



Get Connected! Pre and Post

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Included are activities for you to do with the class—before and after the workshop—to reinforce the concepts and terms in the lesson. There is also a section on activity extensions; books, resource suggestions; vocabulary; and a telecommunications pop quiz related to the topic.

BEFORE THE WORKSHOP

To maximize the workshop's impact and educational value, we recommend introducing the students to the concept of communication and telecommunication prior to the workshop. Here are several fun, easy, and educational activities that will prepare the class for the workshop. These experiments will also help the students become familiar with the concept of observation, hypothesis, experimentation, and the scientific method.

Broken Telephone

Discover the necessity for uncorrupted transmitters in telecommunications.

Materials

- Paper
- Pencil

Procedure

1. Before class begins, write out a sentence on the paper. Try to construct sentences with words that may sound similar to others, like (working, walking); (lazy, lady); (grass, glass).
2. Have your students sit in a circle.
3. Whisper your sentence to one student in the circle.
4. Have the students whisper the sentence from one to another until the message has gone around the circle and back to you.
5. Have the last student to receive the message say it aloud, and then read your sentence from the paper.

6. Discuss how the sentence garbled through transmission, and compare it to interference in telecommunications (telephone, television, radio, etc.).

Explanation

This game shows how indirect communication can easily corrupt information. A telephone line, fiber-optic cable, or radio frequency signal cannot be corrupted during its transmission in order for the receiver to understand the speaker.

Hello Operator

Children learn—hands-on—how calls are connected.

Materials

- Paper cups (one per student)
- String (1m (3ft) per student)
- Scissors
- X-Acto (knife)
- Paper clips (two per student)
- Slips of paper (one per student)

Procedure

1. Before class begins, use the X-Acto to cut the string into 1m (3ft) lengths, and an X into the bottom of each paper cup. Cut five pieces of string into 30cm (1 ft) lengths. Write the name of each student on a slip.
2. Draw five names, and give these students the shorter strings. Hand each of the other students a longer string.
3. Hand each student a paper cup and two paperclips.
4. Have each student thread the string through the paper cup, and tie a paper clip to each end of the string.
5. Draw names to separate the rest of the class into two groups. Have the two groups stand in separate lines, facing each other. Place the five children with the shorter strings between the two lines—within reach of the string from the two lines of children.
6. Explain to the two exterior lines that they are telephone users: One line will call the person whose name is on a slip of paper in the other line. Give each child in one line a slip of paper with the name of a child in the other line.
7. Tell the children in the middle they are telephone operators. They will connect the telephone users to each other.
8. The telephone operator will hook a paperclip to a telephone user's paper clip, and ask the name of the person to call. Demonstrate how the strings between the cups must be tight in order for sound to travel.
9. The telephone operator then unhooks the string, connects the telephone users' strings to each other, and tugs to alert that the phones are connected.
10. Once the connection is made, the telephone operator connects the string of the next telephone user to make another connection.
11. When the two telephone users are finished talking, they shake their connected strings to alert the telephone operator to disconnect their strings.

12. If a string is in use, the telephone user can request a call to another person.

Explanation

When public telephone communications first started, telephone operators were needed to complete the connection between telephone users. When a telephone user picked up the phone, a signal was sent to the operator's switchboard or manual exchange. The operators would plug their headsets into the respective telephone jack and speak with the user. The operators would then complete the call as requested and in some cases would use a key to *ring* the requested person's telephone. The public telephone communications system is now operated by automatic exchanges.

AFTER THE WORKSHOP

Here are some activities you may wish to do with the class after the workshop to reinforce and expand the science concepts.

Sounds Like You, Not Like Me!

Students hear the sound of their voices.

Materials

- Sound recording equipment (cassette tape, CD, tape recorder, microphone, computer)
- Speaker to play back the sound recording
- 5-10 sentence story

Procedure

1. Before the class begins, set up the recording equipment.
2. Bring students—one at a time—to a quiet corner of the room, and record their voices as they read the story.
3. Play short sections of each voice recording, and have the class write down on a piece of paper the name of whom they think is speaking.
4. Compare the results of how many students could identify their voices.

