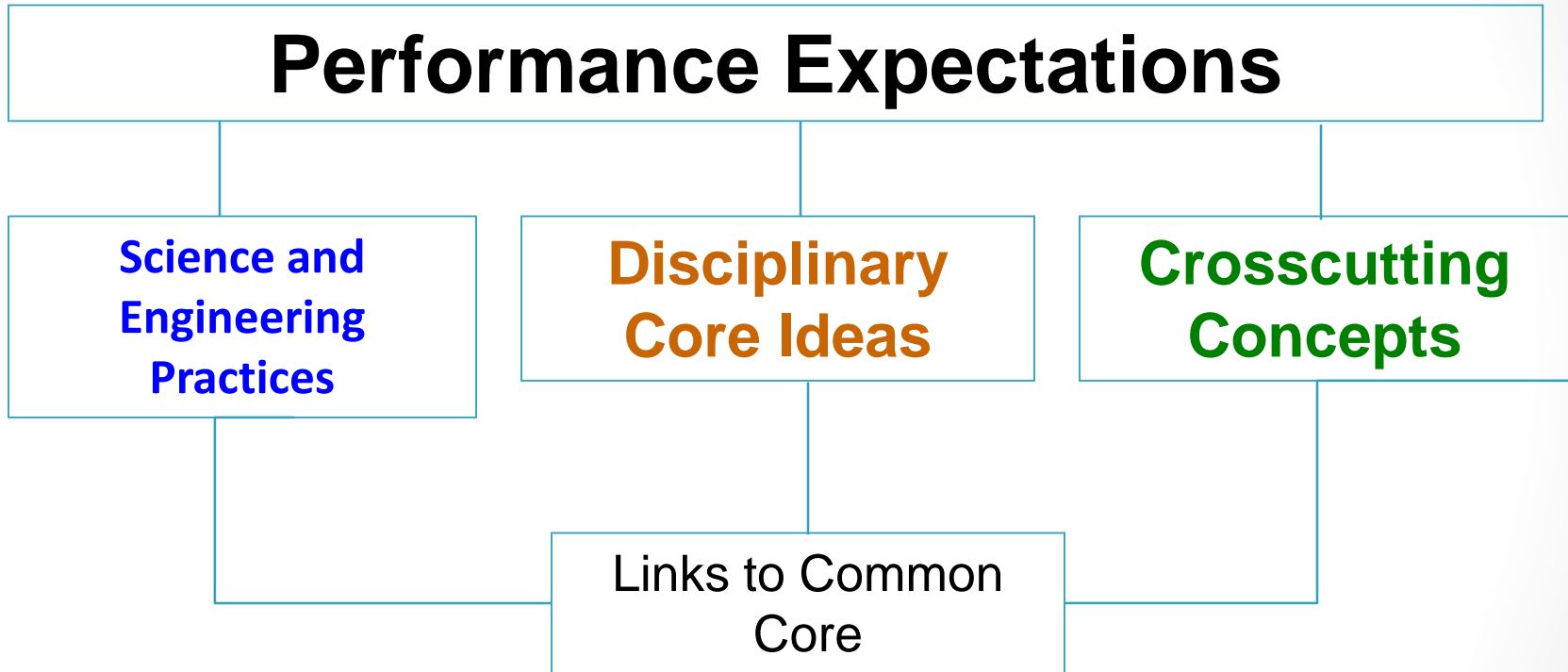
Implementing New Standards

Curriculum – instructional materials

Classroom Assessment – formative & summative

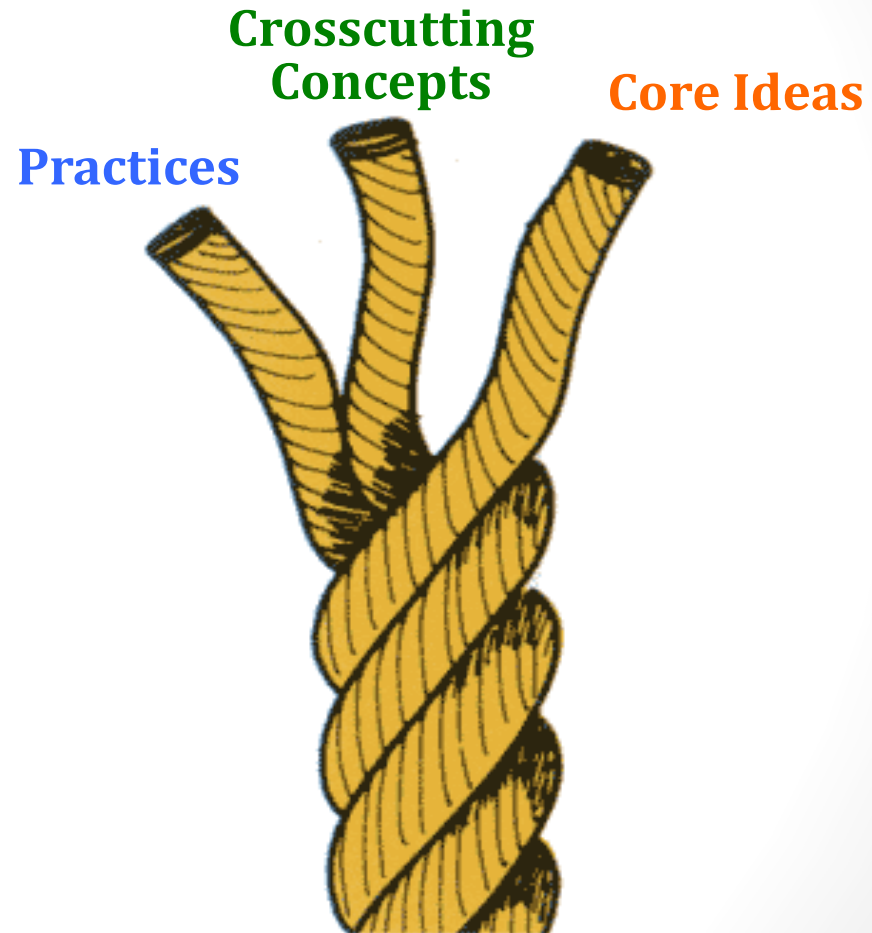
Instruction – teaching tools

# What is 3-D Learning?



# What is 3-D Learning?

The **practices** are the processes of building and using the **core ideas** to make sense of the natural and designed world, and the **crosscutting concepts** hold the discipline together.



# Disciplinary Core Ideas (DCIs)

- **Physical Science**

- Matter and its interactions
- Motion and stability: Forces and interactions
- Energy
- Waves and their applications in technologies for information transfer

- **Life Science**

- From molecules to organisms: Structures and processes
- Ecosystems: Interactions, energy, and dynamics
- Heredity: Inheritance and variation of traits
- Biological evolution: Unity and diversity

- **Earth and Space Science**

- Earth's place in the universe
