



WHY IS THERE POLLUTION IN MEXICO CITY?

Level: High School

Course: Algebra, Biology, and English.

Unit Rationale

It is becoming more of a realization that the high school curriculum should take an integrated approach to learning. This unit provides an opportunity for students to analyze data, graph equations, write equations, research a topic, organize ideas, improve reading comprehension, and synthesize complex ideas. This is accomplished through the topic of "Why is There Pollution in Mexico City?"

Unit Overview

The teacher and students i.e. the learners, will explore the causes of air pollution in Mexico City from a holistic approach. To this end the unit is made up of three lessons, one each for algebra, biology, and English.

Algebra & Science

- * How is air pollution measured in Mexico City?
- * What are the 5 year trends for air pollution in Mexico City?
- * What is the statistical correlation between industry and air pollution over a 5 year period?
- * What is the statistical correlation between transportation, i.e. automobiles and buses, and air pollution over a 5 year period?
- * How does Mexico City compare/contrast to Albuquerque, NM, topographically?

by

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English

- * What are the population trends in Mexico City?
- * What are the political trends in the country?
- * What implications will NAFTA have on Mexico City?
- * What are the social/environmental/cultural implications of living in Mexico City?

Time Needed

The time needed for each lesson varies from 4-8 days, and there are three lessons.

Materials

The lessons have been designed to integrate technology as much as possible. As a result access to a computer lab with Internet access is important. In addition, the instructors should be able to use word processing, spreadsheet, hypertext, and Internet software.

Procedures

Start the unit by showing the slide show of the sheep in sunglasses. This activity is intended to hook the students into the unit. Follow the lesson plans in numerical order.

Follow-up Activities

A follow-up activity for this unit would be to have the students develop an air pollution control plan for your city or town, and present it to the Mayor, Representative, or Superintendent.

Biology Lesson Plan: What is ozone and pollution?

Rationale

This lesson will provide an introduction into the problem of air pollution in Mexico City and Albuquerque, New Mexico. It will also provide the opportunity for your students to learn about ozone and its relationship to pollution.

Objectives

The learner will use the following skills:

- * Critical Thinking
- * Physical Modeling
- * Research Strategies

These skills will be used to do the following:

1. learn how to retrieve information on the Internet relating to air pollution and ozone.
2. learn how and why ozone is being depleted from the atmosphere.
3. learn the effects of ozone depletion on the planet.

Time Needed

3- 5 class periods

Materials

- * Access to library research materials
- * (optional) Access to the Internet via Netscape, Mosaic, or text base
- * (optional) Computer lab with access to word processing programs

Prerequisite Skills

The instructor should be able to use the computer. It is best if the instructor has access to the Internet and knows how to use Telnet, Mosaic, Netscape, or Modem software and is able to teach the students how to access information using these tools..

Procedures

The following is a list of steps that will lead the learner through the objective. Each step could be a day's activity, or each step could take more than a day. It depends on your students' needs.

1. Introduction and "Hook": Show the ClarisWorks slide show of the sunglass wearing sheep. There is a copy of the slide show in Appendix B. After the slide show, write the word pollution on the board and have students brainstorm words that they associate with pollution. After this is completed give an introduction to the upcoming lesson.

2. Research: Divide the class into three groups. Each group will focus their research on a different aspect of air pollution. Each group should then be divided into pairs to work on the project.

Group 1: Using the library or the Internet, this group will find information about ozone depletion. Each student should find at least two articles about ozone depletion.

Group 2: Using the library, the Internet, and city offices, this group of students will Identify the quality of air in their home town, focusing on the what the city thinks the major air problems are, and what kind of policies have been implemented. Each student should get at least one article from the local paper concerning pollution in their city or state.

Group 3: Using the Library and the Internet, this group will find information related to the quality of air in Mexico City. Each student should locate at least 2 articles or documents about air pollution in Mexico City.

Note: This can be a time consuming aspect of the lesson. It is important to give the students some guidance with the research, but do not provide the data for them.

3. Interpretation: After the data has been collected the individual groups must interpret the information.

- * Choose one person from each group to tell the class what their group is working on.
- * Have each student write one question for each of the other groups to answer. (A total of two questions per person)
- * Give these questions to the respective groups.

4. Presentation: Each group is to answer the questions that have been posed to them in a way that the others will understand their answers. It is suggested that groups be able to be very creative in doing this phase of the lesson. They should be encouraged to do a HyperStudio stack, a slide show, design and create a poster, sing a song, or make a play. It should be stated that each group will have to give a 15 minute presentation to the class on their part of the project.

