



Brown Skies in Mexico City?

By: The Clean Air Campaign, Inc. and Earth Day Network

INTRODUCTION

In this lesson, students will receive an introduction to human environmental impact and its effect on air quality in Mexico City. The main concepts covered are causation, effects on human health, economic impact, and no idling solutions. Students are expected to read, research and use persuasive writing to show understanding of the problem.

LESSON OVERVIEW

Recommended Grade Level and Subject: Grades 6-8 Social Studies

Length: 1-2 class period(s)

Objectives:

After completing this lesson, students will be able to:

- Understand and explain the economic impact of air pollution.
- Propose no idling solutions to reduce air pollution.
- Explain causes of air pollution.
- Predict the negative health impacts of air pollution.
- Write an appeal to change public policy and awareness of air quality.

National Standards Addressed:¹

- **Content Standard: [NSS-G.K-12.2 PLACES AND REGIONS](#)**
As a result of their activities in grades K-12, all students should
 - Understand the physical and human characteristics of places.
- **Content Standard: [NSS-G.K-12.5 ENVIRONMENT AND SOCIETY](#)**
As a result of activities in grades K-12, all students should
 - Understand how human actions modify the physical environment.
 - Understand how physical systems affect human systems.
- **Content Standard: [NT.K-12.5 TECHNOLOGY RESEARCH TOOLS](#)**
 - Students use technology to locate, evaluate, and collect information from a variety of sources.
 - Students use technology tools to process data and report results.

¹ Education World (2008) *U.S. National Education Standards*. Retrieved February 5, 2009, from <http://www.education-world.com/standards/national/index.shtml>.

Materials Needed:

- Computers with internet connection
- Flour (1 tablespoon), glitter, talcum powder, water in a spray bottle, dust from an object in classroom, any powder like material
- Glass jar or clear zip top plastic bag
- Reproducible #1- **No Idling Article**
- Reproducible #2- **Web quest worksheet**
- Reproducible #3- **Considering the Impact of Air Pollution**
- Reproducible #4- **Letter Rubric**

Assessment: Students will be assessed through the following activities:

- Participation in class discussion and group work
- Completion of **Reproducible #1 - Web quest worksheet.**
- Answers to the reflection questions about losing one's sense of smell and ways in which to reduce pollution
- Completion of letter to fictional city (see **Reproducible #3 – Letter Rubric**)

LESSON BACKGROUND

Relevant Vocabulary:

- **Air pollution:** Substances in the air that have harmful or unpleasant effects.
- **Climate change:** Climate change is the change in average weather over time and over a region. It results from the greenhouse effect and will cause major disruptions in various ecosystems around the world.
- **Emission:** The process of sending out.
- **Exhaust:** Gases ejected from an engine as waste products.
- **Greenhouse effect:** The insulating effect produced by gases in the Earth's atmosphere. It traps radiant heat and warms the planet.
- **Greenhouse gases:** Any of the atmospheric gases that contribute to the greenhouse effect.
- **Idle or Idling:** Inactive, not in use, not moving or in operation.
- **Smog:** A discolored haze that is a combination of airborne particles, gases, and chemicals (ground-level ozone) that together affect our health and our natural environment.
- **Vehicle:** A machine or object that allows travel from one place to another.
- **Vulnerable:** Easily hurt or injured.
- **Carbon monoxide:** a colorless, odorless, poisonous gas, CO, which burns with a pale-blue flame, produced when carbon burns.
- **Deforestation:** to clear-cut forests or trees to make way for human development i.e. roads, houses & factories.

