

TECHNOLOGY in Practice



Applications and Innovations

Chapter Overview, Concepts, and Goals

Chapter 2, Air Pollution Solutions

Chapter Overview

This module helps students learn about environmental issues in preparation for designing their own environmental solution in Chapter 4. In Chapter 1, students learned about garbage and the environmental concerns related to garbage. They continue learning about environmental issues in this chapter using air pollution as a context.

In the **Engage** activity, *What Is In the Air?*, students express their current conceptions about what air is. They then construct pollution detectors and watch a demonstration to draw out their ideas about air pollution.

In the **Explore** activity, *Detecting Air Pollution*, students learn about the six major types of pollutants that contribute to air pollution. They also learn some of the sources for these pollutants and the factors that may lead to higher levels of the different pollutants in the atmosphere.

In the **Explain** lesson, *Why Is Air Pollution a Problem?*, students focus on the consequences of air pollution. These consequences include harmful effects on people's health and damage to the environment.

In the **Elaborate** activity, *Technologies to Reduce Air Pollution*, students consider four different technologies that address issues related to air quality. Each technology presents different benefits and costs.

The **Evaluate** activity, *The Light Goes On, but Which One?*, asks students to use what they have learned about air pollution and costs and benefits to consider three options for a technological solution. In this case, the lightbulb itself is not the direct issue. However, when considering benefits and costs, students need to think about how much energy the different lightbulbs use, which influences how much electricity needs to be generated. It is the power plant that produces the electricity that is a very significant source of air pollution.

Chapter Organizer

Engage—What Is in the Air?

Key idea:

Air is made up of many things, some of which contribute to pollution.

Activity:

Students express their ideas about what is in air and which of those parts are pollutants.

Linking question:

How do we know there is pollution in the air?

Explore—Detecting Air Pollution

Key idea:

Some of the types of pollutants can be detected.

Activity:

Students create an air pollution detector, then read about the six most common types of air pollutants and their sources.

Linking question:

Why should people be worried about air pollution?

Explain—Why Is Air Pollution a Problem?

Key idea:

Air pollution can cause health problems for people and can damage the environment.

Activity:

Students learn some of the effects that air pollution can have on human health by learning about the Air Quality Index. They also check the Air Quality Index for their area. Students then continue learning about the effects of air pollution on the environment by investigating how acid rain affects seed germination.

Linking question:

How can technology help reduce air pollution?

Elaborate—Technologies to Reduce Air Pollution

Key idea:

Different technologies have been developed to solve the problem of air pollution.

Activity:

Students learn how decisions about technology involve an analysis of costs and benefits. They then practice identifying costs and benefits involved in four technologies that were developed to improve air quality.

Linking question:

How does knowing about air pollution help people make decisions about technologies?

Evaluate—The Light Goes On, but Which One?

Key idea:

People can use information about air pollution to help make choices in their daily lives.

Activity:

Using information about different types of lightbulbs, students consider the costs and benefits to determine which technology is the best choice. Even though the lightbulbs themselves are not a large source of air pollution, the power plants that produce the electrical energy that the lightbulbs need are some of the greatest contributors to air pollution.

Major Concepts

- Air pollution is the addition of gases, dust, fumes, or particles to the air in harmful amounts.
- Air pollution can cause health problems for people and damage to the environment.
- Many of the technologies that we use frequently add greatly to air pollution.
- Many technologies have been developed to reduce air pollution or to monitor the quality of the air.
- All technologies, including those designed to solve air pollution problems, have costs and benefits that must be considered.

Goals for the Chapter

By the end of this chapter, students should

- be able to define air pollution
- be able to list six types of substances that are major contributors to air pollution
- be able to give examples of the sources of the six major air pollutants
- be able to give examples of the harm that can be caused by air pollution
- be able to give examples of technologies that have been developed to monitor air quality or reduce air pollution
- be able to explain how decisions about technology involve costs and benefits
- practice making decisions about technological solutions after considering costs and benefits.