- Earth's systems
- Earth and human activity

- **Engineering**

- Engineering design



# Science and Engineering Practices (SEPs)

- Analyzing and Interpreting Data
- Asking Questions and Defining Problems
- Constructing Explanations and Designing Solutions
- Developing and Using Models
- Engaging in Argument from Evidence
- Obtaining, Evaluating, and Communicating Information
- Planning and Carrying Out Investigations
- Using Mathematics and Computational Thinking

# Crosscutting Concepts (CCCs)

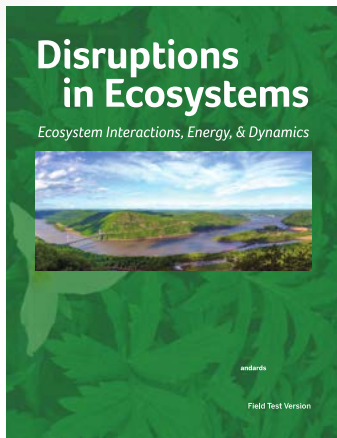
- Cause and Effect
- Energy and Matter
- Patterns
- Scale, Proportion, and Quantity
- Stability and Change
- Structure and Function
- Systems and System Models

# Why Issues?

In order for students to develop a sustained attraction to science and for them to appreciate the many ways in which it is pertinent to their daily lives, classroom learning experiences in science need to connect with their own interests and experiences.