Information:

Direct teach: Pollution is a threat to agriculture, public health, and native plants and animals. Children are especially affected by air pollution because they have a higher breathing rate than adults. This creates a greater dose of pollution delivered to their lungs. During exercise, children, like adults, breathe with their nose and mouth rather than just their noses. When the nose is bypassed during the breathing process, the filtering effects of the nose are lost, therefore allowing more air pollution to be inhaled. Inhaling polluted air can result in more frequent respiratory infections in children. Scientists are concerned that children who experience more frequent respiratory infections may be at greater risk of lower-than-normal lung function later in life.²

Resources:

<http://www.sbg.ac.at/ipk/avstudio/pierofun/mexico/air.htm>

http://healthandenergy.com/mexico_air_pollution.htm

<http://earthtrends.wri.org/updates/node/319>

LESSON STEPS

Warm-up: *How might inhaling a combination of flour, glitter, perfume, smoke from fire and chemicals used to clean a bathroom (bleach, Lysol) affect us?*

1. Begin this lesson by discussing with your class that some cities have worse air quality than others. Ask the following questions:
 - a) What do the exhaust fumes from your school bus or car smell like? *Your students might say something like burning.*
 - b) Have you ever smelled food burning, smoke from a bar-be-que, fireplace, or candle?
 - c) Place flour, glitter in a glass jar or zip top plastic bag. Shake it up and ask students what would happen if someone inhaled the solution. *They may say it would make them sneeze or cough.*
 - d) Can you think of any time that you sneezed because of something you inhaled? *Students might respond when using black pepper, too much perfume.*
 - e) Ask the class to list some activities that they engage in that would not be possible without fresh air. *Playing outside etc.*

Activity One: ***No Idling Article***

1. Assign students to read **Reproducible #1 – No Idling Article**
2. Instruct them to read for the main idea and solutions to improving air quality and list key points of cause and effect.

Activity Two: ***Web quest***

1. Assign students to complete questions on **Reproducible #2 - Web quest worksheet** using internet.

²Socha, Tom (2007) *Air Pollution Causes and Effects*. Retrieved February 5, 2009 from http://healthandenergy.com/air_pollution_causes.htm

Activity Three: *Brainstorming solutions*

1. For this activity, break students into groups of three to five students. Have students share their thoughts on **Reproducible #3: Considering the Impact of Air Pollution**.
 - Activity One on the worksheet asks students to “List five things you would miss the most if you lost your sense of smell? Why? And five things you wouldn’t miss at all. Why?”)
 - Activity Two on the worksheet asks students to brainstorm two solutions to reduce air pollution in Mexico City.

Activity Four: *Paragraph writing*

Students will show their understanding of air pollution, its causes, effect on health, most polluted cities in Latin America, and ways to reduce pollution through no-idling solutions by writing a letter (3 paragraphs in length) to a city in the future that is predicted to have the same problems as Mexico City. They should provide solutions and preventative measures for the city. (See **Reproducible #4: Letter Rubric** for assessment guidance.)

Wrap Up: *Summary*

As a class, list 3 ways to reduce air pollution, 2 ways bad air quality can affect people and 1 reason for bad air quality in Mexico City.

Extension: *Home Learning*

Create a flyer to disseminate to the citizens of a fictional city that is growing rapidly in population and has similar geographic features as Mexico City. The fictional city doesn’t have an air quality problem yet.

CONCLUSION

At the end of this lesson, students should have a better understanding of the economic impact of pollution, as well as the health impacts. They will successfully propose ways to help reduce air pollution and compile suggestions for public policy changes and ways to promote awareness of air quality solutions, such as no idling.

No Idling Article

Be Idle-Free: For Our Health and Our Environment

-compiled by Lynn Perreault, Ph.D. (for Idle-Free Windsor)

A recent study of driving habits and behavior shows that Canadians idle their vehicles year-round (an average of 5 to 10 minutes per day) and they do so for many reasons. Warming up a vehicle is the most common excuse for idling. Drivers also spend a lot of time idling their cars needlessly in the drive-thru lanes of fast-food restaurants and while waiting for someone. Moreover, drivers idle while they are stopped at railway crossings, waiting to park, running quick errands, stopped to talk to an acquaintance or friend, waiting in line to get gasoline or having the car washed, and preparing to leave the house. All these situations have two things in common: they waste fuel and money, and they cause environmental damage.

Idling produces unnecessary emissions of carbon dioxide, the principal greenhouse gas that contributes to climate change. Carbon dioxide is an unavoidable by-product of burning gasoline. Every time drivers turn on their vehicle's engine, they generate carbon dioxide – and the more fuel they use, the greater their greenhouse gas emissions. The average car produces about 2.4 kg of carbon dioxide for every litre of gasoline used. Vehicle exhaust emissions also contribute to other environmental problems such as smog and acid rain.

