

Communications

Grade Levels Targeted: 5-8

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Educational Standards:

National Science Standards: Standard A, Science as Inquiry: all students should develop abilities necessary to do scientific inquiry and understandings about scientific inquiry.

National Science Standards: Standard B, Physical Science: all students should develop an understanding of properties and changes of properties in matter, motions and forces and transfer of energy.

National Science Standards: Standard E, Science and Technology: all students should develop abilities of technological design and understandings about science and technology.

National Science Standards: Standard F, Science in Personal and Social Perspectives: all students should develop understanding of personal health, populations, resources and environments, natural hazards, risks and benefits and science and technology in society.

National Science Standards: Standard G, History and Nature of Science: all students should develop understanding of science as a human endeavor, nature of science and history of science.

Success Indicator: Upon completion of the activity, students will have a better understanding of nonverbal communication and the reasons it is needed.

Setting up the Activity (for facilitator):

Facilitators may want to count students off or pick groups ahead of time to make teams equal.

Set up a rotation schedule for groups ahead of time. Suggested rotation: give each team a number and have that team start in the same numbered station then work their way down. Example: Team 1 begins at Station 1, then 2, 3, and 4; Team 2 begins with Station 2, then 3, 4, and 1.

Each station should be operated by one facilitator, and/or each group be led by one facilitator. Station 3 will also need other facilitators, students or volunteers to role play the President and two or three other world leaders.

Facilitators need to find four areas to perform the communication tasks on the Special Task Force worksheet. Listed below are suggested areas, however accommodations may be needed depending on your location:

Station 1: *In a hallway on either sides of lockers or in a room that has a solid visual barrier. For example, a conference room may have a removable wall; a gym might have a stage with curtains. If possible, have a facilitator or other volunteer pretend to be the spy.*

Station 2: *In a yard, playground or park where there are trees and bushes.*
Set up: *Designate an object to be the house the groups are trying to get closer to. For added effect, facilitators or volunteers can pretend to be guarding the object.*

Station 3: *In a classroom or conference room.*

Set up and materials: Facilitator should set up a rectangular table for formal dining.

Set the table:

-Cover the table with a table cloth.

-One place setting per person. From left to right: salad fork, dinner fork on top of napkin, knife (butter knives only), spoon. Glass should be set above the knife and spoon. For a fancier setting, add a bread plate above the forks, a dessert fork horizontally above the dinner plate, and a coffee cup and saucer beside the glass.

Note: *Make students pretend to eat with these utensils rather than actually putting them in their mouths for sanitary reasons.*

Station 4: *In another classroom or conference room with no windows, or windows and doors completely covered to block out ALL light.*

Set up and materials: *Six snorkeling masks covered with black construction paper, or six blindfolds (dark colored bandanas or scarves), disposable ear plugs: one pair per student.*

Note: *If using snorkeling masks, spray with disinfectant spray before and in between groups. Allow to dry before students wear again.*

Claim an area in the room to be the submarine. This may be as simple as a chair, or students may make a cardboard submarine ahead of time.

Introduction (for youth): Have you ever been told that teenagers speak a different language? Do your parents look at you with puzzled faces when you say certain phrases or words, not having a clue what you mean? Have you ever seen toddlers communicate to each other not yet able to speak a language? What factors go into communication besides language? How do we communicate when we can't speak? How can YOU come up with a communication protocol (system) in situations where speaking is not an option?

Do the activity (for youth):

What's the deal: You are on a special task force who must perform top secret missions. Your team must develop ways to communicate without speaking. Sometimes you may not be able to see each other, and your missions typically require you to be hidden. Therefore, obvious lights and sounds will only tell the enemy you are there. Any communication tools must also be small and light as you will need to be able to move quickly and quietly.

What to do:

1. Get into teams of five or six.
2. Using the Operation: Communication task sheet, look at each of the circumstances/situations on the task sheet and discuss your strategies for each one.
3. Tell a facilitator your team's strategies for each circumstance. Facilitators will make sure your strategies are within the circumstantial boundaries and guidelines.
4. Upon approval, you will be told by the facilitator which station to begin at. Go to the location and follow the directions on your Special Task Force sheet and the station's facilitator.
5. You will be given ten minutes for each circumstance in order to accomplish your task.
6. When time is up for your station, give your task sheet to the facilitator who will write either, "Mission accomplished," or "Mission failed," next to the appropriate station.

Finishing it up (for facilitator): Lead a discussion evaluating the different strategies for each situation based on the follow-up questions.

