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Investigations & Persuasion with CER

Investigations & Persuasions
with CERs (Claim~ Evidence ~ Reasoning)

Critical Effective Results with Conservation PSAs
A Student Inquiry Project

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LESSON MODULE

Investigations & Persuasions with CER

Critical Effective Results with Conservation PSAs

A Student Inquiry Project

GOALS & OBJECTIVES/ COMMON CORE STATE STANDARDS

OBJECTIVES: Students will:

- Students will identify
  - That scientific theories are explanations and laws describe relationships, and both are supported by evidence.
  - Identify a benefit of using a model to explain how things work.
- Students will develop their sense of science process, investigation and data analysis and interpretation through
  - Personal research
  - Use of data findings through technology.

COMMON CORE STATE STANDARDS:

CCSS: ENGLISH LANGUAGE ARTS & MATH STANDARDS 6-8:

LACC.68. **STANDARDS FOR LITERACY IN HISTORY, SOCIAL SCIENCE, SCIENCE, AND TECHNICAL SUBJECTS**

LAFS.68.WHST.3.7 Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.

LAFS.68.RST.1.3Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.

RST.3.7: Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

WHST.3.7

LA.6.4.2.2 The student will record information (e.g., observations, notes, lists, charts, legends) related to a topic, including visual aids to organize and record information and include a list of sources used

LA.6.2.2.3 The student will organize information to show understanding (e.g., charting, mapping, paraphrasing, summarizing, or comparing/contrasting

Math Stds 6-8: MA.6.A.3.6 Construct and analyze tables, graphs, and equations to describe linear functions and other simple reactions using both common language and algebraic notation.

MS-ESS2-5 Collect data to provide evidence for how the motions and complex interactions of air masses results in changed in weather conditions.

MS-ESS2-6 Develop and use a model to describe how unequal heating and rotation of the Earth cause patters of atmosphere and oceanic circulation that determine regional climates.

Grade 8 Annually Assessed Benchmarks for the FCAT 2.0 Science Assessment Florida - Science: 6th -8th Grade Next Generation Sunshine State Standards

Big Idea 1:	**The Practice of Science**
SC.6.N.1.1	Define a problem from the seventh grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.6.N.1.2	Differentiate replication (by others) from repetition (multiple trials).
SC.6.N.1.3:	Distinguish between an experiment (which must involve the identification and control of variables) and other forms of scientific investigation and explain that not all scientific knowledge is derived from experimentation.
SC.6.N.1.4	Identify test variables (independent variables) and outcome variables (dependent variables) in an experiment
SC.6.N.1.5	Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics. (ALSO SC6.7.N.3.2, SC.8.N.1.5, SC.8.E.5.10)
SC.6.N.1.7	Explain that scientific knowledge is the result of a great deal of debate and confirmation within the science community.
Big Idea 2	**The Characteristics of Scientific Knowledge**
SC.6.N.1.5	Recognize that science involves creativity, not just in designing experiments, but in also creating explanations that fit evidence.
SC.6.N.2.1	Distinguish science from other activities involving thought
SC.6.N.2.2	Explain that scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered.
SC.7.N.3	Identify that scientific theories are explanations and laws describe relationships, and both are supported by evidence. Identify a benefit of using a model to explain how things work.
Big Idea 3:	**The Role of Theories, Laws, Hypotheses, and Models**
SC.6.N.3	The terms that describe examples of scientific knowledge, for example; "theory," "law," "hypothesis," and "model" have very specific meanings and functions within science.
Big Idea 10:	**Transformation of Energy**
Forms of Energy	Energy exists in many forms and has the ability to do work or cause a change.
SC.6.E.6.1:	Describe and give examples of ways in which Earth's surface is built up and torn down by physical and chemical weathering, erosion, and deposition.
SC.6.E.7.4	Differentiate and show interactions among the geosphere, hydrosphere, cryosphere, atmosphere, and biosphere
SC.6.E.7.6:	Differentiate between weather and climate.
SC.6.E.7.9	Describe how the composition and structure of the atmosphere protects life and insulates the planet
SC.7.P.10.2:	Observe and explain that light can be reflected, refracted, and/or absorbed.
SC.7.P.11.2:	Investigate and describe the transformation of energy from one form to another.
SC.7.P.11.3	Cite evidence to explain that energy cannot be created nor destroyed, only changed from one form to another.

SC.8.P.11	The Law of Conservation of Energy: Energy is conserved as it transfers from one object to another and from one form to another. Identify energy as stored (potential) or expressed in motion (kinetic).SC.7.P.11.In.b Recognize that one form of energy can change to other forms of energy, such as solar panels change light into electricity.
SC.6.L.14	Organization and Development of Living Organisms
SC.6.L.14.3	Recognize and explore how cells of all organisms undergo similar processes to maintain homeostasis, including extracting energy from food, getting rid of waste, and reproducing.
SC.6.L.14.4	Compare and contrast the structure and function of major organelles of plant and animal cells, including cell wall, cell membrane, nucleus, cytoplasm, chloroplasts, mitochondria, and vacuoles.
SC.6.N.1.4	Discuss, compare, and negotiate methods used, results obtained, and explanations among groups of students conducting the same investigation.
SC.8.N.1	The Practice of Science - The processes of science frequently do not correspond to traditional portrayal of "the scientific method."
SC.8.N.1.2	Design and conduct a study using repeated trials and replication.
SC.8.L.18.1	Describe & investigate the process of photosynthesis, such as the roles of light, carbon dioxide, water and chlorophyll; production of food; release of oxygen.

Course Outline/ Overview

Investigations & Persuasions with CER

Critical Effective Results with Conservation PSAs

- A Student Inquiry Project

Students are excited about improving their global and community through conservation. If they can see that they can have an impact, they are motivated to persuade and prove their claim through evidence. A teacher can tap into their enthusiasm, with a relevant process of communication to be taught to students in the 21st century. Through videos, students can express their viewpoints and show the evidence that supports their claims. Students are eager to communicate the findings of their investigations and persuasive reasoning through videos.

Students learn about improving the quality of life through the applications of lessons and labs in Science and Language Arts and community service projects with activities. Through Language Arts, students become capable of communicating their aspirations and claims, providing evidence from their activities, explaining their reasoning, hoping to persuade others to care enough about improving our world through conservation.

CER (Claim, Evidence, and Reasoning) is an effective way for students to communicate what they know, how they know it, and what evidence supports their claim. They learn how to think and examine with objective skepticism, real life situations. Students become more proactive in projects and investigations that can be empowering, as students become more dynamic in persuasive writing through the written or multimedia communication and documentation.

Constructing scientific explanations in which students support their claims with appropriate evidence and reasoning is important in scientific inquiry and critical in effective persuasion in writing. Students learn the process of using evidential documentation and reasoning through inquiry and conservation of natural resources, energy, water, and wildlife. Collaboration teachers work in teams with curriculum to participate in programs and instructional technology for research, to empower students to take an interest and make a difference in environmental concerns.

Teachers are essentials in teaching the process of evidential literacy and supporting students in documenting scientific inquiry investigations with evidence in multimedia formats. Strategies that teachers use to support students in writing scientific explanations include: making an accurate and explicit framework in using models, to make explanations understandable, provide a rationale for creating explanations, to connect evidence with reasoning to everyday explanations, and assess their writing to provide feedback to students.

As students become more successful at writing scientific explanations, teachers introduce more complex tasks. Students can analyze data from evidence where there are multiple possible explanations. CER Process in writing about scientific investigations promotes more effective persuasive writing, which is important for helping students to become scientifically literate and critically evaluate scientific claims presented in popular cultures (e.g. newspapers, journals, and magazines).

In our activities, students research, investigate environmental, scientific, and ecology issues, using interactive technology, while accessing global resources with journalistic interactive presentation. Students become familiar with concepts in literacy through science by researching current events, collaborating on projects, writing articles, and using applications relevant in their lives through documentation of familiar media, such as cameras, Smart phones, videos, and multimedia presentations.

