Example of a Unit Makeover: 6th Grade Science
Scientific Inquiry

How do curriculum and instruction change as a result of using a sustainability approach? How does the content become richer, and level of inquiry deepen? This document shows what happens when a teacher applies sustainability concepts and approaches to create a unit "makeover." Prepared by the teacher, this report summarizes the "before" and "after" unit in terms of guiding questions, instructional strategies, assessment, and other factors that impact student achievement.

Background

The unit makeover was an outcome of the 2006 Summer Sustainability Institute sponsored by the Children's Environmental Literacy Foundation, with facilitation provided by Creative Change Educational Solutions and Scott Beall consulting. During the intensive week-long institute, teachers gained content knowledge, resources, and strategies to rethink their approach to curriculum and instruction using the lens of sustainability. Guided planning time and one-on-one mentoring at the institute enable teachers to walk away with a unit "makeover" like this one that was implemented during the school year.

After the week-long institute the teachers were provided on-going support and communication. Teachers sent their in-progress lesson plans to Creative Change and CELF, and received feedback and mentoring via phone and e-mail. This document is an outcome of this process.

Name of unit: Scientific inquiry

Length of unit:

Original unit (before SE infusion):	New unit (after SE infusion):
Two months	Two months

Unit objectives/guiding questions:

Original unit (before SE infusion):	New unit (after SE infusion):
Science Unit Question: How do scientists conduct, analyze and report results of scientific inquiry?	*New <u>Team</u> Guiding Questions for the Year:* - How has our environment changed over time? - What will our environment be like in the future? - How can we affect positive change? *Science Unit Question*: How do scientists study the environment and report their discoveries?

State standards met:

Original unit (before SE infusion):	New unit (after SE infusion):
Science - NYS Standard 1: Scientific Inquiry (Analysis, Inquiry, and Design) - NYS Standard 2: Information Systems - NYS Standard 3: The observations made while testing proposed explanations, when analyzed using conventional and invented methods, provide new insights into natural phenomena - NYS Standard 7: Connections (Interdisciplinary Problem Solving) **Social Studies** - NYS Standard 1: Economics	**Science** - NYS Standard 1: Scientific Inquiry (Analysis, Inquiry, and Design) - NYS Standard 2: Information Systems - NYS Standard 3: The observations made while testing proposed explanations, when analyzed using conventional and invented methods, provide new insights into natural phenomena. - NYS Standard 4: Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science. - NYS Standard 6: Systems Thinking (Interconnectedness: Common Themes) - NYS Standard 7: Connections (Interdisciplinary Problem Solving) **Social Studies** - NYS Standard 1: Economics - NYS Standard 5: Civics, Citizenship, and Government

Sustainability connections:

Original unit (before SE infusion):	New unit (after SE infusion):
⇨ Awareness of dilution process used to deal with pollution.	⇨ Systems Theory (Introduce group work expectations with "Perfect Square" activity, and continued reference to group goal throughout unit.) ⇨ Awareness of dilution process used to deal with pollution. ⇨ Awareness of product choices involving recycled content and bleaching. ⇨ Awareness of biodegradable rather than Styrofoam material. ⇨ Awareness of cleaners which are safer for people and the environment.

Examples of learning activities and methods used:

- The overall activities and methods, hands on lab experiences, have not changed. There have been subtle changes in the labs that have increased the depth of discussion and demanded more complex decision making.
- Students are now asked to make personal decisions with the Earth in mind, mirroring the type of thinking I hope to encourage them to utilize in the real world.

Original unit (before SE infusion):	New unit (after SE infusion):
⇨ Group participation expectations are created through discussion.	⇨ Group participation expectations created through listing of behaviors experienced during "Silent Squares" activity that support group goal achievement vs. behaviors that interfere with group goal achievement.
⇨ Gum drop lab reinforces qualitative and quantitative observational skills.	⇨ Styrofoam vs. corn based packing peanut lab to reinforce qualitative and quantitative observational skills.
⇨ Paper towel absorption lab asks students to determine which product to purchase based on absorbency and price.	⇨ Paper towel absorption lab asks students to determine which product to purchase based on absorbency, recycled content, bleaching process, and price.

Opportunities for students to engage in real-world problem-solving:

Original unit (before SE infusion):	New unit (after SE infusion):
Determine if dilution is a logical solution for water pollution. Make purchasing decisions made based on paper towel absorbency and price. Students create a real world "controlled study" on an area of interest.	Determine if dilution is a logical solution for water pollution. Make purchasing decisions made based on paper towel absorbency, recycled content, bleaching process, and price. Students create a real world "controlled study" on an area of interest, if possible, with environmental aspect. Determine which packing material is the best for the shipper, customer, and Earth.

Assessment strategies: (Same)

Original unit (before SE infusion):	New unit (after SE infusion):
⇨ Tool quiz to determine knowledge of tools, measurement units, and use. ⇨ Observation of lab group participation, discussion levels, and written reflections. ⇨ Quiz on scientific method terminology, identification of variables and ability to plan a study to investigate a problem. ⇨ Formal lab report of self created controlled study.	⇨ Tool quiz to determine knowledge of tools, measurement units, and use. ⇨ Observation of lab group participation, discussion levels, and written reflections. ⇨ Quiz on scientific method terminology, identification of variables and ability to plan a study to investigate a problem. ⇨ Formal lab report of self created controlled study.

Meaningful community connections:

Original unit (before SE infusion):	New unit (after SE infusion):
none	It was not possible this year, but in the future I'd like to have some students bring environmentally focused projects to the CELF Expo in the Spring.

Integration of content:

Original unit (before SE infusion):	New unit (after SE infusion):
⇨ Technology Used: Excel spreadsheets and graphing tool Word processing Internet research for lab report ⇨ "Archeological Digs" using scientific tools, related to Social Studies investigation of ancient civilizations. ⇨ Collection, organization and analysis of mathematical data. ⇨ Concise, clear written expression of observations and conclusions related to ELA focus.	Same, but ⇨ Data analyzed is more relevant and has greater connection to real-world issues ⇨ Writing and communication applied to authentic audiences.

Evidence of student learning:

Original unit (before SE infusion):	New unit (after SE infusion):
⇨ Quiz performances ⇨ Observation of group discussion ⇨ Observation of lab participation level ⇨ Written and computer generated lab report quality (including charts and graphs) based on grade level rubric	⇨ Same, but evidence of learning more connected to real-world content.