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## Educating for Sustainable Development in a Common Core Environment: Strategies for Secondary Teachers

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Presented by



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### Agenda

1. Review of sustainability
2. Sustainability concepts in your curriculum
3. Examples of lessons aligned to Common Core
4. Overview of ESD instructional strategies

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### 1. Review of sustainability

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A working definition

**Sustainable development:**

*Meeting the needs of the present without compromising the ability of future generations to meet their own needs.*

- The Brundtland Commission. (1987). *Our Common Future*



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*Sustainability: Beyond the environment*



- Healthy people and environment
- Stable, secure communities
- Democracy and equity

*Living well for all, now and into the future, within the means of the environment.*



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*Educating for sustainability*



- Real-world, integrated content
- Critical thinking
- Solutions-oriented projects
- Community engagement
- Equity and achievement for all

*What kind of citizens will we create?*

*What kind of world will they shape together?*



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2. Sustainability concepts in your curriculum



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Integration strategy:  
Overlaying sustainability concepts  
onto your curriculum topics

("Conceptual Overlay")



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Core sustainability concepts: Which do you use most?

- interdependence
- change
- community
- diversity
- ecological limits
- equity
- ethics
- limits/scale
- beauty
- resilience
- systems
- wellbeing/prosperity



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Conceptual Overlay: Equity, Limits, Scale

**Equity/Limits/Scale**

Coal:  
Geology and chemistry  
Mining processes  
Electricity generation

- Impacts of coal production on ecosystems and communities
- Health impacts on miners



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Conceptual Overlay: Well-being

**Limits, ecological health**

Math:  
Linear equations

**Graphing rates of regeneration**



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Conceptual Overlay: Equity, Interdependence, and Diversity

**Ecological health, equity**

History:  
American revolution

**Cultural and environmental impacts of colonization**



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Core sustainability concepts: Which do you use most?

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A complete framework showing the intersection of disciplines and concepts is shown in the document *Educating for Sustainability: A framework of Essential Knowledge, Skills and Dispositions*



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3. Examples of sustainability lessons aligned to Common Core



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## Common Core Background

Developed by

- National Governors' Association
- Council of Chief State School Officers



Goal: College and career readiness




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## English Language arts:

Emphasis on nonfiction and increasing complexity

50% in elementary; 70% in high school

Similar standards increase in complexity across grades.

Grades 6+: Reading and writing standards for both science and social science




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## Major ELA Strands

Language

Reading: Foundational Skills (K-5 only)

Reading: Literature

Reading: Informational Texts

Speaking and Listening

Writing




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**Strand: Reading-Informational texts**

*Substrand: Key Ideas and Details*

Sample standards:

- Cite textual evidence.
- Determine a theme or central idea.
- Synthesize information.



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**Approach: Place standards in context**

What are the critical texts and information my students need?



What is important to speak and listen about?



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**Strand: Reading-Informational texts**

*Substrand: Key Ideas and Details*

Strategies:

1. Select content-rich texts.
2. Use texts rich in text features.
3. Engage students in analysis.
4. Structure tasks that require integration.



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## Sample lesson: Gasoline for Lunch

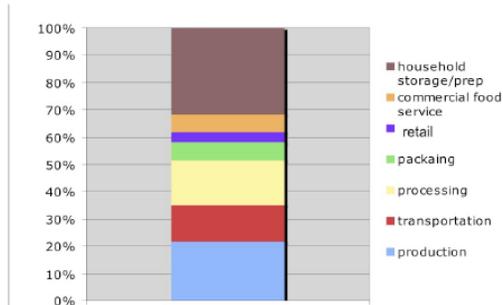
- High school learners investigate the role of fossil fuels in the food system.
- The lesson integrates several standards and strategies.



### Integration of Knowledge and Ideas

A) Food system stage	B) % fossil fuels used	C) Examples of energy use
Agricultural Production	24%	Of all energy used in this stage, 40% is used for producing synthetic fertilizers and pesticides; 25% is for diesel fuel; 35% is for other uses such as irrigation
Transportation	13.5%	Gas and diesel fuel are used to transport foods from manufacturers to store and from stores to your home
Processing Industry	16.4%	Electricity (often powered by coal) is used for processing steps such as baking, drying, slicing, and freezing

### Graphic representation





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Integrating Point of View with Speaking and Listening

Understanding sustainability issues *requires* speaking and listening from different points of view.