Idling is particularly an issue at schools – many parents idle their vehicles while waiting to pick up their children. This is made worse by the fact that, due to commuting traffic, smog is already at its daily peak when parents are picking up their kids. Smog is one of Canada's most dangerous air-borne pollutants. Children are particularly vulnerable to smog because their lungs are still developing, they spend more time outdoors being physically active, they breathe faster than adults and inhale more air per kilogram of body weight, and their breathing zone is lower than adults which exposes them to vehicle exhausts and heavier pollutants that concentrate at lower levels in the air.

In order to protect children's health and the environment, it is important to stop idling. Talk to your family, friends and neighbors about the benefits of not idling. It will save money, protect the environment and contribute to a healthier community.

Webquest:
Air Pollution in Latin America

What's the air like in Mexico City?

Section 1: Click on the following links and answer the questions

<http://www.sbg.ac.at/ipk/avstudio/pierofun/mexico/air.htm>

Look at the chart and list the three most polluted cities in Latin America?

http://healthandenergy.com/mexico_air_pollution.htm

How much does air pollution cost the Mexican government?

What steps can be taken to reduce air pollution in Mexico City?

What is ground-level ozone?

<http://earthtrends.wri.org/updates/node/319>

Use headphones and watch video, you may pause and replay the clip as needed to answer the following questions.

“We experience the world through our five senses.” What, as stated in the video clip, happens if we diminish (lessen) one of our senses?

Adriana Lobo, Director of the Center of Sustainable Transportation in Mexico states that “in the past 10 years the number of cars on the roads has doubled.” She expects the same pattern in the next 10 years. It takes commuters 2-3 hours daily to get to work which adds up over time to 5 years of one’s life spent in a car, at the same time inhaling harmful ozone gas. Over time this affects a person’s _____.

What does “Rudolpho” state as the reason for his illness?

What does Marco Guarneros state about improving air quality?

“Researchers from UNAM Mexico’s national university, conducted a study revealing that people living in Mexico City are _____.”

Considering the Impact of Air Pollution.

Activity 1: In groups of no more than 3, think about the following questions and answer them in detail in two paragraphs. Use complete sentences, proper grammar and punctuation. What five things would you miss the most if you lost your sense of smell? Why? What five things would you not miss at all? Why?

Activity 2. 600 Cars are added to Mexico City's streets each day. Knowing what you now know about the effects of pollution, brainstorm solutions to submit to the Mexican government to reduce pollution from cars, trucks and buses and to improve air quality conditions in Mexico City.

RUBRIC: For letter

Letter Writing: Prevent air pollution in your future

Teacher Name: _____

Student Name: _____

CATEGORY	4	3	2	1
Content Accuracy	The letter contains at least 5 accurate facts about the topic.	The letter contains 3-4 accurate facts about the topic.	The letter contains 1-2 accurate facts about the topic.	The letter contains no accurate facts about the topic.
Ideas	Ideas were expressed in a clear and organized fashion. It was easy to figure out what the letter was about.	Ideas were expressed in a pretty clear manner, but the organization could have been better.	Ideas were somewhat organized, but were not very clear. It took more than one reading to figure out what the letter was about.	The letter seemed to be a collection of unrelated sentences. It was very difficult to figure out what the letter was about.
Sentences & Paragraphs	Sentences and paragraphs are complete, well-constructed and of varied structure.	All sentences are complete and well-constructed (no fragments, no run-ons). Paragraphing is generally done well.	Most sentences are complete and well-constructed. Paragraphing needs some work.	Many sentence fragments or run-on sentences OR paragraphing needs lots of work.
Grammar & spelling (conventions)	Writer makes no errors in grammar or spelling.	Writer makes 1-2 errors in grammar and/or spelling.	Writer makes 3-4 errors in grammar and/or spelling	Writer makes more than 4 errors in grammar and/or spelling.