

Lesson Plan: Decoding WWII with Paper Circuits

Grade

Grade 5 Social Studies and ELA

Topic

World War II - Communication and Technology



Enduring Understanding

- Key developments in technology, aviation, weaponry, and communication had a significant impact on World War II and on the economy of the United States both during the war years and in the postwar period. With the increase in production necessary to sustain the war effort, the economy of the United States experienced a boost, lifting the nation out of the Great Depression. Medical advances in the treatment of infection and disease such as the first antibiotic, penicillin have helped to prolong the lives of many Americans and contributed to an aging population.
- Secret communications codes developed during the war contributed to the development of computer systems designed to break those codes. The first computers were room-sized machines. The computer industry has grown tremendously in the last sixty years and as a result Americans enjoy almost instant access to information through the use of personal computers, laptops, smartphones, tablets and other hand-held devices.
- An author may use many different tactics when writing in order to inform and persuade. The reader must use clues from the text to interpret the true meaning.

Primary Standards/Indicators

Social Studies

5-4.6 Summarize key developments in technology, aviation, weaponry, and communication and their effects on World War II and the United States economy.

ELA

5.C.1 Interact with others to explore ideas and concepts, communicate meaning, and develop logical interpretations through collaborative conversations; build upon the ideas of others to clearly express one's own views while respecting diverse perspectives.

Secondary Standards/Indicators

ELA

5-W.2.1 Write informative/explanatory texts that: k. use precise language and domain-specific vocabulary to inform or explain the topic;

5.RI.8 Interpret and analyze the author's use of words, phrases, text features, conventions, and structures, and how their relationships shape meaning and tone in print and multimedia texts.

Social Studies

5-4.4 Explain the principal events related to the involvement of the United States in World War II, including campaigns in North Africa and the Mediterranean; major battles of the European theater such as the Battle of Britain, the invasion of the Soviet Union, and the Normandy invasion; and events in the Pacific theater such as Pearl Harbor, the strategy of island-hopping, and the bombing of Hiroshima and Nagasaki.

Academic Language

Vocabulary

- Navajo
- Decipher
- Guadalacanal
- Communication
- Perspective
- Radio

Language Function and Content Objectives

- Explain the impact that Navajo Code Talkers had on World War II.
- Evaluate how the Code Talkers were treated because of their background in relation to the contribution they made.
- Create a hidden message using the Navajo code that was used during World War II.
- Utilize paper circuits and radio in order to hide and decode a war message.

Assessment Plan

- Pre-Assessment-
 - Students are asked to complete a Padlet in which they write one sentence about something important from World War II. This can include people, places and events. Students are encouraged to think through everything they have studied and try not to duplicate their classmates ideas. *Note- This can also be easily done with Post-Its.*
 - After students have written their ideas, ask them to volunteer to share about a topic that they did not write about. Make corrections as needed but allow students to show what they know and talk about several different ideas in order to activate knowledge.
 - Anticipation Guide - Students should answer each question on the anticipation guide prior to reading the story book.
- Post-Assessment-
 - Students complete the anticipation guide to demonstrate understanding or identify areas of confusion about communication during World War II.
 - Finally, they should answer the after portion of the anticipation guide.
- Criteria for Mastery -
 - Student is able to explain the the role of Navajo Code Talkers in sharing communication and codes during World War II.
 - Student is able to create a simple message explaining a major event that took place during World War II and why it was important using precise language.
 - Student is able to create a model circuit.
 - Student can translate a coded message using technology from World War II.

Materials

- Padlet or Post-Its
- Anticipation guide
- *The Unbreakable Code*
- Paper circuits

- Copper tape
- 3V coin cell batteries
- Surface mount LEDs
- Binder clips
- Model circuit paper (so students can “trace” circuits)
- Paper materials to make hidden message (cardstock or construction paper)
- Crayons, markers, etc.
- Sample circuits
- [Alphabet Handout](#)
- Walkie Talkies

Teacher Preparation

For this lesson students should be familiar with the major events of World War II, as this can be used as a review of the material and an intro to the technology used during this time, as well as the importance of perspective in writing. The paper circuits may seem like an intimidating concept but are fairly easy to use. To help alleviate stress, sample circuits have been included in the kit and students will be provided with outlines of the circuit patterns so they know where to place the copper wiring.

It is helpful to have materials set out prior to lesson. The model papers can be helpful so that students can “trace” where to put copper wiring, battery, light, etc.

Meat of Lesson

- **Hook**
 1. Complete the “Before Reading” section of the anticipation guide.
 2. Read aloud - The Unbreakable Code **(Step 1 can be completed the day before. Additionally, you will only want to read a section of the book. A recommended sample has been marked.)**
 - a. What does the word Navajo mean?
 - b. What did John’s grandfather do during World War II?
 - c. Why was this important?
 - d. How did the Code Talkers help win the war?
 - e. What technology did the Code Talkers use?
 - f. How does this story fit with other things you know about World War II?
What surprised you?
 3. Explain directions-
 - a. “Today you will be learning about the Navajo Code Talkers. We will work in pairs to create a secret message to inform others about a major event in WWII using the Navajo language and paper circuits. You’ll then share your code over radio and another group will have to decipher it.”
 4. Ask students to predict why we are using radios. Why were these important during the war?
 - a. Allow students to make predictions. You may want to write these on the board.