Talking it over:

a. Share what you did:

What methods of communication worked for each situation? (*Answers will vary*)

How did each method of communication satisfy the criteria of the situation? (*Answers will vary. For example, in situation four, students may have held hands and pulled one another in the direction they wanted to go, satisfying the criteria of not being able to see or hear each other.*)

What methods did not work that you thought were going to and why?

(Answers will vary. Failed strategies are usually because of a factor the students did not consider. For example, in situation four, perhaps students did not think about more than one person pulling the others, breaking the chain of hands.)

What would you change about the methods that did not work? *(Answers will vary.)*

b. Process what's important:

Why do we need various communication methods? *(There are situations in which communication is necessary, but we are not able to use all of our senses. For example, in a fire, you may not be able to see one another because of the smoke, and you may not be able to hear one another because of the loud fire alarm. There are also situations in which all people do not speak the same language.)*

What physical barriers can get in the way of us hearing or seeing each other? *(Possible response: natural disasters of all kinds: avalanches, hurricanes, fires, etc.)*

You created ways of communicating without technology. How would you have been able to communicate if allowed to use various forms of technology? Would it have been easier? Why or why not? *(Possible response: using wireless hearing aids as today's national security agents do for Situation 3. Yes, because code words could be said and agents outside of the room would be able to know there was a problem without anyone leaving the room. Another possible response: using night vision goggles for Situation 4 would have allowed everyone to see in the dark.)*

c. Generalize to your life:

What situations have you been in where you could not communicate by speaking? Visually? Both? How did you communicate? *(Answers will vary. See possible situations from the previous section and/or share your own personal experience here.)*

What if the technology of telephones or radio waves did not exist? How would your lives be different? *(We would not trade goods as often, communication and travel would be limited, we would be more isolated and have to depend more on the natural resources of this country.)*

Imagine if people were normally blind and deaf. What senses do you think we'd use more for communication? Why? *(Possible answer includes the sense of touch. People could communicate via systems like Brail.)*

d. Apply what you learned:

Leaders often speak of a global economy. What technologies have engineers and scientists created to permit regular, quick communication around the world and across language barriers? (Cable, Internet, satellite, etc.)

Will you ever use any of the communication mediums you created again? In what situations might you use them? (Answers vary. Possible response: Yes, I would use the finger symbols to communicate to my friend if I wanted to tell him something without others knowing what I was saying.)

What communications technologies do you use regularly? List as many as you can. (Telephone, internet & email, television, cellular phones, cable, teleconference/videoconference, pagers, text-messaging.)

More Challenges:

To help youth apply what they have learned about nonverbal communication, they can create their own situation and have another team try to communicate within their guidelines. They can also broaden their knowledge of communication systems by researching how various forms of communication such as DSL, cable, phone, radio, or radio were developed and why. Finally, students may want to learn how to communicate via Morse Code using flashlights.

Background Information (for facilitator):

Throughout history, people have had to communicate nonverbally for various situations. Our most common form of communication is writing, which began as pictures during prehistoric times. However, people continue to experiment with various technologies to make nonverbal communication more effective, faster, quicker, or to accommodate special situations, such as soldiers in the military. We can all think of war movies in which we watch the soldiers make hand gestures to each other in order to communicate whether they heard the enemy, to stay still or to move forward.

Every form of communication uses symbols of some kind. Some other examples of communication technologies that were used in wars are Morse Code, the Navajo Code Talkers and Semaphore. The following descriptions are excerpts from a website, ***Wikipedia, the free encyclopedia*** @ <http://en.wikipedia.org/wiki/>:

Morse code is a system of representing letters, numbers and punctuation marks by means of a code signal sent intermittently. It was developed by Samuel Morse and Alfred Vail in 1835.

Morse code is an early form of digital communication; however, unlike modern binary digital codes that use just two states (commonly represented as 1 and 0), it uses five: dot (·), dash (–), short gap (between each letter), medium gap (between words) and long gap (between sentences).

In general, any code representing written symbols as variable length signals can be called a Morse code, but the term is used specifically for the two kinds of Morse code used for the English alphabet and associated symbols. American Morse Code was used in the wired telegraph systems that made up the first long-distance electronic communication system. International Morse Code, which uses only dots and dashes (eliminating the pause), is used today.

International Morse code is still in use today, although it has become almost exclusively the province of amateur radio operators. Until 2003 the International Telecommunications Union (ITU) mandated Morse code proficiency as part of the amateur radio licensing procedure throughout the world. In some countries, certain parts of the amateur radio bands are still reserved for transmission of Morse code signals only.