Students examined the guiding questions, “What choices can I make, and how can I contribute to the conservation of energy, limited natural resources, and / or wildlife. How can I help reduce the progression of climate change to improve our environment and the world?” Engaged students used technology to use presentations to demonstrate an understanding about conservation from research and experiential learning strategies, while mentoring others with their presentations. This project inspired and cultivated a digital generation of environmental activist and innovators to access print and online publications, related to science, and technology, and how it can be used to improve their lives.

This instruction is based on MDCPS District instruction of CER:

Claim – A conclusion that answers the original questions. Students need to make and accurate and complete claim.

Evidence – Scientific data that supports the claim. Students provide appropriate and sufficient evidence to support their claim, preferably empirical and validated data.

Reasoning – Justification that links the claim and evidence. It shows why the data count as evidence by using appropriate and sufficient scientific principles.

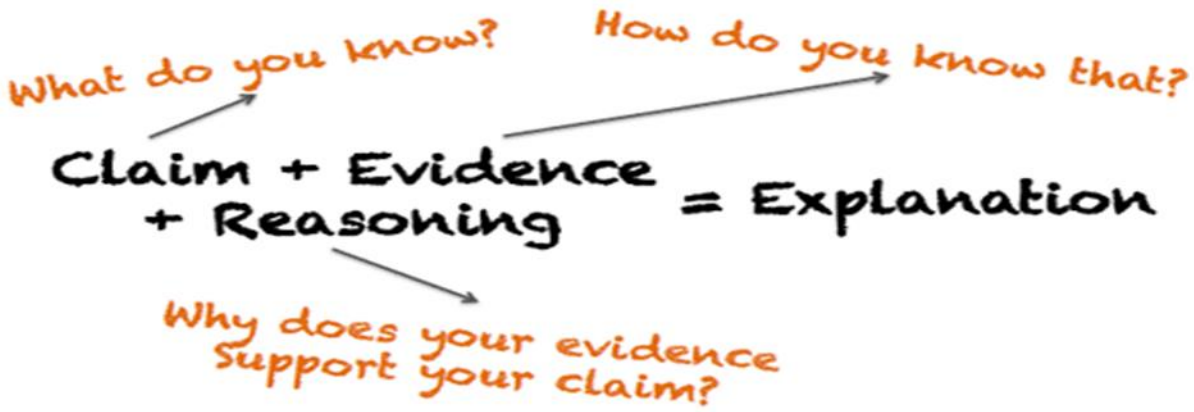
Students start to connect Language Arts and Science skills, with critical thinking, through their activities and “Passionate causes” in order to relay their information to others, by publishing their written documentation and producing their recorded evidence through presentations. This has helped achieve a deeper understanding of written communication and reasoning, resulting in increasing test scores and achievements.

Students became more aware of the need to practice effective writing through CER (Claim, Evidence, and Reasoning) for persuasion to improve our educational environment. Students realized that learning can be fun, effective, personalizing it for them, and can have a lasting impact on the community. Student performance increases in test scores with a proactive approach of learning more so they can have an impact and “make a difference”.

Optimizing Learning Students retain (if they focus attention on the lesson at hand):
-10% of what they read
-26% of what they hear
-30% of what they see
-50% of what they see and hear
-70% of what they say and
-90% of what they say and do.
If we want to optimize learning, it helps to learn in a multi-sensory environment.

Anticipated Project Results:
Science concepts will be reinforced by creating articles, brochures, and podcasts about issues in wildlife conservation and environmental science, affecting students locally, nationally, and globally. Students will develop skills and strategies in creating expository writing and Public Service Announcements (PSA) videos about relevant topics, interact with online conservation groups in scientific and environmental studies, compile research, data input collection, and analysis. They will become proficient in reading and writing in scientific format, with articles in digitally published and podcast distribution. Students will develop valuable writing, editing, and publishing skills through technology and have a physical manifestation of their skills to share with other students, families, community, and globally engaged student programs. Intended outcomes will be measurable through product, publication and online informational dissemination, increased student achievement and student acceptance in environmental and conservation programs. Future educational endeavors will show improved progress in student achievements and assessments.

Essential Question Here



Courtesy of Miami Dade County Public Schools, District Office of Mathematics and Science

Claim

Evidence

Reasoning

Student Explanation

Lesson 1 Research- Scientific Method using CER

Asexual Reproduction in the Kitchen

LESSON PLAN – ASEXUAL REPRODUCTION OF GARLIC

Goal- Students will understand and demonstrate the process of asexual propagation, by cloning, of a monocot plant that is edible. Objectives-

Students will

- Discuss, compare, and negotiate methods used, results obtained, and explanations among groups of students conducting the same investigation.
- Compare and contrast the structure and function of major organelles of plant and animal cells, including cell wall, cell membrane, nucleus, cytoplasm, chloroplasts, mitochondria, and vacuoles
- Become familiar with classification of plants for the purpose of propagating garlic plants using asexual processes.

Refer to Appendix for Lesson 1 diagrams.

TEACHING ASEXUAL REPRODUCTION OF PLANTS

Asexual reproduction is a mode of reproduction in which offspring arise from a single organism and inherit genes from one parent only. A complete lack of sexual reproduction is relatively rare among multicellular organisms, particularly animals. Current hypotheses suggest that asexual reproduction may have short term benefits when rapid population growth is important or in stable environments, while sexual reproduction offers a net advantage by allowing more rapid generation of genetic diversity, allowing adaptation to changing environments. Offspring are *clones*

SEXUAL VS ASEXUAL PROPAGATION OF PLANTS

- ***Sexual: Growing from Seeds is sexual propagation.***

Advantages:

1. Easy, economical,
2. Develops a superior root system.

Disadvantages:

1. All seed propagated plants go through a juvenile period.
2. Lack of knowing the quality of the fruit of the new seeds

- ***Asexual Propagation Methods –***
  1. ***Cloning***
  2. Growing from cutting: Adventitious Roots
  3. Division
  4. Grafting
  5. Leaf cutting
  6. Air Laying

THE CLONING GARLIC PLANT ACTIVITY: Cloning is achieved by growing a plant that is originating from a single parent plant – propagated asexually.
Steps in cloning garlic:
1. Separate “cloves” or buds from the garlic plant stem.
(There may be 10 cloves from 1 stem. Identify the parts of the clove.)
2. Root, Stems (Swollen storage chambers), Leaves (that is the part we eat)
3. Demonstrate technique for the cloning process of garlic from the parent plant.
4. Separate students in groups of no larger than 3, and give each group a garlic bulb.
Roots -Stem -Leaves

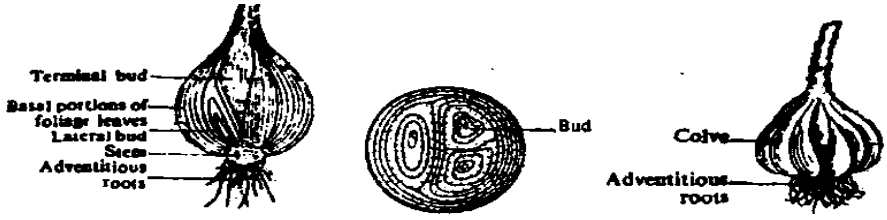
NATURE OF SCIENCE INVESTIGATION

Asexual Reproduction Investigation activity
All you need is garlic, dirt, and cups.
1. Pose questions about the natural world
2. Conduct systematic observations Quantitative & Qualitative
3. Examine books and other sources
4. Review what is known in light of empirical evidence
5. Use appropriate evidence and reasoning to justify these explanations to others
Graphs, Data Tables, & Charts
6. Present results of scientific investigations
7. Evaluate the merits of the explanations produced by others
WRAP UP ACTIVITY/ASSESSMENT

Elementary
•Data collection techniques using Interactive JOSE- Journal of science experiments.