Explanation

When you speak, you hear the sound of your voice from two sources. The sound moves through the air to your ears, and it moves through the bones of your skull to your inner ear. You are the only one to receive these two sources of sound when you speak! Someone listening to you talk will only hear your speaking voice. You can hear your speaking voice without your inner ear voice in a sound recording. This voice is different from the voice you normally hear, so you may have trouble recognizing it as your own!

Brain Cell Phone Game

Students develop their own brain game based on telecommunication facts.

Materials

- Books on telecommunication
- Internet links to telecommunication sites
- Information from the telecommunication sponsor
- 30 second timer
- Telecommunication-themed prize
- 2 sound buzzers

Procedure

1. Divide the class into groups of 5.

2. Challenge each group to come up with 15 facts about telecommunication in a question-and-answer format. I.e., Question: How does sound travel to a cell phone? Answer: Sound travels in radio waves from a cellular tower to the cell phone. Give the groups a few days to develop their set of questions.
3. Put all of the questions together, and divide the class in two teams.
4. Tell the students that they are in a contest to see how many correct answers they can give to the questions they wrote.
5. The member who sounds the buzzer first has 30 seconds to answer the question. If answered incorrectly, the opposing team member has 30 seconds to answer the question.
6. Have one member of each team stand at the front. Read a question aloud to them.
7. Once all the questions are answered, reward the winning team with a telecommunication-themed prize.

Explanation

There are many resources to research a topic. This game provides the incentive for students to do independent research using multimedia resources. The technology for telecommunications has blossomed over the past decade, and information on the newest technologies is abundant on the World Wide Web.

MORE TO DO

Language Arts

- Have the students write a newspaper column explaining proper cell phone etiquette. I.e., excusing yourself from a face-to-face conversation with someone to answer your phone, turning the ringer off at a concert or in the movie theater, lowering your voice when speaking in public, etc.
- Challenge the students to decipher text messages from classmates. The students should write their decoded text message using proper grammar and spelling.

Art

- Have students create advertisements for their cell phone brand.
- Have students create information posters on cell phone etiquette (see Language Arts, above, for examples).

Math

- Have the students compare various cell phone packages to get the best deal for a teacher's benefits.
- Create a survey of the physical characteristics (size, shape, color) of the cell phones owned by the students in the class, and challenge the students to create charts to show these differences.

Social Studies

- Develop email-pals on a safe email provider with same grade students in another school.
- Have a discussion and create posters listing safe and unsafe internet practices.
- Have students discuss cell phone etiquette for children, teens, and adults.
- Have the class research scientists and inventors of telecommunication devices. I.e., Alexander Graham Bell, Benjamin Bredding, Martin Cooper.

Field Trip Suggestions

- Go for a walk in your city's downtown area, and challenge the students to identify different types of cell phones (ask local cellular companies to send you images of their products).
- Visit a telecommunications museum.

BOOKS

Title: Let's Talk: How We Communicate

Author: Waters, Jennifer

Publisher: Compass Point Books

ISBN#: 0756503817

Description: From smoke signals to email, this book explains the different methods people have used to communicate throughout time. This book is suitable for 1st to 3rd grade.

Title: High-Tech Inventions

Author: Bailey, Gerry

Publisher: Mercury Books

ISBN#: 190466878X

Description: This book is from the Crafty Inventions series. It presents new telecommunications tools invented this century. Children will learn about the information superhighway and virtual reality. A set of cool experiments—from making a mobile phone booth to groovy CD coasters help reinforce these concepts. This book is suitable for 2nd to 4th grade.

Title: Get the Message: Telecommunications in Your High-Tech World

Author: Skurzynski, Gloria

Publisher: Simon & Schuster Children's Publishing

ISBN#: 0027780716

Description: This book uses a telephone conversation between two teens to discuss how telephones and fax machines work. Colorful photographs of new technology accompany easy to understand explanations of how they work. This book is suitable for 4th to 6th grade.

Reference Books

Title: The Science of Sound and Music

Author: Levine, Shar and Leslie Johnstone

Publisher: Sterling Publishing

ISBN#: 0806971835

Description: This book contains stimulating projects that help children uncover the mysteries of sound. Interesting sound facts introduce each section of the book. Descriptive photographs accompany each simply written activity. This book is suitable for 1st to 4th grade.