- Provide evidence
- Speak for one's self
- Acknowledge other views



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Sustainability and Common Core Math



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**Examples of Mathematical Practices**

Abstract and quantitative reasoning

Modeling and representation



Making connections among math domains



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**Approach: Place standards in context**

What data is important?

How do we represent and analyze data in a real world setting?

What measurements are useful in explaining sustainability issues?




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**Major Math Domains: 6-8**

Geometry

Ratios and Proportions

The Number System

Expressions and Equations

Functions

Statistics and Probability




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**Geometry through Sustainable Food Systems**

Design Guidelines III: Geometric Shapes and Designs	Yes	No	If yes, what type of land use does the shape represent or create a border for?
4. In your model, use labels and/or different colors to represent at least three of the following geometric shapes that make up the area of your land use types:			
• right triangle			
• square			
• circle			
• polygon			
5. In your model, use labels and/or different colors to represent at least three of the following types of lines:			
• parallel line			
• perpendicular line			
• intersecting line			

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## Ratios and Proportional Relationships through Price vs. Cost Analysis

Each female worker earns \$92/hr and sews 14 T-shirts in that time. Using the ratio table below, please answer the following questions.

T-shirts	14 T-shirts	2 T-shirts	1 T-shirt
<b>Wage</b>	\$92	\$13	

4. Approximately how much money does one woman earn per T-shirt she sews?

- A. \$.07
- B. \$.14
- C. \$1.00
- D. \$.02

5. Using the equivalent fraction equation, determine what percentage of the T-shirt price is paid to the worker?

$$\frac{\$.07}{\$25.00} = \frac{p}{100}$$




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## Unit Conversions through Embodied Energy in Food (grades 6+)

How many gallons of gas are embodied in the foods you eat each day?



$$\frac{\text{calories of embodied energy}}{1 \text{ Day}} \times \frac{1 \text{ Gallon of Gasoline}}{31,000 \text{ calories}} = \frac{\text{Gallons of Gasoline}}{\text{Day}}$$




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## Major Math Domains: High School

Number and Quantity

Algebra

Functions

Modeling

Geometry

Statistics and Probability




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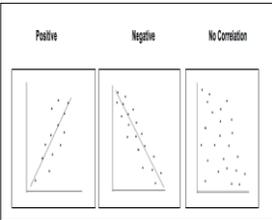
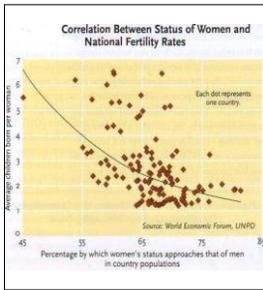
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### Reasoning with Correlation and Causation through Gender, Poverty, and Population




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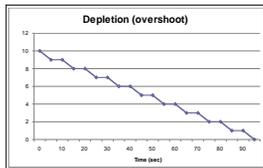
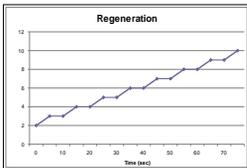
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### Algebraic Thinking and Linear Equations through Regeneration and Overshoot of Renewable Resources




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It's all about math in real-world contexts

Graphing data about community food systems

Finding the ratio of prices to wages

Using fractions and conversion to calculate energy in food systems

Using linear equations to determine rates of regeneration




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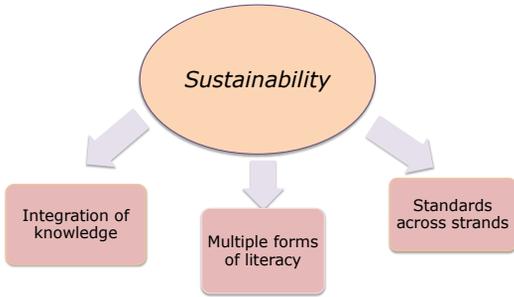
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Summary



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Download additional sample lessons from the Curriculum and Resource Center: [www.creativechange.net/crc](http://www.creativechange.net/crc)

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Contact me to discuss professional development opportunities:  
santone@creativechange.net



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