Middle
•(CER) Claim – Evidence – Reasoning – Students will write a reflection to be shared with the class and how they can improve content comprehension.

High School
•Students will present their scientific investigation findings, and peer review one another using a Roses **(+),** Buds **(*I*)**, Thorns **(-)** format.



Lesson 2: Research & Scientific Method using CER-Models Biomes &Ecology

MODELING THE GREENHOUSE EFFECT

Courtesy of Miami Dade County Public Schools, District Office of Mathematics and Science

Purpose of the Lab/Activity:

- Create models of Earth with and without heat-trapping greenhouse gases.
- Relate a greenhouse to how the Earth's atmosphere traps heat. Identify the gases in the atmosphere that "act" like the glass in a greenhouse.

Prerequisites:

- Basic understanding of the Greenhouse Effect and global climate change.
- Basic understanding that the greenhouse effect is a necessary phenomenon for life on Earth.

Problem Statement / Research Question: "How does the Greenhouse Effect influence temperature on Earth?"

Materials:

- 2 clear plastic cups
- Clear plastic wrap
- 2 thermometers
- 2 rubber bands
- Potting soil
- Stopwatch or clock
- Lamp with 100 watt light bulb
- Copy paper
- Colored pencils or markers

Procedures: Day of Activity:

Before Activity Engage	**What the teacher will do: Engage:** Probe student understanding by asking the following questions: 1. Are greenhouse gases, carbon dioxide in particular, good or bad? Accept all responses and indicate that responses will be accepted or modified after the experiment. 2. What is the difference between weather and climate? The difference between weather and climate is a measure of time. Weather is what conditions of the atmosphere are over a short period of time, and climate is how the atmosphere "behaves" over relatively long periods of time. 3. Explain what a greenhouse is and how it is used to maintain a temperature at which plants are able to grow even though the temperature outside the greenhouse sometimes will not support plant life. A glass building in which plants are grown that needs protection from cold weather. 4. Ask students to explain the correlation between the "greenhouse effect" and weather and climate. The continued increase in "greenhouse" gases, such as Carbon Dioxide (CO_2), on the planet leads to a change in climate, which can affect weather in various ways. 5. Have students watch **The Greenhouse Effect** presentation from **National Geographic**. http://environment.nationalgeographic.com/environment/global-warming/gw-overview-interactive.html

During **Activity:** **<u>Explore</u>**	**What the teacher will do: <u>Explore</u>** 1. Monitor students to make sure they are remaining on task and are following proper lab protocol. 2. Instruct students that their team will design an experiment that will measure the different amount of heat retained in a glass jar beneath a heat lamp. -This activity will model how carbon dioxide and greenhouse gases warm Earth. -Each team will investigate the following question: **"How does the Greenhouse Effect influence temperature on Earth?"** -During the investigation, the students may develop and perform procedures similar to the following: 1. Place equal volume of soil in the bottom of each plastic cup. 2. Place the thermometer inside of each container at the same height relative to the soil. Record the initial temperature in degrees Celsius (^{0}C) 3. Seal the top of one container with plastic wrap held in place with the rubber band while leaving the second container open. 4. Place the lamp with the exposed 100 watt bulb between the two containers. The light bulb should be kept on during the whole experiment. 5. Record the temperature in each container every 2 min for the next 20 minutes. 6. Construct a multiple line graph with both sets of data on the same axes (temperature on Y, time on X). -Review the experimental design diagram by asking students to explain the different parts of the experiment. -Instruct students to **title** their experiment written as "the effect of the **Independent Variable (IV)** on the **Dependent Variable (DV)**" -Instruct students to form their **hypothesis** in the form of an "if-then" statement. -Instruct students to identify the **Independent Variable**. -Instruct students to state the number of trials they will be conducting in this experiment. -Instruct students to identify the **Dependent Variable** and state how they will be measured. -Instruct students to identify the constants.
After Activity **<u>Explain</u>** **<u>Elaborate</u>** **<u>Evaluate</u>**	**What the teacher will do: <u>Explain</u>** 1. Ask each team to share their findings from the activity. 2. Have the students to summarize the results of the activity. 3. Ask the students to reflect on the experiment and describe how the Greenhouse Effect influence temperature on Earth 4. Students are to state their **claim** – The conclusion to the question. 5. Students are to identify the **evidence –** The scientific data that that support the claim. 6. Students are to explain their **reasoning –** The justification that links the evidence to the claim. -Ask the students what happened to the temperature of the jar over time? -Have students illustrate how the set up of the glass jar beneath a heat lamp modeled the greenhouse effect on Earth. -Have students complete the evaluation. **<u>Elaborate:</u>** Have students watch the <u>Global Warming and Greenhouse Effect</u> video. http://www.pbslearningmedia.org/asset/tdc02_vid_greenhouse/ Have students research how changes in greenhouse gases in the atmosphere affect the other "spheres" (biosphere, cryosphere, geosphere, hydrosphere) and then create a story line tracing how these changes affect each sphere.

Extension:

1. ***Activity # 1.*** Students may want to continue the experiment and record the two temperatures every day at the same time for a week. Graph the data and discuss how the temperatures fluctuate from day to day.
2. ***Activity # 2.*** Green House Gases.

There is no scientific dispute about the presence of "greenhouse gases" (including carbon dioxide-CO_2) in the Earth's atmosphere that function to trap heat from the Sun. There is also no dispute that the amount of CO_2 in the atmosphere has increased 25%. Does this mean that global warming is occurring? Nobody knows for certain, but many atmospheric scientists are becoming concerned about the increasing amount of CO_2 in the atmosphere.

What does this mean to you?

Despite the uncertainties, if global warming does occur (or if it has already begun), it will profoundly affect human societies. Global warming may result in severe droughts, reducing crop production necessary to feed billions of people. Rising sea levels will threaten beaches, coastal cities, and people. The migration of millions of people would strain economic, health, and social services. Conflicts over remaining resources could escalate. Wildlife habitat will be destroyed, with countless species facing extinction. With the potential devastating effects of global warming, it is reasonable and prudent to examine alternatives to fossil fuels to decrease the amount of CO_2 in the atmosphere. The transportation sector is one area that can, generally speaking, use alternative methods of fuel, since there are already a variety of alternate fuels available. The good news is that this transition can be done relatively easily, cheaply, and painlessly.

Activity #3: **With parental supervision,** students will visit two parking lots in different areas, and list the types of cars present to determine the amounts of CO_2 these cars release.

(1) Select two areas in your town with substantial parking lots. These parking lots can be in different parts of town, surrounding different types of stores (food stores, clothing stores, discount stores), or can be of different sizes (shopping malls, "mom and pop" stores, specialty shops).

(2) Walk through each parking lot, writing down the following information for 10 cars (it helps if at least one person knows about cars):

- Car type (Be specific! For example: Ford F350 pickup truck)
- The condition of the car (new, used but excellent, badly used, etc.)
- The size of the car (very big, large, medium, compact, etc.)
- Approximately weight of the car in tons. Since CO_2 emissions are tied to the weight of

the car, assume that each car emits as much CO_2 per year as it weighs. Record this amount for each car. Alternatively, students can research specifications of the vehicles such as weight and fuel economy along with amount of CO_2 released from a gallon of gas and typical vehicle mileage per year (or use 10,000 miles a year for simpler calculations) to develop a more accurate estimate.