- i. Since TV and computers were not yet used, radio was an important way to share information. What was developed during WWII would become the foundation for technology that we use today, like laptops and smartphones.*

5. Remind students - *You will create a hidden message using the Navajo code to show your understanding of a major battle during World War II. You must make sure that your code makes sense, as you'll use the radio to share this information with someone who does not yet know your code.*

- **Brainstorm**

- Students will be assigned to work with a partner.
- Students will have time to look at the [sample circuits](#) and select one of the options or make up their own. (Included in kit)
- Next, they will work with their partner to select a major event to write their message about. They should use the Planning section of the anticipation guide to do this and answer all questions.
 - Students should also use any notes they have if needed.
- Once they've selected their model circuit and come up with their notes, they should translate the message using the Navajo alphabet.
 - Each group will need a copy of the [alphabet](#) at this time.
 - Using the anticipation guide, they should translate and draw their message on the back of the page.
 - The instructor should encourage them to be creative in how they plan to use the circuits to further hide the message.

- **Prototype**

- Students will work with their partner to create their circuits and should be encouraged to help each other.
 - Each will receive the model paper, 2-3 lights and copper wiring. They will connect these materials.
- After they've done this, they will add their message and decorations to highlight the important ideas of the message. They may cut, paste, draw, etc.
- Once they've completed their design, students will attach the battery using the binder clip. Again, they should look at the sample circuits to help them see how to do this.
 - Students that struggle with this should be encouraged to work with students that have successfully completed their circuit.
 - Students can be reminded of 3rd grade when they had to complete simple circuits.
- Once students have put all of the pieces together, they should test their message. Is the translation complete? Do the light(s) go on? Does the message talk about a major event of the war? Can it be improved?
 - Instructor should be asking these questions of groups. If anyone finishes early, ask them how they can improve their message.

- **Share**

- Each set of partners will be matched with another pair. These groups will need to translate the other groups hidden message. To do this, one team will slowly say

their message over the walkie-talkies. The other team should write down the message, with one member writing it while the other translates. This will take some time but to create the feeling of the soldiers, they will only have three minutes to share their message before having to switch.

- Each group should be given time to use the walkie talkies

- **Synthesize**

- At this time students should be brought back together in a whole group. The instructor will lead a discussion of what was needed for the light to go on. See *discussion guide*.
- Students should complete the post assessment and after reading on the anticipation guide.

Supports for Student Learning

Accommodations

- **ELs**- Provide labels and written directions for each of the steps. The instructor can also use props to further help students understand major concepts and instructions. Due to the visual and hands-on nature of this lesson, there is little written work but students may use images instead of complete sentences when creating their maps.
- **Grade Level adaptation**- Stencils are provided and groups can be teacher selected to scaffold for those that need more support. Definitions can be introduced and practiced ahead of time. Those that need help writing or explaining their note can substitute words for images and can be paired with other students to develop a script.
- **Advanced students**- Those students who are able to grasp these concepts quickly will be asked to incorporate more intricate circuits in their maps, including adding switches. They will use these to examine how to better control the circuit and make their message more interactive through the use of one or multiple switches.
- **Additional supports**- As needed.

Discussion Guide

Synthesis

- What did your team write about? *This is a good opportunity to check their understanding of major events.*
- What did the team you translate write about? *Allow students to share and for other teams to provide feedback if needed.*
- Was it hard to write the message? To translate? *You can explain how difficult it was for code talkers to work quickly and understand details, as others depended on it. This was one type of code used during the war and it meant to communicating with others was very important.*
- Why did you have to translate a message? How does using the radio compare to phone or text? *We want students to understand the importance of sharing ideas and the radio as an important communication tool. You can even ask them what it might have been like to write messages back and forth in code.*

- What went well? What made this challenging? *Allow them to share their answers and see if any talk about how they adapted their messages.*

The next questions are about the paper circuits. You may choose to skip these but the answers may be helpful in assisting your students.

- Your light would not go on until you added the battery. This was held in place with the binder clip. What job does the battery do? (*Provides power to the circuit.*) Do you think you could use something other than the binder clip? (*Yes, this is just a way to hold the battery in place.*)
- Why did we use copper tape in our message? Do you think string or ribbon would have worked just as well? (*No, ribbon or string would not work as well. These are examples of **insulators**. Copper foil is made of copper metal, which is a great material to **conduct** electricity.*)
 - If time, you can test this with the students.
- Did the circuit work when the foil wasn't touching other foil or the LED light? Can you predict why? (*If the pieces do not all touch, the electricity cannot flow all the way through and the circuit is broken.*)
- What happened if you did not leave a gap for the LED light and ran the copper foil through it? Can anyone predict why? (*The light did not shine. If there is no break, the electricity will "skip" the light and continue to run through the foil. This is known as a short circuit.*)
- What do you think the plus (+) and minus (-) signs mean? Why do you think they need to match in order to make your circuit work? (*These show positive and negative charges. If they do not match, the circuit will not work.*)

More to Explore (Resources)

<https://tinkering.exploratorium.edu/paper-circuits>

https://www.teachengineering.org/lessons/view/cub_energy2_lesson01

<https://learning-in-action.williams.edu/opportunities/elementary-outreach/science-lessons/4th-grade-energy-unit/>

<https://www.thehomeschoolmom.com/homeschool-lesson-plans/world-war-ii/>