Communication Chapter 5 - Long-Distance Communication

National Science Education Standards

Chapter Challenge

The need to communicate across distances sets the stage for the scenario presented in this chapter. Students consider themselves members of an engineering team that is developing a system that will communicate from one room in the school to another. The challenge is to send and receive, then measure the speed of the transmission. The final report must describe both the design and the physics of the system and a discussion of how the system is better than the methods explored in the chapter.

Chapter Summary

To gain understanding of science principles necessary to meet this challenge, students work collaboratively on activities with codes, electricity and magnetism, sound waves, and light rays. They also use the iterative process of engineering design; refining designs based on effectiveness and physics concepts. These experiences engage students in the following content from the National Science Education Standards.

Content Standards

Unifying Concepts and Processes

- Systems, order and organization
- Evidence, models and explanations
- Constancy, change and measurement

Science as Inquiry

- Identify questions and concepts that guide scientific investigations
- Design and conduct scientific investigations
- Formulate and revise scientific explanations and models using logic and evidence

Science and Technology

- Identify a problem or design an opportunity
- Propose designs and choose between alternate solutions
- Implement a proposed solution
- Communicate the problem, process, and solution

Science in Personal and Social Perspectives

- Science and technology in local, national, and global challenges

History and Nature of Science

- Science as a human endeavor
- Historical perspectives

Physical Science

- Structure and properties of matter
- Interactions of energy and matter