Title: Inventing The Radio

Author: Fedunski, Marianne

Publisher: Crabtree Publishing

ISBN#: 077872817X

Description: This book encompasses both the history and technology behind the radio invention. It documents the use of radio waves from its first emission to podcasting. This book is suitable for 3rd to 6th grade.

Title: Communication Inventions: From Hieroglyphics to Dvds

Author: Ball, Jacqueline A. and Gabriel Kaufman

Publisher: Bearport Publishing

ISBN#: 1597161292

Description: This book covers the topic of communication and telecommunications, and provides information in an engaging question-and-answer format. There are fact boxes throughout the text and a Just the Facts section at the end of the book. It is suitable for 3rd to 6th grade.

Title: Gordon McComb's Gadgeteers Goldmine

Author: McComb, Gordon

Publisher: McGraw-Hill/TAB Electronics

ISBN#: 083063360X

Description: This book provides exciting electronic projects from magnetic levitation and lasers to high-tech surveillance and digital communications. The experiments in this book require adult guidance. This book is suitable for 4th to 6th grade.

Title: Digital Technology

Author: Woodford, Chris

Publisher: Chelsea House Publications

ISBN#: 0791088618

Description: This book introduces curious young minds to the world of technology. Some of the topics covered are the binary system, digital transmission and music, smart cards, animation, mobile phones, internet, and broadcasting. This book is suitable for 4th to 6th grade.

Title: Messengers, Morse Code, and Modems

Author: Parker, Janice

Publisher: Raintree

ISBN#: 0739801384

Description: In this book, children are introduced to all aspects of communication. Telecommunication-based activities allow children to use their new knowledge in everyday life. This book is suitable for 4th to 6th grade.

Title: Telecommunications: From Telegraphs to Modems

Author: Lampton, Christopher

Publisher: Grolier

ISBN#: 0531125270

Description: This high-school level book provides substantial background on telecommunications from the past to the present. Black-and-white, pen-and-ink drawings clarify the concepts. This book is suitable for teacher reference.

VOCABULARY

Broadcast: To transmit (a radio or television program) for public or general use. I.e., Radios and televisions in homes receive radio and television show broadcasts.

Cellular Technology: This term encompasses all wireless phones regardless of the technology they use. The term is derived from cellular base stations that receive and transmit calls. Both cellular and Personal Communications Services (PCS) phones use cellular technology.

Frequency: Measurement of the number of waves per second that a sound or radio wave makes. The unit for frequency is hertz.

Network: A system of two or more devices that can communicate with one another.

PCS: Personal Communications Services (PCS) is a wireless phone service very similar to cellular phone service. PCS includes paging, caller ID, and e-mail.

SMS: Short Messaging System (SMS) is a system that sends text messages up to 160 characters (letters and spaces) from one cell phone to another. This is commonly known as text messaging.

Telecom: Short for telecommunication. Telecommunication is communication over a distance. I.e., cable, telegraph, telephone, or broadcasting.

Wireless: A radio that is capable of transmitting data without using a cable, or being plugged into an electric socket.

ASSESSMENT QUIZ

The next page contains a series of questions designed to help assess students' understanding of the concepts in the workshop. It is in a pop quiz format that can be photocopied and given to children to complete after the workshop.

Answer Key to "Get Connected" Quiz:

1. C
2. A
3. B
4. A
5. C
6. B

Get Connected! Quiz

Circle the correct answer for each question.

1. Telecommunications means:
 - a) talking to people in outer space
 - b) communication with a tele
 - c) communication at a distance
2. Telephones work when they have:
 - a) electricity
 - b) color coordinated handsets and cradles
 - c) scientist operators
3. Cell phones send signals to:
 - a) the upper atmosphere
 - b) cellular relay towers
 - c) cell phone companies
4. When you go to a movie theater, do you:
 - a) turn off the cell phone
 - b) change your ringer so that it matches the movie soundtrack
 - c) turn your ringer on maximum
5. Wireless communications send this type of signal:
 - a) sound waves
 - b) sign language
 - c) radio frequencies
6. Text messaging means:
 - a) reading a textbook and explaining it to someone
 - b) sending a written message to someone's cell phone
 - c) mailing a letter to someone