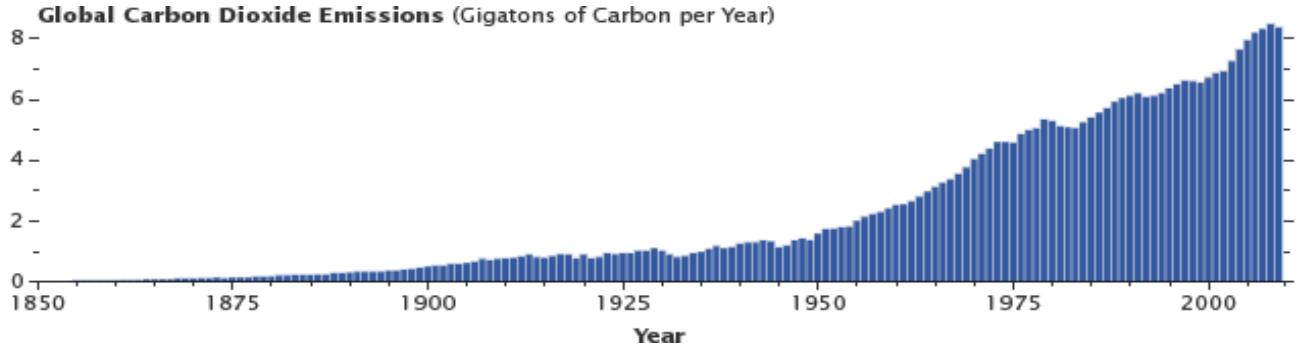
Questions:

1. Were there significant differences in the types and ages of the cars you saw in the different parking lots? Why or why not?
2. Did there seem to be a correlation between the cars and the type of store?
3. Did there seem to be a correlation between the size and age of the cars?
4. Which parking lot had the cars with the most estimated CO_2 emissions? Why might this be?
5. Look up the weight information for your car. What type of CO_2 emissions does it have?
6. Would you consider emissions of air pollutants in the purchase of your next car? Why or why not?

Sources:

- http://www.enviroliteracy.org/pdf/labge1.pdf
- http://www.myteacherpages.com/webpages/SBrenneman/files/EXPERIMENTAL%20DESIGN11.doc
- http://www.climatechangenorth.ca/section-lp/LP_06_I_B_greenhouse.html
- http://highered.mcgraw-hill.com/sites/dl/free/0072315474/26241/pollution_1.htm
- http://www.nasa.gov/mission_pages/noaa-n/climate/climate_weather.html

MODELING THE GREENHOUSE EFFECT



Global Carbon Dioxide Emissions. Source: Robert Simmons, NASA

Background:

The **Greenhouse Effect** is an increase in the average temperature of our planet. This occurs when certain gases such as carbon dioxide ($C0_2$), methane (CH_4), nitrous oxide (N_20), ozone (O_3) (in the lower atmosphere), water vapor (H_20) and chlorofluorocarbons (CFCs – used in refrigerators and spray cans) absorb infrared heat that would normally be radiated out into space. One greenhouse gas that has been increasing in the past 100 years is carbon dioxide. The more carbon dioxide there is in the atmosphere, the warmer the air will be since carbon dioxide absorbs heat. If the air gets too hot, the balance of life on Earth is disrupted. Plant and animal species will die off and which will directly affect the food chain. We also have a great loss of much needed rainforest that take in carbon dioxide. In addition, the burning of fossil fuels by cars, factories and plant, which releases carbon dioxide, is part of the cause leading to global warming which is a serious worldwide problem.

Problem Statement(s): How does the Greenhouse Effect influence temperature on Earth?

Vocabulary: atmosphere, climate, Global warming, Greenhouse Effect, insulate, temperature

Materials (per group):

- 2 clear plastic cups
- clear plastic wrap
- 2 thermometers
- 2 rubber bands
- potting soil
- watch or clock
- lamp with 100 watt light bulb

Procedures:

1. You and your team will design an experiment that will measure the different amount of heat retained in a glass jar beneath a heat lamp. This activity will model how the greenhouse effect influences the temperatures in our Earth's atmosphere. You will investigate:
   How does the Greenhouse Effect influence temperature on Earth?
2. Using the given materials design and complete an experiment to test your hypothesis.
3. Explain how you tested your hypothesis. It should be as specific as possible. Often, scientists read relevant information pertaining to their experiment beforehand.

Modeling the Greenhouse Effect Lab/Activity Sheet

Research Question: **How does the Greenhouse Effect influence temperature on Earth?**
Claim: (Make a statement that answers the research question, based on what you observed in the lab you performed)
Evidence: (Support your claim by citing data you collected in your lab procedure)
Reasoning: (Describe the science concepts that explain why or how the evidence you presented supports your claim)

1) What happened to the temperature of the jar over time?

2) Relate how the set-up of the glass jar beneath a heat lamp models the greenhouse effect on Earth.

3) Identify the test (independent), and outcome (dependent) variables in your activity.

4) Identify what you could do to improve this activity.

Courtesy of Miami Dade County Public Schools, District Office of Mathematics and Science

LESSON 3: How to create a Public Service Announcement

Create a Water Conservation Public Service Announcement

Objectives: Students will become familiar with digital technology through the planning and designing the components of public service announcements.

Overview: Student groups will create a Public Service Announcement (PSA) with a water conservation message. The PSA should motivate fellow students to take actions to protect this precious resource. The PSA should stress the consequences of water waste.

Students will research and share information about water conservation efforts conducted throughout the United States. Collaborating in small groups, information should include successful measures, as well as unsuccessful measures
Through multimedia videos, students report the impact of the measures on the environmental health, showing evidence and stating their reasoning to support their CER Claim. They should not forget to show pictures to support the stated impact.

Water Conservation Efforts in the USA

Background:
A Public Service Announcement (PSA) can be written or presented in audio or visual form. Unlike a press release, a public service announcement is usually transmitted electronically, via radio, television, or Internet, in a short spot of ten to sixty seconds.

A requirement of the Federal Communications Commission (FCC) is that stations donate a certain amount of airtime to serve the public and the community. A public service announcement typically educates and raises awareness in a community topic, usually, but not always, for a non-profit organization. There are many science competitions for videos that promote environmental concerns and conservation (SECME, Dream in Green, Fairchild Botanical Gardens, among others).

Though the PSA covers less material than the typical press release, it requires the same “who, what, where, when and why.” Be responsible for your audience and focus on the purpose of the PSA. An on camera interview of yourself or a personal representative can announce the issue or concern. You can submit your own video, but be sure it is appropriate and the sound can be understood. You may have to do a voice over narration. Success in delivering the message may hinge on hearing the words. Speak slowly, scan the camera slowly, and move more slowly. Have friends, family, and teachers view and critique it. Don’t be afraid to make it even better with tweaking details.

Activity Description: Student groups are responsible for creating a PSA that will generate awareness in a theatrical manner. They should research ways in which a person wastes water. The goal of presentations is to increase the awareness of what is good and bad for the environment. The PSA is presented in the classroom.

The techniques of writing a PSA differ from media to media. Use the following basics as your guide. Put "PUBLIC SERVICE ANNOUNCEMENT" at the top middle of the single sheet of paper. Type your name(s), school name, and contact person. In bold letters, type the topic followed by a short, concise explanation of what you want aired.

You need to know your plan ahead of time. What do you want to educate or make your audience aware of? Make it legible, visually attractive and pleasing to the eye, and intense. You have 30-60 seconds to impact your audience with dramatic effect.

Guidelines:

1. In a team, create a Public Service Announcement with a green message
2. Research that motivates people to make behavioral changes with messaging to influence such changes
3. The PSA should be between 30 seconds to 3 minutes long
4. Video record or take pictures of what was done in the CER project with narrations.
5. Promote the PSAs on school websites and social media of conservation programs like Dream in Green.

Software programs for your computer

Movie Maker (Windows)
iMovie (Mac)

Apps for you smart phone

iMotion HD (iOS: Free)
Magisto Video Editor & Maker (Android: Free)
Andromedia Video Editor (Android: Free)

Materials:

Paper/ Pencil- for script & story board
Timer
Digital Camera / Cellular phone- Smart phone
Computer

How to Write Public Service Announcements

1. Have a plan or an issue that you feel strongly about. Students should request information about topic research and review specific requirements, restrictions and limitations of PSAs, along with a sample PSA.

2. Research other PSAs on television, radio, and Internet

3. Ascertain the length of the PSA option (30-, 60-, 90-second spots) into which the organization fits.

4. Write down the key points that must be covered with the PSA. Always try to answer the obvious questions of who, what, when, where, why and how.

