



Virginia 4-H MAKING the Future

*18 U.S.C. 707

Making a String Telephone - Handout

Make a String Telephone:

- Use a push pin to poke a hole in the bottom of 2 cups.
- Safety note: Adults should supervise the use of sharp pushpins.*
- Cut a length of string and thread it through the hole in each cup.
 - Tie a paper clip on the end of each string, on the inside of the cup.
 - Find a friend, walk apart until the string is tight then talk through the inside of your cup while they listen on their cup.

Ask yourself. . .

- What happened?
- How did the sound of your voice travel?
- How else can sound travel?



What happens if you. . .

- Use fishing line instead of string?
- Hold the string when you talk?
- Change the length of the string/line?
- Let the string become loose when you talk?
- Use a different sized cup?
- Use a plastic cup instead of a paper cup?
- Try to make a 3-way call?

Ask yourself again. . .

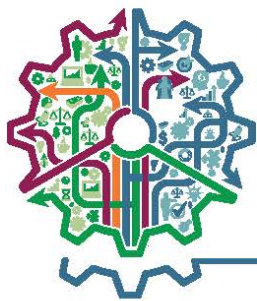
- What surprised you?
- What worked well?
- What would you change?
- What else could you use?
- Why did you choose the items that you chose?

Did you notice. . .

- If you touch the string while you are talking it is the same as muting the line?
- If the string becomes loose it is the same as hanging up on the other phone?

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The Science of Telephones

The Science Behind it . . .

How do landline telephones work?

When you speak into a landline phone, your voice travels in small sound waves. The sound waves are carried to a thin metal disk inside the phone, called a diaphragm, and are converted into electrical energy. The electrical energy travels over wires to another phone and is converted from electrical energy to sound waves again which can be heard by someone on the other end of the phone!

How do cell phones work?

A cell phone does not use wires to transfer your voice. When you speak into a cell phone a microphone turns your voice into electrical signals. A microchip in the phone modulates (or varies) a radio wave using the electrical signal. The radio wave travels through the air to a nearby cell tower; the tower sends your voice to the person you are calling and the process is reversed so that the person on the other end can hear your voice.

How does the string telephone work?

A string telephone works very much like a landline phone. When you talk into the cup your voice sends sound waves inside the cup, vibrating the bottom of the cup. The vibrations are transferred to the string, across the string and into the bottom of the other cup. The sound waves become vibrations inside the second cup, transferring the sound of your voice.

Materials

- ⇒ Paper cups (2 per youth)
- ⇒ String (10 feet or more per youth)
- ⇒ Paperclips (2 per youth)
- ⇒ Pushpins (to share)
- ⇒ Scissors (to share)

Making and Exploring Further

Make activities encourage problem solving through trial and error, allowing for individual creativity and experimentation. Youth will ignite their curiosity and expand their critical thinking skills as they move from the planned and guided activity to an open exploration of different materials and methods.

- ⇒ Encourage youth to substitute 'phones' using recycled containers, or larger paper cups.
- ⇒ Encourage youth to substitute 'phone lines' using fishing line, yarn, or embroidery thread.
- ⇒ Encourage youth to personalize their 'phone' with markers or stickers.

Sources

- ⇒ Science Kids: Make a String Telephone: www.sciencekids.co.nz/projects/stringphone.html
- ⇒ Scientific American: Talk through a String Telephone: <http://www.scientificamerican.com/article/talk-through-a-string-telephone-bring-science-home/>
- ⇒ University of Wisconsin-Madison: Build a String Telephone: <http://wonders.physics.wisc.edu/build-a-string-telephone.htm>
- ⇒ Yale-New Haven Teacher's Institute: www.yale.edu/ynhti/curriculum/units/2003/4/03.04.07.x.html
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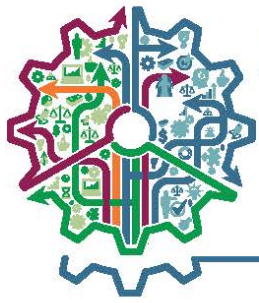
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The History of Telephones

The History Behind it . . .

When was the telephone invented?

Alexander Graham Bell is credited with inventing the telephone in 1876. Many people during this time were working on a prototype and Alexander Bell was the first to file for a patent (US patent number 174,465) on February 14, filing only two hours before another inventor, Elisha Gray. If Elisha had documented his invention before Mr. Bell, he may have received that important patent!

On February 17, his prototype carried the first message to his assistant in another room, "Mr. Watson, come here, I need you". He had a great vision, creating the Bell Telephone Company in 1877, which later became AT&T. Technology continued to increase the availability of the telephones and by the 1890s many towns had switchboard operators to transfer calls between the houses. Originally, boys were hired to be the switchboard operators, but were quickly replaced by females who had a gentler voice.

World War I

The Army adopted the telephone as soon as it was invented, using it in the Spanish-American War. In 1917 General Pershing asked the War Department to recruit women to serve overseas as telephone operators to pass messages back and forth between the front lines and headquarters. Although 7,000 women applied to serve, only 233 were sent to the war. They were named the 'Hello Girls'. They were required to pass physical and psychological tests, pass Secret Service investigations, as well as be able to speak French fluently. The 'Hello Girls' provided a vital service for their nation, relaying messages about troop movements and supplies, often working in the front lines.

In addition to the 'Hello Girls', women made other significant contributions to WWI:

- 21,490 Army nurses served in military hospitals in the U.S. and overseas;
- 18 African-American Army nurses served stateside caring for German prisoners of wars and African-American soldiers;
- 50 stenographers were sent to France to work with the Quartermaster Corps.
- 11,880 enlisted in the Navy as Yeomen to serve stateside in shore billets and release sailors for sea duty;
- 1,476 Navy nurses served in military hospitals stateside and overseas;
- 305 enlisted in the Marine Reserves to "free men to fight" by serving as clerks and telephone operators on the home front.

Did you know?

- The 'Hello Girls' were notified after the war that they were not considered soldiers, but contractors working for the Army. In 1978, they finally received recognition for their service and were provided veteran's status.
- Alexander Graham Bell was a teacher at the Pemberton Avenue School for the Deaf; both his wife and mother were deaf/hearing impaired.

Sources

- ⇒ A. Lincoln Lavine. *Circuits of Victory*. Garden City, NY: Country Life Press, 1921. Online and print.
- ⇒ Federal Communications Commission: https://transition.fcc.gov/cgb/kidszone/history_telephone.html
- ⇒ The History Channel: www.history.com/this-day-in-history/alexander-graham-bell-patents-the-telephone
- ⇒ The Library of Congress: <https://www.loc.gov/rr/news/topics/hello.html>
- ⇒ The Women's Memorial: www.womensmemorial.org/Education/timeline.html
- ⇒ U.S. Army Signal Corps: http://signal.army.mil/old/history/history-hello_girls.html
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