Lesson Plan

Methods and Modifications

Book: *Televisions*
Series: How It Works
Level: Navigator

Objective

To help students compare and contrast the varying technical processes that televisions have used to create, display, and broadcast images and sound at different points throughout history.

Supplies

- *Televisions* book
- Methods and Modifications Guided Reading Assignment (attached)
- Paper and pencils

Before the Activity

Read through the *Televisions* book, or assign it to students to read on their own. Print enough copies of the Methods and Modifications GRA so that each student can have one. Cut them apart so each set of questions is on a separate slip of paper.

Activity

Over the years, people have used different methods to send, receive, and display images on televisions. These methods have changed as people's understanding of science and technology continues to develop. Today, students will explore some of these changes. Give each student a Methods and Modifications GRA. Students should use the *Televisions* book to answer each question. They should write their answers on a separate sheet of paper. Each answer should be 3 to 8 sentences long.

Evaluation

Use the attached answer key to grade each student's GRA, for a total of up to 30 points.

Standards

This lesson may be used to address the Common Core State Standards' reading informational texts standards, grade 5 (RI 5.3; RI 5.10) and writing standards, grade 5 (W 5.9), and the National Science Education Standards' Content Standard E, grades 5–8.

Methods and Modifications GRA

1. How did John Logie Baird's TV system send and receive images? (5 points)
2. How was Philo T. Farnsworth's TV system similar to Baird's? How was it different? (3 points)
3. How did black-and-white CRT TVs display images? (4 points)
4. How are color CRT TVs similar to black-and-white CRT TVs? How are they different? (4 points)
5. How did analog TVs broadcast signals? (8 points)
6. How are digital signals similar to analog signals? How are they different? (6 points)

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Methods and Modifications GRA: ANSWER KEY

1. How did John Logie Baird's TV system send and receive images? (5 points)
Baird's TV system used two spinning discs. Glass lenses around the first disc picked up light from the object. When the light hit a photoelectric cell, the light energy was converted into electric signals, which were sent over a wire to a receiver. In the receiver, a second spinning disk recreated an image of the object one line at a time, using a process known as scanning. (pp. 6–7)

2. How was Philo T. Farnsworth's TV system similar to Baird's? How was it different? (3 points)
Like Baird's TV system, Farnsworth's system picked up light from an object and reassembled the image on a screen in the receiver. It also used the process called scanning to recreate the image. But Farnsworth's TV system used cathode rays instead of spinning disks. (pp. 7–9)

3. How did black-and-white CRT TVs display images? (4 points)
A cathode ray in the receiver reassembled the image. The ray hit a glass screen at the end of a cathode ray tube. This screen was coated in phosphor, which made it light up when the ray hit it. The ray scanned only one row of the image at a time. (pp. 8–9)

4. How are color CRT TVs similar to black-and-white CRT TVs? How are they different? (4 points)
Color CRT TVS also used cathode rays to recreate images. They used the scanning, too. But color TVs used three electron beams (one red, one blue, and one green) instead of just one. The three colors blended together to make all the colors in the image. (p. 9)

5. How did analog TVs broadcast signals? (8 points)
A camera split each image into electrical impulses. Dark areas of the image made weak impulses. Bright areas made strong impulses. Microphones changed the sound into electrical impulses, too. These impulses created a signal that varied. TV stations broadcasted the signals. Antennas on the TV station's transmission towers sent out radio waves, which were picked up by antennas on viewers' roofs and sent to each viewer's TV. (pp. 11–12)

6. How are digital signals similar to analog signals? How are they different? (6 points)
Digital broadcasts also convert sound and image into signals. These signals are also broadcast using radio waves. But in digital signals, the image and sound are encoded as bits. Each bit represents a small part of the image or sound. Digital signals can carry more information for longer distances. They also make clearer sound and pictures possible. (pp. 13–14)