5. Decide how to capture the audience's attention at the beginning of the PSA. This can be done with music, humor, image, or a quotation, by asking a question. Make it a thought-provoking statement, by sharing a fact, or any other method that will make the audience want to listen. That will become the first part of the PSA.

6. Storyboard or draft the PSA with all components in place. Use words that will attract the public's attention and compel them to listen. Example: Our Ocean is our home and Florida, the only home for Manatees, and endangered species.

7. Time the drafted PSA to make certain that it fits within the timeframe allowed. If it doesn't, rewrite the PSA until it does.

Assessments: Provide the CER rubrics and include guidelines based on choice of media, digital, video, PowerPoint, or type of Public Service Announcement. Assessment is based on completion of project according to guidelines and collaboration with group partners.

LESSON 4: Tree-mendous Choice for Erosion Prevention

Model Eliciting Activity (MEA) *Resource ID#: 48841*
Prevention of soil erosion with watersheds

Tree-mendous Choice for Erosion Prevention
SOURCE AND ACCESS INFORMATION
Name of Author/Source: Dr. Gwendolyn Foote /CPALMS
District/Organization of Contributor(s): Miami-Dade
This document was generated on CPALMS - www.cpalms.org

This activity provides students with an open-ended, realistic problem for which students will research, discuss, and present the characteristics of 8 trees based on characteristics, type of wood, and suitability for growth in wet or dry climate with current weather patterns. Their objective is to promote the soil erosion prevention Students support claims with clear reasons and relevant evidence, as they produce clear and coherent writing to describe the project of their structure ins development, organization, and style are appropriate to task, purpose, and audience.
Subject(s): English Language Arts, Science

Grade Level(s): 6 -8

Suggested Technology: Computer for Presenter, Computers for Students, Internet Connection, Interactive Whiteboard, LCD Projector, Adobe Acrobat Reader, Microsoft Office

Instructional Time: 2 Hour(s)

Keywords: Model-eliciting activity, MEA, Trees, Erosion, Soil erosion prevention, Investigation activity, water /soil conservation, modeling

Instructional Component Type(s): Lesson Plan, Problem-Solving Task, Text Resource, Data Set, Student Center Activity, Model Eliciting Activity (MEA) STEM Lesson

Instructional Design Framework(s): Cooperative Learning

Resource Collection: Model Eliciting Activities (MEAs) ATTACHMENTS
Letter 1.Tree.mendous.docx
Letter 2.Tree.mendous.docx
Rubric forTree.mendous.docx

LESSON 4 CONTENT

- **Lesson Plan Template:** Model Eliciting Activity (MEA)
- **Formative Assessment**
  Use text dependent questions and readiness questions (see "Supplemental Reading1" for text dependent questions).

  Supplemental reading will ensure that students understand the content from background information needed to understand the problem. Readiness questions encourage a deeper comprehension of the problem being presented.
- **Feedback to Students**
  Feedback will take place through Reflective Questions at the end of Part 1 and Part 2 and discussions with collaborative learning groups and teacher.
- **Summative Assessment**
  Student Letter 2 will be submitted to be assessed by a Rubric.

Student Collaborative Learning Groups will present the findings of their letter to other groups and show how their reasons are supported by the evidence.
Rubric forTree.mendous.docx

It should be clear and coherent writing in in development, organization, and appropriate style to task, purpose, and audience. Student work should provide evidence and rational reasoning in the process of problem solving.

- **Learning Objectives**
  Students will:
  1. Compare and contrast the characteristics of different tree and evaluate their effectiveness in preventing erosion.
  2. Read informational text and cite evidence to support analysis of the text and informational data from data table to support the claims of their reasoning.
  3. Be able to draw conclusions and summarize their decisions by supporting claims with logical reasoning and relevant evidence.
  4. Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table)
  5. Identify climate as the expected weather patterns in a region
  6. Recognize different types of weather conditions, including hot/cold, raining/not raining, and windy/calm.
  7. Differentiate between weather and climate
- **Prior Knowledge**
  Students should know some of the causes of soil erosion and ways to prevent erosion from soil and wind.

  SC.5.L.17.1 Compare and contrast adaptations displayed by animals and plants that enable them to survive in different environments such as life cycles variations, animal behaviors and physical characteristics.

  SC.5.E.7.5 Recognize that some of the weather-related differences, such as temperature and humidity, are found among different environments, such as swamps, deserts, and mountains.

- **Instructional Suggestions**

  Day 1 - Students will identify climate as the expected weather patterns in a region. Recognize different types of weather conditions, including hot/cold, raining/not raining, and windy/calm, and differentiate between weather and climate.

  Links: Weather and Climate
  Climate and Weather

Students read informational resources from current topics of erosion from weather. They read the supplemental reading sources on Tree Classification. Students receive client letter 1 and dataset 1 to work in collaborative learning groups of 3-4 students. The teacher can review the Readiness Questions with the learning groups and class. In teams, students discuss and work through the problem and respond to the client.

The teacher will circulate through learning groups to ask Reflective Questions and address concerns from students.

Teachers provide guidance in the reasoning process to help students determine the most significant factors in solving the problem and to deal with critical factors.

Day 2 - Students receive letter 2 and new additional criteria to work out with their team. After all teams complete their responding to the second letter, they share their results with the class and discuss the reasoning of each team to support their claim through evidence. Peer critique and discussion will follow.

- **Supplemental Reading**

  Text Dependent questions: How can tree classification help in knowing their characteristics?

What would happen to trees if they could not prevent soil erosion? Links:

1. The Best Trees for Erosion Control
2. Garden Guide Best Trees for Erosion Control
3. How Stuff Works
4. National Geographic- Erosion
5. Erosion and Geography
6. How to Use Trees to Stop Soil Erosion
7. Study Jams Activities

- **Guiding/reflective Questions**
  - What do you think of the issue of erosion?
  - How can you solve a problem of erosion with trees?
  - Would your solution work with different rankings?
  - What are the most important factors for you to consider in this problem solving?
  - Do you agree or disagree with your team members and classmates?

Refer to Appendix for Lesson 4 for Letters & Letter Templates

- **Reading Passage 1**
  Letter 1.Tree.mendous.student.docx
  Readiness Questions
  What is the problem?
  Who is the client?
  What is the client asking your team to do?
  What things do you need to include in your solution?
  Do you think there is more than one correct answer to what the client is asking? Why or why not?

- **Data Set 1** Tree.mendous.DATA.TABLE OF TREE CHARACTERISTICS.docx
  Students are supplied with supplemental reading articles for evaluating their choice of tree selection for erosion prevention.

  Students are offered a proposal to rank, based on data of tree traits, the best choice of trees to plant for the purpose of preventing erosion for the chosen geographical area. Taxonomy of trees will be incorporated in the choice of selected trees.

  Attachment – Online Articles in supplemental reading list
  Strategies: Student Based Research, Concept maps, Small Groups, Data Collection
- **Comprehension/readiness questions**

  How does this problem influence students to relate to science content?
  What is the client asking your team to do?
  What things do you need to include in your solution?
  Do you think there is more than one correct answer to what the client is asking? Why or why not?

- **Reading Passage 2**
- **Data Set 2** Tree.mendous.DATA.TABLE OF TREE CHARACTERISTICS.docx
  Students are supplied with a supplemental reading articles for evaluating their choice of tree selection for erosion prevention.

  Students are offered a proposal to rank, based on data of tree traits, the best choice of trees to plant for the purpose of preventing erosion for the chosen geographical area. Taxonomy of trees will be incorporated in the choice of selected trees.