Algebra Lesson Plan: Using real data to write equations of lines

Rationale

This lesson will enable your students to apply writing equations of lines to a set of real data. It will also expose your students to pollution in Mexico City, Mexico.

Objectives

The learner will use the following skills:

- * plotting points
- * writing equations
- * graphing calculator

The learner will complete the following:

1. analyze the correlation between vehicles and air pollution in Mexico City.
2. analyze the correlation between population growth and air pollution in Mexico City.
3. analyze the correlation between population and people in Mexico City.

Time Needed

4- 7 class periods

Materials Needed

- * Graphing paper (Very Important)
- * Clear straight edge
- * Graphing calculator
- * Algebra textbook
- * Access to library research materials
- * Access to a computer lab.
- * (optional) Access to the Internet via Netscape, Mosaic, or text base.
- * (optional) Computer lab with access to word processing and spreadsheet programs.

Prerequisite Skills

The instructor should be able to use the computer and graphing calculator to do the following:

- * Computer: Be able to use a spreadsheet program like ClarisWorks to input and graph data.
- * Computer (optional): Be able to access the Internet using Telnet, Mosaic, Netscape, or Modem software.
- * Computer (optional): Be able to access information using gopher, Mosaic, or Netscape.
- * Calculator: Be able to use a graphing calculator to do statistical analysis.
- * Algebra: Be able to provide appropriate support materials for teaching writing equations of lines.

Procedures

The following is a list of steps that will lead the learner through the objective. Each step could be a day's activity, or each step could take more than a day. It depends on your students' needs.

Set-up Divide the class into groups of two.

1. Research: Have the students research information on the following:

- * Pollution levels in Mexico City for the last 5 years (10 would be better).
- * The number of vehicles in Mexico City for the last 5 years (10 would be better).
- * The population of Mexico City for the last 5 years (10 years would be better).

Note: This can be a time consuming aspect of the lesson. It is important to give the students some guidance with the research, but do not provide the data for them. Look in the appendix for research ideas.

2. Data Analysis: Have the students analyze the data found in the following ways:

- * Using a spreadsheet program, have the students input the data and draw various graphs of the data. In addition, have them determine the best type of graph to use.
- * Using graph paper have the students draw an x-y graph that represent the different relationships between the variables. (There are 3 combinations.)

- * Have the students identify a best fit line for the data, and calculate the equation of the line.
- * Have each student input the data into a graphing calculator. Using the statistical functions of the calculator, have the students run a linear regression on the data. (Algebra II students could do both a linear regression and an exponential regression.)

After the graphs have been made have each student write a statement about the relationship expressed in the graph, or have them write a question about what is represented by each of the three graphs.

3. Interpretation: The following questions are to help the students understand the significance of what they have done:

- * Was there a difference between your equation of the line and the calculator's equation? Why do you think this difference occurred?
- * Describe the relationship between population and pollution, vehicles and pollution, and vehicles and population.
- * If you were the Mayor of Mexico City ,what would you do to reduce pollution in Mexico City?
- * Why do you think the population in Mexico City is growing so fast? (See Lesson Plan.....)
- * Are there any similarities between your city and Mexico City? (See Lesson Plan.....)

English Lesson Plan: Exploring the Social and Cultural Environment of Mexico City

Rationale

Since we live in the Southwest, immigration, NAFTA, and Mexican Americans are a part of everyday life. However, our students really do not know much about Mexico or its peoples. This lesson will introduce students to the social and cultural environment of people living in Mexico City. The idea is to have the students produce something that can be presented to elementary students. Having the students use the information they learn to produce a totally different product forces them to synthesize the information they learn.

Objectives

The learner will research the culture and environment of Mexico City reading short stories, newspaper articles, and connect with students in Mexico City Via E-Mail. Through these activities students will work on research, writing, organization, syntheses, and presentation skills.

Time Needed

4- 7 class periods

Materials

- * Access to a computer lab.
- * Access to the Internet via Netscape, Mosaic, or text base.
- * Computer lab with access to word processing and computer graphics programs.

Prerequisite Skills

The instructor should be able to use the computer to do the following:

- * access the Internet using Telnet, Mosaic, Netscape, or Modem software
- * access information using gopher, Mosaic, or Netscape
- * use E-mail and down load files

Procedures

The following is a list of steps that will lead the learner through the objective. Each step could be a day's activity, or each step could take more than a day. It depends on your students' needs.

