

The environment: an inquiry-based lesson regarding problems and solutions

Angela Picco, NSF GK-12 Fellow

4/22/05

Background:

This lesson plan is designed to teach students about the environment and what they can do to help. Inquiry-based teaching methods will be employed in this lesson plan, encouraging student participation and insight.

Teachers should be familiar with the various issues influencing our environment, and ways to decrease the negative impacts that humans have on the environment. Students should have basic background knowledge of graphing (using bar graphs and circle graphs).

Some important vocabulary words include biodegradable, contamination, deforestation, endanger, global warming, and acid rain. For background information, please refer to references at the end of the lesson.

Students are initially asked what problems are associated with our environment so that the teacher can address the misconceptions about environmental issues, and engage the students by addressing issues that interest them.

Objectives:

Students will be able to:

- hypothesize what issues affect our environment
- test their hypotheses regarding the issues affecting our environment through group discussion/presentation
- hypothesize the chain of effects for each environmental problem
- develop questions about where these chains lead
- conduct an experiment to test recycling efforts in the student's homes
- use graphing techniques to present the results of their experiment
- compare/contrast their results from the recycling experiment with the class results

State Standards:

- Communicate verbally or in writing the results of an inquiry (S1C4P01)
- Design and construct a technological solution to a common problem or need using common materials (S3C2P03)
- Propose a solution, resource, or product that addresses a specific human, animal, or habitat need (S3C1P02)
- Record data in an organized and appropriate format (*e.g., t-chart, table, list, written log*) (S1C2P05)

- Choose an appropriate graphic representation for collected data: bar graph, line graph, Venn diagram, model (S1C4PO2)
- Analyze data obtained in a scientific investigation to identify trends and form conclusions (S1C3PO1)

National Standards:

Content Standard A: Science as Inquiry

- Abilities necessary to do scientific inquiry
- Understandings about scientific inquiry

Content Standard C: Life Science

- Populations and ecosystems

Content Standard E: Science and Technology

- Abilities of technological design

Content Standard F: Science in Personal and Social Perspectives

- Personal health
- Populations, resources, and environments
- Risks and benefits
- Science and technology in society

Content Standard G: History and Nature of Science

- Nature of science

Materials:

“Dear Children of the Earth” book
Environmental problems slides (Powerpoint)
“Who is impacted and how?” handout
“Do you pollute?” homework handout
Local recycling information (and/or presenters)

“Pollution Concept Map” handout
Pen
Grocery bags
Graphing paper

Time: 4 hours total

Grade Level: 5-8

Procedure:

Part 1- Environmental Problems

1. Students are initially asked what problems they know about that are related to the environment. A list is created on the board based on their knowledge of environmental issues. While creating the environmental problem list, the teacher should encourage discussions about each of the problems so that the class as a whole understands the numerous issues.

2. Teacher reads "Dear Children of the Earth" book to the students which reveals many environmental problems and even suggests some solutions. Students are asked to write a one-page letter in response to the book. Options for the letter include: a) have animals write to Mother Earth, b) have animals write to the children of the Earth, and c) have children respond to Mother Earth with a plan for what they can do to help.

3. Teacher shows powerpoint presentation on environment so that students can see photos of the impact associated with environmental problems.

4. Students are given "Who is impacted and how?" handout and are asked to hypothesize the chain of effects that the various environmental problems cause. Students are also given "Pollution Concept Map" handout and are asked to describe the causes, effects, and solutions regarding air and water pollution.

Part 2- Environmental Solutions (Conservation)

1. Teacher guides a discussion about conservation and what we can do to help. Students give suggestions and ideas are written on the board. Recycling is suggested (if not already) as an action that students can take to better the environment.

2. The City of Phoenix Recycles group gives a presentation to the students about recycling and conservation.

3. After students are aware of the regulations regarding recycling, students are given "Do you pollute?" handout and the assignment is clearly described. Students are asked to monitor their recycling for one week as a homework assignment. Students keep track of the number of each type of recycled item for the duration of a week.

4. Students graph the results of their recycling homework, creating both a pie chart and a bar graph.

5. Teacher asks students to place their results from the homework on the board in a single table. Students are asked to calculate the class average for each recycled item. Students graph the class results creating both a pie chart and a bar graph.

Evaluation:

1. Students are evaluated on their written Dear Children of the Earth assignment.
2. Students are evaluated on their participation in completing both the "Who is impacted and how?" and "Pollution Concept Map" handouts.

3. Students are graded on their "Do you pollute?" homework assignment. In addition, students are evaluated on their graphs of the "Do you pollute?" results.
4. Students are evaluated on their final test on the environment and conservation.

References:

Websites

<http://phoenix.gov/GARBAGE/recycle.html>

http://www.geosociety.org/educate/LessonPlans/E_envir.htm

<http://www.enchantedlearning.com/Home.html>