  Attachment – Online Articles in supplemental reading list

  Strategies: Student Based Research, Concept maps, Small Groups, Data Collection

  Students are asked to consider trees to help prevent soil erosion based on the prediction that heavy rains and possiblies of flooding will be frequent in roads and sea level areas.
- **Letter Template 2**
  Reflection question 2
  How do you think your decisions and ranking would affect the area and prevent soil erosion?
  Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table)

How do you think your decisions and ranking would affect the area and prevent soil erosion? Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table)

- **Additional Instructions or Materials**
  Computers, digital visual media with projector or interactive whiteboard
  Internet connection

ACCOMMODATIONS & RECOMMENDATIONS

- **Accommodations:** Through collaborative learning groups, students will work together in sharing ideas and using visuals through projectors and computer resources. Collaborative learning groups allow for peer mentoring and think-pair-share discussions in differentiated learning strategies.
- **Extensions:** Students can create models with sand and dirt in which they will place obstructions with string and paper to demonstrate the effectiveness of trees that can prevent erosion due to their species and characteristics.
- **Suggested Technology:** Computer for Presenter, Computers for Students, Internet Connection, Interactive Whiteboard, LCD Projector, Adobe Acrobat Reader, Microsoft Office
- **Special Materials Needed:**

Additional Information/Instructions
By Author/Submitter- Dr. Gwendolyn Foote, Nautilus Middle School, Miami Beach, FL

Green activity for soil and water conservation is important in the prevention of soil erosion.
This activity aligns with standards and uses problem solving concepts with collaborative learning groups.

CPalms http://www.cpalms.org/Public/

Lesson 5: Engineering Design Model: Hands-On Open Inquiry

The Challenge "Keeping the Heat Out with CER"

Courtesy of Miami Dade County Public Schools, District Office of Mathematics and Science

Guiding Question: How does the Greenhouse Effect influence temperature on Earth?

Engage

-**Observe** the insulation of heat within a model using a physical barrier.
-Discuss as a group the limitations of the model based on the greenhouse effect resulting in a combination of gasses in the atmosphere.

Explore

-On chart paper, develop a model to improve upon the limitation of the observed greenhouse effect model.
-Build and test your model
CER- Using the information gathered from the investigation, complete your CER. (Rubric) **Refer to Appendix for Lesson 5 for CER Rubric*
-How does the Greenhouse Effect influence temperature on Earth?

Elaborate/Evaluate:

- Using the data and information from your lab, draft lab report and C-E-R from the chart paper, produce a digital science fair board.
- Each group will have one member stay behind with their digital board to give an oral presentation on their findings
- Students will write a reflection on the inquiry skills developed and needed from the activity. (EXIT SLIP)

NGSSS: SC.7.P.11.4: Observe and describe that heat flows in predictable ways, moving from warmer objects to cooler ones until they reach the same temperature.
SC.7.P.11.2: Investigate and describe the transformation of energy from one form to another.
SC.7.P.11.3: Cite evidence to explain that energy cannot be created nor destroyed, only changed from one form to another

Scenario:

In order to save money while reducing the carbon footprints based on electrical consumption, you have applied to design a residential home that will limit the entry of heat from the outside for a community developer.

Criteria

1. The House must have at least two scale windows per side per story and 2 doors (1 front door and 1 back door).
2. The initial test for the house should be done without any insulation to determine the effects of insulation.
3. To mimic different times of the day, the heat lamp should relocated to simulate light during the morning, mid-day and afternoon.

Constraints

1. Base area maximum of 645cm2 (100in^2), maximum height of 40cm (15.75in).
2. File folders must only be one layer thick on the model.

Materials:

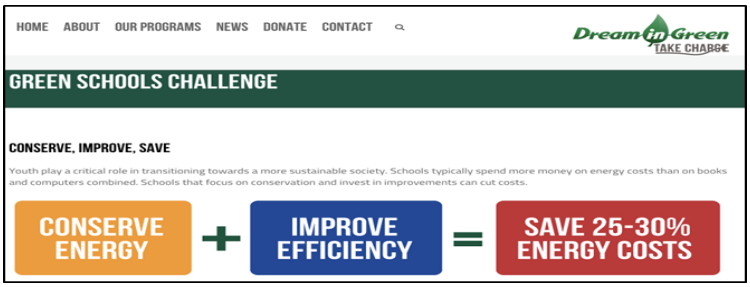
- Drinking straws or tongue depressor for the frame of the house, file folders for walls and roof, Glue (hot glue)/tape, lamp, thermometer, 15 Cotton balls, thermal imaging app such as Thermal Camera FREE by Fingersoft (App Store and Android) or Seek Heat (multiple platforms).

Product:

- Physical model that has been tested and redesigned.

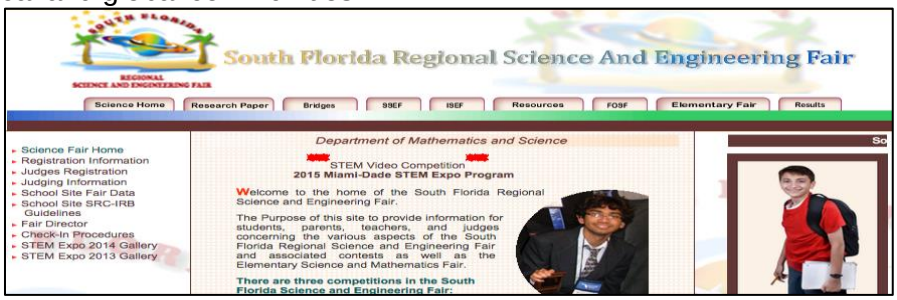
Written description of completed task and proposed solution to presented problem or scenario. Include reference to the thermal images and recorded temperature before and after insulating the structure to provide evidence of effectiveness of their design.

Presentations: Present your project as a sales pitch for a community developer including the highlights from their project summary
Activity can be used in Green School Challenge Program for Energy Conservation.



www.dreamingreen.org

Dream in Green Program/ Green School Challenge is free environmental program.
Green School Challenge helps build leadership experience, as a collaborative team to resolve environmental hot topic issues and implement a green school atmosphere. Students and teachers are trained to learn how to conserve energy, improve efficiency, and save in the expenses of school and homes. Student driven projects promotes motivation to continue learning about natural science and the environment through action and behavior.
Objectives of this program and science labs develop and implement environmental education programs that promote energy and water conservation and efficiency, environmental sustainability and the use of renewable energy in the public and private sectors; and to raise awareness and deepen understanding of the energy, climate change and environmental issues confronting local and global communities.



www.science.dadeschools.net
Courtesy of Miami Dade County Public Schools, District Office of Mathematics and Science

LESSON 6: Ecosystems: Finding your passion in ecology with digital videos

How do I make the right choices?

Language Arts / Science Class: Parts of an Ecosystem
An ecosystem exists when plants and animals interact with each other and their physical environment. This lesson and research will introduce students to ecosystems in South Florida, as well as the plants and animals that make up the ecosystems. Students will seek out the key animals and plants as they read about the ecosystems.

Overview: Students will use what they learn in science ecology and language arts in writing and presenting through technology to create a persuasive presentation for conservation.

Today's digital kids think of information and communications in technology (ICT) as something like to oxygen. They expect, it's what they breathe, and it's how they live. Students use ICT to meet, play, date, and learn. It's an integral part of their social life; it's how they acknowledge each other and form their personal identities.

Time: 1-4 weeks
Objectives:
Students will
• Define terms associated with marine and coastal ecosystems
• Define terms for elements that make up these ecosystems, including vegetation, Endangered, and threatened animals, marine life
• Locate Florida Keys on a map of Florida and color the sections appropriately for land, water, estuaries, and coral reef.

Materials Required:
• Computer(s) with Internet access
• Blank outline and topographic maps of Florida and Atlantic coast, one for each student
• Magazines.
• Colored pencils
• Power Point Presentation Software
• Publisher Software
• Digital cameras

Procedure:
Students will use computers and cameras to research, create a presentation of their choice related to the environments and conservation. Working in collaborative learning groups, students will present it to the class for feedback. The presentation will be improved and represented to the school.
Distribute the outline maps of Florida to the class. Create a list of facts students already know about Florida. Some responses might include references to the beach, the heat, surfing, Everglades, agriculture, cuisine, multicultural background, and weather.