Set-up Divide the class into groups of two.

Research:

1. Have the students research life in Mexico City by retrieving off the Internet articles from Mexico City newspapers.
2. Students go to the local library to check out books about life in Mexico.
3. Students contact other students in a Mexico City high school for real life interaction, asking the other students about life where they live.
4. Assign a short story or a novel to the students to read about life in Mexico City.

Product:

Working alone or in pairs, have the students produce a product that depicts how life is in Mexico City. Helping the students to pick a theme for their product will help them focus on a particular aspect. Some suggestions for themes are:

- * Transportation
- * School
- * Recreation
- * Earthquakes
- * Pollution

Be sure to indicate that the students will be showing their projects to a real audience.

The product should show the students' understanding of a day in the life of Mexico City. Some examples of products the students could produce are:

- * a ClarisWorks slide show
- * a video
- * a play
- * a song
- * a HyperStudio stack
- * a children's book
- * a short story

Presentations

The products should be presented in an open house show for elementary schools. (Contact a local feeder school.) This will provide an authentic audience for the students' work.

Unit Bibliography

Students will find all of the data for this project on their own. They will be able to get a lot of information from local libraries and the Internet. Another possibility would be to get in contact with a sister school in Mexico City and have the students exchange pollution data from their cities.

Internet

The following is a list of possible resources and search terms for the World Wide Web (WWW) or Gopher:

- * CIA Fact Book URL: <http://www.research.att.com/cgi-wald/dbaccess/411>
- * Latin American Data Base URL: <http://ladb.unm.edu>
- * Pollution
- * Ozone
- * Mexico City

LADB, Articles using a search for Mexico and Pollution, found were 40 articles that were helpful to the authors. URL: <http://ladb.unm.edu>

Using NETSCAPE, Searching the World Wide Web (WWW) for Latin America and then Mexico brought up several articles that were helpful also. A useful source is the CIA Fact Book URL: <http://www.research.att.com/cgi-wald/dbaccess/411>

GOPHER, searching for Latin America and then Mexico brought up information that was helpful to the authors.

Books

Bustos Cerecedo, Miguel, La ciudad de Mexico en la poesia. Mexico : Departamento del Distrito Federal, Secretaria de Obras y Servicios, 1974.

Young, Robert J., Jr. Introduccion al arte y estilo literario. Mexico : Coordinacion de Humanidades, Direccion General de Publicaciones, Universidad Nacional Autonoma de Mexico, 1978.

Collazos, Oscar, Literatura en la revolucion y revolucion en la literatura: Mexico. Siglo Veintiuno, 1975.

Festival Musica Verbal e Imagen (1985 : Mexico City, Mexico) Memorias del Festival Musica Verbale Imagen : la generacion de fin de siglo. Mexico, 1985. Mexico. Secretaria de Educacion Publica. Consejo Nacional de Recursos para la Atencion de la Juventud. Mexico, D.F. : Secretaria de Educacion Publica : CREA, 1986.

Jimenez, Juan Ramon, 1881-1958. El modernismo; notas de un curso (1953)

Onis, Federico de, 1885-1966. Antologia de la poesia espanola e hispanoamericana. Mexico, Aguilar, 1962.

Millan, Maria del Carmen. Antologia de cuentos mexicanos. Mexico : Secretaria de Educacion Publica, Direccion General de Divulgacion, 1976.

Schon, Isabel. A Bicultural Heritage: Themes for the Exploration of Mexican and Mexican-American Culture in Books for Children and Adolescents. Metuchen, N.J. : Scarecrow Press, 1978.

Rosser, Harry L. Conflict and Transition in Rural Mexico: the Fiction of Social Realism. Waltham, Mass.: Crossroads Press, c1980.

Guerrero Mendoza, Francisco Javier. Cultura Nacional y Literatura Urbana. Mexico, D.F. : Instituto Nacional de Antopologia e Historia, 1990.

Lewis, Oscar. Five Families. Mentor Books. New York, New York, 1959.