*Next Generation Framework*  
National Research Council, 2011





1.1  
1.2  
1.3  
1.4 .....  
1.5  
1.6  
1.7

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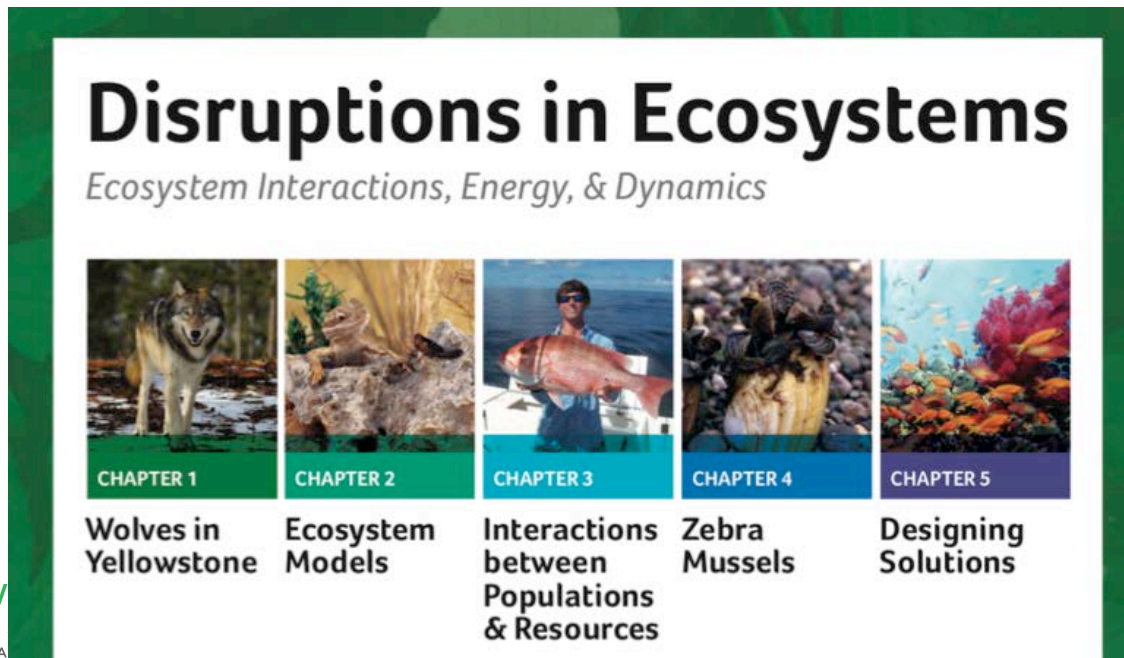
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# Phenomena & Anchoring Events

1. Humans can affect the relationships among organisms in an environment.
2. Natural disasters can affect the transfer of energy and the cycling of matter in ecosystems.
3. The growth of organisms and populations are limited by the available resources.
4. The introduction of a new organism can affect the stability of an ecosystem.
5. Humans are using more resources, causing the need for solutions.



# Example Activity

- From a model middle school NGSS-aligned unit on Ecology
- Overarching issue in chapter: invasive species (Zebra mussel in the Hudson River)
- Final activity in the chapter
- Evaluate activity in the 5E cycle

# NGSS Alignment

DCIs	SEPs	CCCs
MS LS2.C.1	Asking Questions	Stability and Change
MS LS2.A.1	Analyzing and Interpreting Data	Cause and Effect
MS LS2.A.2	Engaging in Argument from Evidence	Patterns
MS LS4.D.1		

PEs: MS-LS2-4 and MS-LS2-1

# Where did you see 3-D learning?

- What could you do with your students throughout a unit/school year to make 3-D learning more explicit?

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- Thank you to NSF for funding this project!
- Presentation will be available on [sepuplhs.org](http://sepuplhs.org)
- Zebra mussel materials (graphing tool, readings) are on [www.amnh.org/education/resources/rfl/web/riverecology](http://www.amnh.org/education/resources/rfl/web/riverecology)
- Please evaluate our session at [www.nsta.org/nashvillebrowser](http://www.nsta.org/nashvillebrowser)