Ask students to color the topographical outline map of South Florida and the Keys noting sea coast features and coral reef. Activity booklets from Sea Grant Coast Programs will be implemented and reviewed in class for feedback to students in their investigation of the targeted ecosystem being studied. This research and discussion will be applied in Power Point Presentations created by students for presentation to other student groups of symbiotic ecosystems.

Development:
As a class, view podcasts of Florida Fish and Wildlife and sea coast videos.
Ask students what would happen to the ecosystem if one of the elements were removed.
Students will brainstorm and discuss how the 3 ecosystems discussed interrelate and depend on each other. Ask the students if any of the animals they have learned about remind them of animals that they know about that live in different ecosystems?

Suggested Student Assessment:
Working in small collaborative learning groups, students will present their component of lessons to the rest of the class. Each group will be assigned an ecosystem of coral reef, seagrasses, or Mangroves. One group will coordinate the other groups to connect the factors in the integration of the 3 ecosystems.

Extending the Lesson:
Working in small collaborative learning groups, ask students to send explore the Save a Manatee Website to research about adopting a Manatee for the class.

LESSON 7: Conservation of Energy & Water

WE-LAB Activity 6 – Building a Model Aquifer

(http://dreamingreen.org/we-lab/)

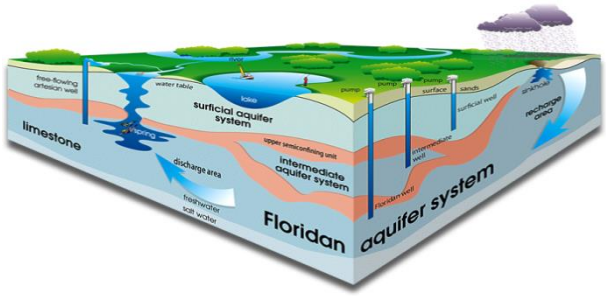
Overview: Only one tablespoon in every gallon of water on earth is fresh water (called potable water). The remaining water is salty, or frozen as ice.

In Miami-Dade County, the majority of fresh water is supplied by the Biscayne aquifer. Students will build a working model of an aquifer to describe how ground water flows through the Biscayne aquifer, how ground water can become contaminated, and why it is so difficult to clean contaminated ground water. Students will study watershed models, design and create a watershed model out of recycled materials to understand water runoff and the impact of heavy rains on soil.

Although almost half of all Americans get their drinking water from wells, many people have never heard of ground water. The use of ground water supplies increases at twice the rate of surface supplied water, with the trend expected to continue.

OBJECTIVE: Students will use a model of an aquifer to describe how ground water flows through an aquifer, how groundwater can become contaminated, and why it is so difficult to clean contaminated ground water.

Activity Description:



The use of ground water is increasing at twice the rate of surface water, and the trend is expected to continue. Until the late 1970's, it was widely believed that ground water was protected from contamination by the natural filtering effect of the many layers of soil, sand, gravel and rocks. We now know that pollutants can travel through all these layers. Incidents of serious contamination have been reported in every state in the nation

A model can be a very flexible tool which will allow students to simply study groundwater flow, look at how well placement affects yield, or examine how ground water is vulnerable to contamination. For primary schools, each student can use a cup to build their own model aquifer. For secondary schools, the teacher may lead groups of four or five students in building their own models, or the teacher may build a single, larger (the larger the better) version for demonstration.

When completed, students present their model aquifer to the class.

Primary Schools Activity Details:
http://water.epa.gov/learn/kids/drinkingwater/upload/2005_03_10_kids_activity_grades_k-3_aquiferinacup.pdf
Secondary Schools Activity Details:
http://water.epa.gov/learn/kids/drinkingwater/upload/2009_04_29_kids_activity_grades_9-12_buildingamodelaquifer.pdf

Guidelines:

- Research where our drinking water comes from
- Discuss why it is important to protect the Biscayne aquifer
- Review the activity details in the links provided above
- For secondary schools, you may use an aquarium, a large plastic container, or large clear vase as alternative options to building a Plexiglas structure
- Have the students present their aquifer to the class

http://we-lab.net/

Dream in Green's Program of Green School Challenge, a free program, offers an effective structure for integrating science curriculum with applications of hands on projects, in which students gain greater understanding and can personally practice the conservation of energy and water to impact their school, community, home, and their own everyday lives.

Students can enjoy collaborating in teams in a county wide competition with monthly challenges that can be taught through science labs with hands on inquiry that follow up curriculum lessons for 6th – 12th grade classes. These student driven projects empower students to change things that impact their own lives and communities.

The Green School Challenge Dream in Green Program assists teachers and schools with training of instructional lessons, labs, and projects to compete in Miami-Dade County competitions for recognition of student achievements throughout the year.

Students come together as a Green Team to build a green environment of education and complete fun monthly challenge activities related to energy efficiency and conservation, waste reduction, recycling, water conservation, alternative transportation, green buildings, and green careers. Students and staff are directly involved in designing and implementing energy and environmental solutions at their schools.

Courtesy of WE-LAB, Green Schools Challenge Program. http://dreamingreen.org/

References

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www.dreamingreen.org

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http://www.epa.gov

http://ephemeris.sjaa.net/0805/g.html

www.fairchildchallenge.org

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http://www.schools.pinellas.k12.fl.us/educators/tec/mitchell2/questact.htm

www.science.dadeschools.net/CER

www.science.dadeschools.net Miami Dade County Public Schools. District Office of Mathematics and Science

http://www.seaturtle.org

http://sofia.usgs.gov/flaecohist/

http://sofia.usgs.gov/flaecohist/kidscorner/

Modified with permission from Global Climates - Past, Present, and Future, S. Henderson, S. Holman, and L. Mortensen (Eds.). EPA Report No. EPA/600/R-93/126, U.S. Environmental Protection Agency.

APPENDIX

STUDENT HANDOUTS

RUBRICS

Scientific Explanations

CLAIM

What is a Claim?

A claim is a statement about what you know and are trying to help others understand.

How to write your claim:

- Use one complete sentence.
- Use descriptive words.
- Answer the question.

EVIDENCE

What is Evidence?

Evidence is data used to support the claim. The evidence tells the audience the support you have collected that makes the claim convincing.

How to write your evidence:

- Include observations that you have collected and/or analyzed from activities, readings, discussion, and research. Observations can be qualitative (word) and/or quantitative (numbers).
- Include accurate evidence. This means your evidence is correct.
- Include sufficient evidence. This means you have enough evidence.
- Include appropriate evidence. This means only evidence that supports and relates to the claim.

REASONING

What is Reasoning?

The process of explaining how and why evidence supports your claim using scientific principles.

How to write your reasoning:

- Use a logical chain that shows how the scientific principle and evidence work together to support the claim.
    - Statement A: Explain a scientific principle related to your claim.
        - *The scientific principle states…*
    - Statement B: Explain how and why pieces of evidence relate to the scientific principle.
        - *The evidence shows…*
    - Statement C: Restate your claim.
        - *Therefore...*

The QUESTION:

_____

_____

CLAIM: When you start your response to the question, state your claim.

_____

_____

_____

EVIDENCE: Support the claim with accurate, sufficient, and appropriate evidence. Use the chart below to state your evidence and explain what the evidence means.

	My EVIDENCE Support your claim with accurate evidence from your investigations, readings, discussions, and research. Be SPECIFIC and RELATE DIRECTLY to your CLAIM!	**My INTERPRETATIONS** Explain what your evidence means. How does it relate to the claim? Use words such as: means, tells, shows, and demonstrates.
Evidence #1		
Evidence #2		
Evidence #3		
Evidence #4		

Evidence #5		
Evidence #6		

REASONING: Relate evidence to a scientific principle in order to support the claim.