Childrens' Books

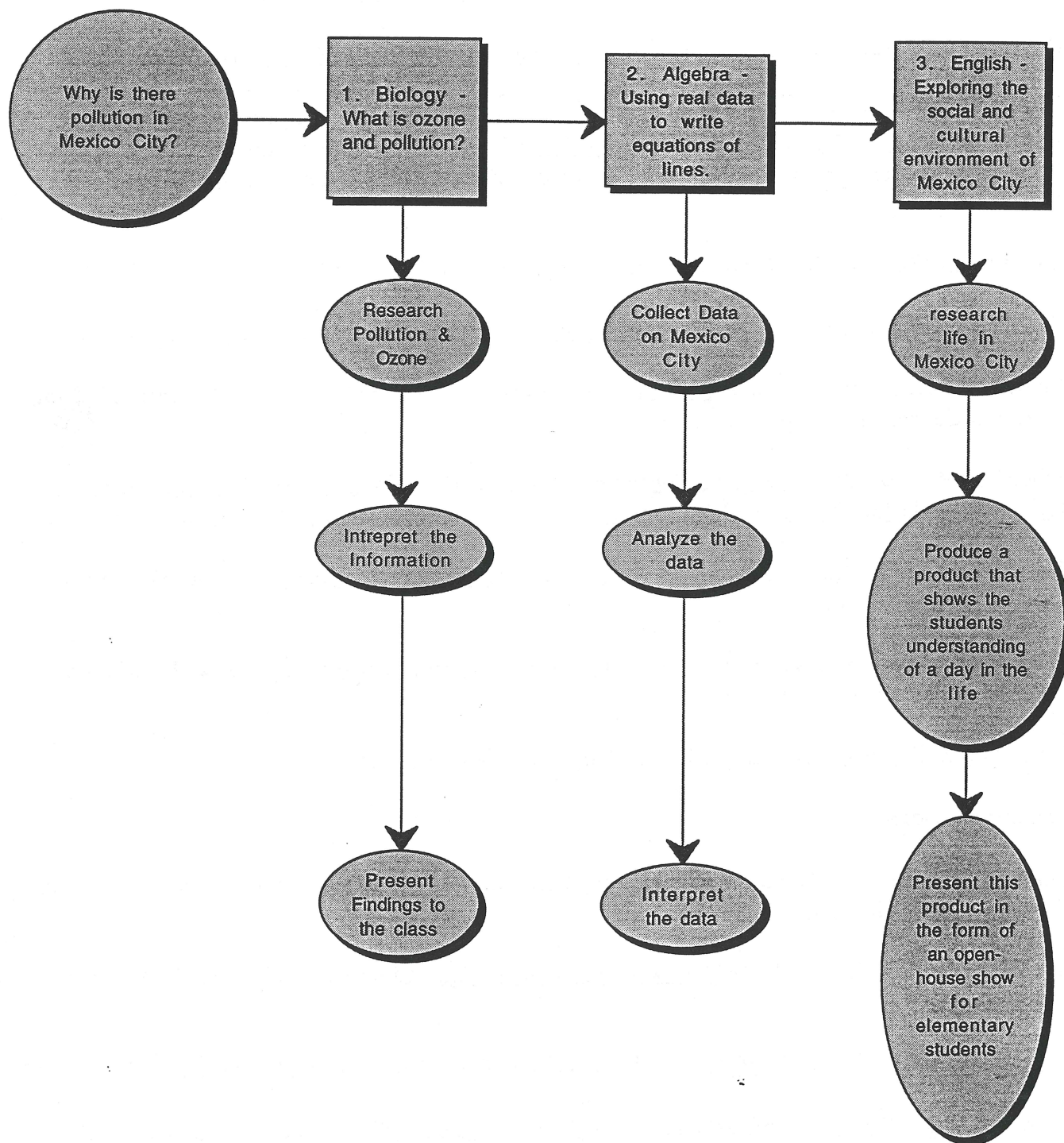
Rohmer, Harriet and Anchondo, Mary; How We Came To the Fifth World. Children's Book Press, San Francisco, California, 1988.