As of 2004 commercial radiotelegraph licenses are still being issued in the United States by the Federal Communications Commission. Designed for shipboard and coast station operators, they are awarded to applicants who pass written examinations on advanced radio theory and show 20 WPM code proficiency (this requirement is waived for "old" Extra Class licensees). However, since 1999 the use of satellite and very high frequency maritime communications systems (GMDSS) have essentially made them obsolete.

Code talkers were Native American soldiers who transmitted secret messages over radio or telephone using codes based on their native languages. The name refers chiefly to Navajo language speakers in special units in the Pacific Theatre of World War II. However, the Choctaw language, Comanche language, and other languages were also used, beginning in World War I. In WWII the military (particularly the US Marines) used Navajo speakers for the first time.

Contrary to popular conception, the Navajo code did not consist of merely speaking Navajo over a battlefield radio or wired link. The code talkers developed several letter substitution codes in which each letter of an English message was converted to an English word starting with that letter, and then the Navajo translation of that word would be transmitted. In this way, anything expressible in English could, if necessary, be spelled out. For efficiency, a codebook was also developed for many relevant words and concepts. A codetalker message would consist of some plain Navajo language, some code words (also in Navajo, but with special coded meaning), and, if necessary, some spelled out English words (with each letter being represented by a preselected Navajo word). To an ordinary Navajo speaker, the entire 'conversation' would have been quite incomprehensible. See the link at the end of the article to see the now-declassified codebook. The codetalkers memorized all these variations, and practiced their rapid use under stressful conditions.

The Japanese never cracked the spoken code, and high military officers have stated that the United States would never have won the Battle of Iwo Jima without the secrecy afforded by the code talkers. Yet the codetalkers received no recognition until the declassification of the operation in 1968. In 1982, the code talkers were given a Certificate of Recognition by President Reagan, who also named August 14 "National Code Talkers Day".

Code talkers in fiction

The 2002 action film, *Windtalkers* starring Nicolas Cage, Adam Beach and Jason Isaacs, was based on the Navajo code talker operation of WWII, although it is not entirely historically accurate.

Semaphore (communication)

The **semaphore** line was a signalling system invented by the Chappe brothers in France. It is different from the naval semaphore system that uses hand-held flags, which was invented later.

Claude Chappe began development when he and his four brothers lost their livelihoods because of the French Revolution. They determined by experiment that it was easier to see the angle of a rod than determine the presence of a panel. Their system was composed of black movable wooden arms, the position of which indicated alphabetic letters. The Chappe system was controlled by only two handles, and was mechanically simple, and reasonably rugged. Night operation with lamps on the arms was unsuccessful.

Each of the two arms showed seven positions, and the cross bar connecting the two arms had four different angles, for a total of 196 symbols (7x7x4).

The first Chappe semaphore line was established between Paris and Lille in 1792. It was used to carry dispatches for a war between France and Austria. In 1794, it brought news of a French capture of Condé-sur-l'Escaut from the Austrians less than an hour after it occurred. Other lines were built, including a line from Paris to Toulon.

By 1824, the Chappe brothers were promoting the semaphore lines for commercial use, especially to transmit the costs of commodities.

The system was widely copied by other European states, especially after it was used by Napoleon to coordinate his empire and army. In most states, the postal union ran the semaphores.

Britain developed a series of semaphore towers which allowed rapid communications between London and the naval dockyards at Portsmouth.

This was the period in which the naval semaphore system was invented. This system uses hand-held flags. It is still accepted for emergency communication in daylight.

Napoleon Bonaparte saw the military advantage in being able to transmit information between locations, and carried a portable semaphore with his headquarters. This allowed him to coordinate forces and logistics over longer distances than any other army of his time.

Semaphores were adopted and widely used (with hand-held flags replacing the mechanical arms) in the maritime world in the early 1800s. Semaphore signals were used, for example, at the Battle of Trafalgar.

The semaphores were successful enough that Samuel Morse failed to sell the electrical telegraph to the French government. However, France finally committed to replace semaphores with electric telegraphs in 1846. The last stationary semaphore link in regular service was in Sweden, connecting an island with a mainland telegraph line. It went out of service in 1880.

Resources:

<http://en.wikipedia.org/wiki/>

<http://inventors.about.com/library/inventors/bltelegraph.htm>

<http://history1900s.about.com/library/weekly/aamcurrent.htm?terms=code+talker>

<http://connected-earth.com>