The scientific principle states

_____

_____

_____

The evidence shows_____

_____

_____

Therefore, _____

_____

_____

_____

Courtesy of Miami Dade County Public Schools, District Office of Mathematics and Science

LESSON 4: **Tree-mendous Choice for Erosion Prevention**

Model Eliciting Activity (MEA) *Resource ID#: 48841*
Prevention of soil erosion with watersheds

Reading Passage 1
Mc G
Chief Erosion Prevention Officer
Florida Conservation Organization
Miami, Fl
Florida Schools
Students Green School Science Activities

Dear Students,

We have been offered trees for our schools, parks, and recreational areas to help conserve water and prevent soil erosion. We are interested in evaluating a selection of tree species to help with the prevention of soil erosion.

As students, you have the opportunity to help make the choice for our tree selection and decide our Tree-mendous Choice for Erosion Prevention.

Students will be offered a selection of 8 trees with characteristic traits to evaluate which tree they feel would make the best selection for an area based on rainfall or precipitation (or lack of) for a chosen geographical area. The area would range from the most rainfall, or largest annual precipitation, to the least, to even an arid region.

Students will be asked to rank their selection for a given area and climate based on the characteristics of the roots, foliage, and wood from the tree, in order to provide optimal protection from erosion and heavy water run-off.

Please report your choice of the order of your ranking and why. Include reasons for your ranking. We appreciate you being a part of our project.

Thank you,

Mc G
Chief Erosion Prevention Officer

- **Letter Template 1**

  Dear _____,

  Our team, _____ of _____, has determined the following procedure for ranking:

  The order that we ranked our choices from highest to lowest is:

  We made these choices because_____

  Sincerely, _____

Reading Passage 2

Students Green School Science Activities

Dear Student Green Teams,

We appreciate your help in the selection of trees that will aid in our soil conservation prevention. Your team's report of ranking for preference of tree selections will help in our weather concerns. We would like to ask your team to study the selection of tress with the focus of this next year's predictions of heavy rain and flooding. These species will be evaluated for their use in the prevention of soil erosion.

Students are asked to consider trees that will help prevent soil erosion based on the prediction that heavy rains and possibilities of flooding and flash flooding. It is expected to be frequent in roads and sea level areas and falling in heavy amounts in a short time. We need to include this issue of rainfall that usually comes in large amounts at a time.

What trees would you recommend for planting in areas that may flood during the rainy season, to deal with water runoff and soil erosion?

Thank you for your report of ranking and reasoning for your decisions.

Thank you,

Mc G
Chief Erosion Prevention Officer
Parks & Recreation Dept.

- **Letter Template 2**

  Dear _____,

  Our team, _____, has determined the following procedure for ranking:

  Our procedure for ranking (did / did not) change. (If procedure changed, explain how and why. If procedure did not change, explain why not).

  The order that we ranked our choices from highest to lowest is:

  because_____

  Sincerely,

  _____

Scientific Explanation Rubric

Name: _____ Date: _____/_____/_____ Due Date: _____/_____/_____ Period: _____

Element	Exemplary	Accomplished	Developing	Beginning
	3	2	1	0
Claim	The claim demonstrates a deep understanding of the science topic.	The claim demonstrates an understanding of the science topic.	The claim is inaccurate/ or implausible.	No claim is provided.
Evidence	All evidence used to support the claim is accurate, sufficient, and appropriate.	Most evidence used to support the claim is accurate, sufficient, and appropriate.	Some evidence used to support the claim is accurate, sufficient, and appropriate.	No evidence is provided.
Reasoning	Thoroughly relates evidence to a scientific principle in order to support the claim; reasoning is logical, complete, and accurate.	Somewhat relates evidence to a scientific principle in order to support the claim; reasoning is mostly logical, complete, and accurate.	Reasoning is illogical, incomplete, or inaccurate.	No reasoning is given.
Writing Quality and Clarity	• Writing uses clear, concise, and expressive language. • Writing accurately includes scientific terms and vocabulary.	• Writing uses clear and understandable language. • Writing accurately includes scientific terms and vocabulary.	• Writing uses clear and understandable language. • Writing uses conventional terminology and vocabulary.	• Writing does not use clear and understandable language. • Writing uses conventional terminology and vocabulary.

Rubric Total		**Grammar & Spelling** Errors in grammar and spelling will result in a one point deduction.		***Overall Total***		**Mastery Score**
	—		=		→	

Courtesy of Miami Dade County Public Schools, District Office of Mathematics and Science

5 E Lesson Plan

Engage- *mentally engage students with an event or question.*

These activities mentally engage students with an event or question. Engagement activities capture students' interest and help them to make connections with what they know and can do. The teacher provides an orientation to the unit and assesses students' prior understanding of the concepts addressed in the unit.

Explore- *hands-on experiences to explore the concept further*

Students encounter hands-on experiences in which they explore the concept further. They receive little explanation and few terms at this point, because they are to define the problem or phenomenon in their own words. The purpose at this stage of the model is for students to acquire a common set of experiences from which they can help one another make sense of the concept. Students must spend significant time during this stage of the model talking about their experiences, both to articulate their own understanding and to understand another's viewpoint.

Explain- *provide the scientific explanation and terms for what they are studying…via lecture, demonstration, reading, or multimedia (video, computer-based).*

Only after students have explored the concept, does the curriculum and/or teacher provide the scientific explanation and terms for what they are studying. The teacher may present the concepts via lecture, demonstration, reading, or multimedia (video, computer-based). Students then use the terms to describe what they have experienced, and they begin to examine mentally how this explanation fits with what they already know.

Elaborate/Extend- *opportunities to apply the concept in unique situations, or they are given related ideas to explore and explain using the information and experiences they have accumulated so far, discussing their ideas with others, students can construct a deeper understanding of the concepts.*

Students elaborate on their understanding of the concept. They are given opportunities to apply the concept in unique situations, or they are given related ideas to explore and explain using the information and experiences they have accumulated so far. Interaction between the students is essential during the elaboration stage. By discussing their ideas with others, students can construct a deeper understanding of the concepts

Assessments

Formative Assessment: The comprehension questions/readiness questions and reflection questions can be used as formative assessment (for questions, see the Readiness questions section).

Comprehension and readiness questions will indicate whether the students understand the problem and the problem context, and reflection questions are meant to elicit students' thinking as they are working through the problem.

The readiness questions are asked of students after they read the first client letter (see Reading Passage 1). The teacher can ask the class to respond to these questions and ensure understanding before students begin working with the data.

The reflection questions are asked by the teacher as students are working in their groups on parts 1 and 2 of the MEA. These questions can reveal any misunderstanding or issues that students have as well as guide them to think about what they are doing.

Feedback to Students: Students will get feedback from the teacher about their performance or understanding during the lesson.

The readiness questions will initiate discussions and brainstorming in collaborative learning groups to clarify questions about what is expected of them.

They have an opportunity to use this feedback to improve their performance as they modify their models and design for better performance of the product throughout the activity.

Summative Assessment:

Summative assessment will include criteria from Collaborative Learning Group Rubric and a final technical report written by each group about their product design, performance, and specifications.

CER Writing Rubric

Component	Level		
	0	1	2
Claim - A conclusion that answers the original question.	Does not make a claim, or makes an inaccurate claim.	Makes an accurate but incomplete claim.	Makes an accurate and complete claim.
Evidence – Scientific data that supports the claim. The data needs to be appropriate and sufficient to support the claim.	Does not provide evidence, or only provides inappropriate evidence (evidence that does not support the claim).	Provides appropriate but insufficient evidence to support claim. May include some inappropriate evidence.	Provides appropriate and sufficient evidence to support claim.
Reasoning – A justification that links the claim and evidence. It shows why the data count as evidence by using appropriate and sufficient scientific principles.	Does not provide reasoning, or only provides reasoning that does not link evidence to claim	Provides reasoning that links the claim and evidence. Repeats the evidence and/or includes some – but not sufficient – scientific principles.	Provides reasoning that links evidence to claim. Includes appropriate and sufficient scientific principles.

Department of Mathematics and Science

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