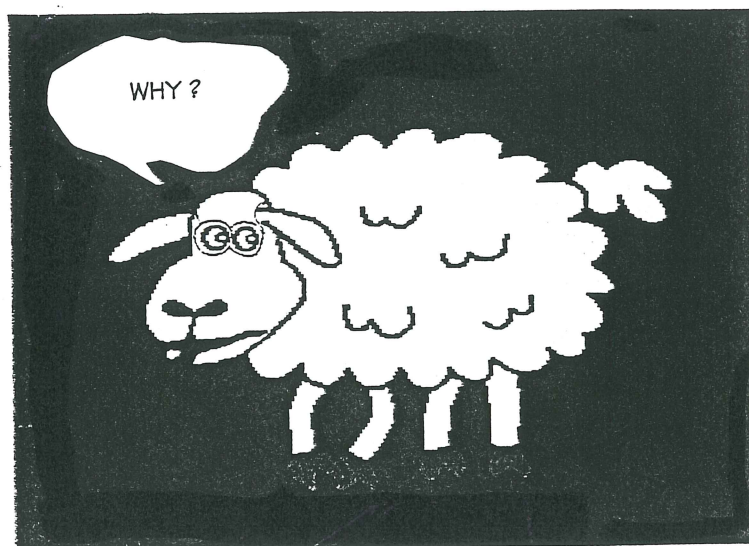
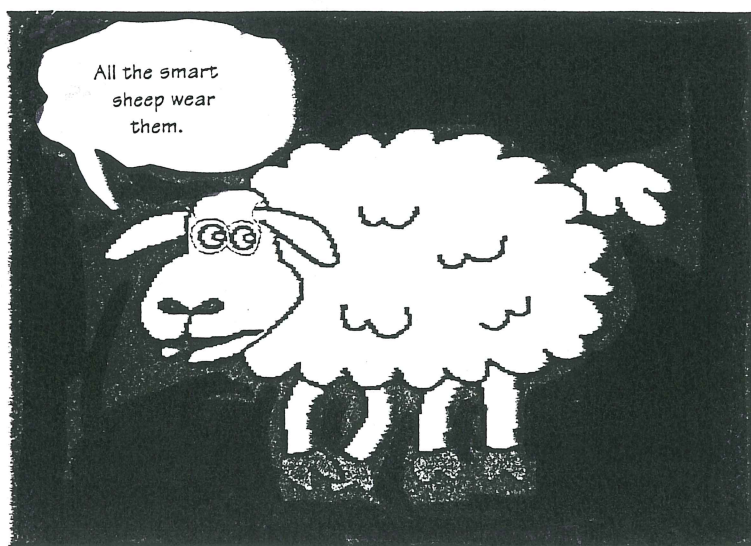
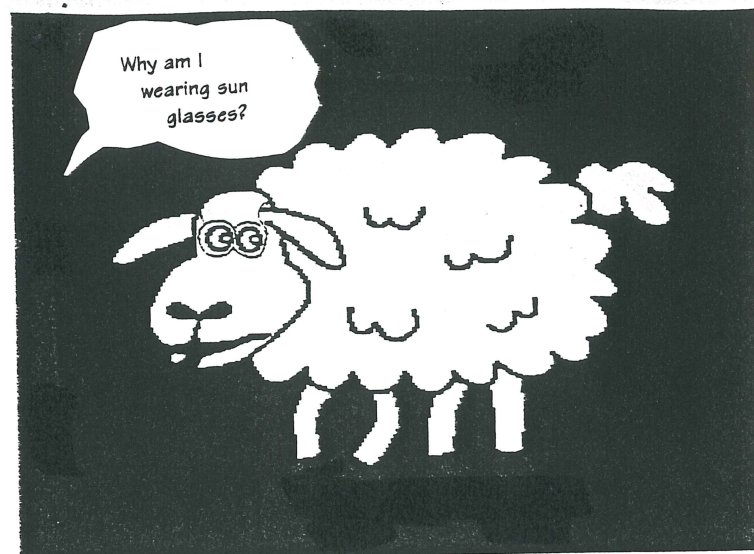
Martinez, Alejandro Cruz; The Woman who Outshone the Sun. Children's Book Press, San Francisco, California, 1991

Garza, Carmen Lomas; Family Pictures. Children's Book Press, San Francisco, California, 1990.

Ancona, George; Pablo Remembers the Fiesta of the Day of the Dead. Lothrop, Lee and Shepard Books, New York, New York, 1993.

This Flow chart gives an overview of the unit "Why is there pollution in Mexico City?". Lessons are indicated by rectangles. The arrows and numbers indicate the flow of the lesson, realize there can be many paths through the material. The paths moving down represent the main themes of the individual lessons





This Clarisworks slide show is a take off on the fact that in South America the Ozone is depleting so much that Sunglasses are becoming essential to life down there. As you know, the theme of the unit is pollution in Mexico City so starting off by talking about why a sheep is wearing sunglasses could be a good start. I can not confirm this, but I have heard that sheep are wearing sunglasses in southern Chile.

After the slide show, start a discussion of why a sheep might be wearing sunglasses. Follow this with the next unit.
