

# Citizen U<sup>®</sup>

Preparing tomorrow's citizens today



**Subject:** Science

**Grade Level:** 3 – 5

**Lesson Title:** Electromagnetism, Electric Communication, and Community

**Lesson Overview:** In this lesson students will examine the science of communication and its role in building community in our country. Using the invention of the telegraph and what it meant for the unification of our nation, students will look at telecommunications and its impact on people. Students will explore electromagnetism and electric communication by doing a hands-on activity to build and use their own telegraph machines out of household materials or by viewing a video on building a telegraph. They will put the role of communication in community building into a broad and applicable context by evaluating the place of digital communication in today’s world. This lesson can be completed in 60 – 80 minutes. There are opportunities for the development of further civic projects.

CONCEPT: Community		THEME: Belonging
<b>Overarching Essential Question:</b> <ul style="list-style-type: none"> <li>How do our lives connect with others in this country?</li> </ul>		<b>Lesson Essential Question(s):</b> <ul style="list-style-type: none"> <li>How has communication played a part in building friendships?</li> <li>How did communication change the world?</li> <li>How can digital communication aid in building community today?</li> </ul>
<b>Lesson Objectives:</b> Students will: <ul style="list-style-type: none"> <li>Define the importance of communication in community building.</li> <li>Evaluate the role of communication in their own lives.</li> <li>Construct their own telegraph machine by creating an electromagnetic field with common objects.</li> <li>Assess the impact of electric communication.</li> <li>Illustrate how they can use digital communication to build community for civic purpose.</li> </ul>		
<b>CIVIC KNOWLEDGE</b> <ul style="list-style-type: none"> <li>Civic life, politics, &amp; government</li> <li>Roles of citizens in American democracy</li> </ul>	<b>CIVIC SKILLS</b> <ul style="list-style-type: none"> <li>Working with others</li> <li>Clearly articulating ideas and interests</li> <li>Building coalitions, seeking consensus, negotiating compromise, and managing conflict</li> </ul>	<b>CIVIC DISPOSITIONS</b> <ul style="list-style-type: none"> <li>Developing as an independent member of society</li> <li>Participating in civic affairs in an informed, thoughtful, and effective manner</li> <li>Promoting the healthy functioning of American constitutional democracy</li> </ul>

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Find additional materials and resources at the <https://citizen-u.org/> and <https://PrimarySourceNexus.org>.

Content created and featured in partnership with the TPS program does not indicate an endorsement by the Library of Congress.

## LIBRARY OF CONGRESS RESOURCES & ADDITIONAL RESOURCES

### Library of Congress Resources

The First Telegraph Message from California <https://www.loc.gov/resource/cph.3c16943/>  
 Overland Pony Express: <https://www.loc.gov/resource/cph.3c27508>  
 Primary Source Analysis Tool <http://www.loc.gov/teachers/primary-source-analysis-tool/>

### Materials Needed

LOC Resources (listed above)  
 Quick write <https://ablconnect.harvard.edu/quick-write>  
 Telegraph Machine Materials (per group) \*see Teaching Directions  
 Video: “How to Build a Telegraph”  
<https://www.youtube.com/watch?v=1r2eOpkBT0o>  
 Morse Code Conversion Chart:  
<http://teacher.scholastic.com/lessonrepro/lessonplans/profbooks/gotmessage3.pdf>  
 Handout A – Exit Slip

Supporting Question 1 ENGAGE	Supporting Question 2 EXPLORE	Supporting Question 3 EVALUATE
How has communication played a part in building friendships?	How did communication change the world?	How can digital communication aid in building community today?
PERFORMANCE TASK 1	PERFORMANCE TASK 2	PERFORMANCE TASK 3
<b>Quick Write</b> to launch inquiry and the role of communications on a personal and applicable level.	Pair share their responses.	<b>Exit Slip</b> to demonstrate knowledge gained during the lesson and provoke further civic development.

## TEACHING PLAN

### PART 1 – INQUIRY INTRODUCTION

1. Ask students “How has talking played a part in making friends?”, the students [quick write](#) their answer. **(2-3 minutes)**
  
2. Explain to the students that communication hasn’t always been as easy as picking up a telephone or sending an instant message. Use the example of the news concerning William Henry Harrison’s death. Ask the students: “How long do you think it took for this news to travel across the country in 1841?” Have the students share aloud their guesses. **(2 – 3 minutes)**

### PART 2 – INQUIRY EXPLORATION WITH PRIMARY SOURCES

3. Reveal to the students that before the Pony Express and the Transcontinental Telegraph, it took the news 110 days to reach Los Angeles from the East coast. **(1 minute)**
  
4. Introduce the LOC resource material [The Overland Pony Express](#) and [The First Telegraph from California](#). **(1 minute)**
  
5. Distribute LOC [primary source analysis tool](#) **(1 minute)**
  
6. Have the students use the [primary source analysis tool](#) to observe, reflect and create

a new question for the LOC material. Students can use questions directly from the tool such as “What do you notice first?” and “If someone made this today, what would be different?” **(10 minutes)**

7. Ask, “How did communication change the world?” Have the students share their responses. **(5 minutes)**
  
8. Ask the students: “In what ways did the invention of the telegraph bring people together from the East and West coast?” Allow students to share their responses and write them on the board. **(5 - 7 minutes)**

### PART 3 – APPLYING INQUIRY AND ACTION

9. Have the students explore electromagnetism and electric messaging by building their own telegraph tapper. Split students into two groups, both equipped with all of the materials and aid them in constructing a telegraph tapper using the method detailed in the teaching directions. NOTE: If you feel this is too difficult for your students, you may choose to show them a video on how to construct a telegraph tapper. **(15-20 minutes)**
10. Students can experiment sending messages to each other or craft their own message to a civic leader with the [Morse code conversation chart](#). **(5 minutes)**
11. If time allows, follow up the activity with some science-based questions like: “Why does the wire need to be wrapped around the wire to make the sounder work?” and “Could a brass tack be used instead of a steel tack?” **(2 – 3 minutes)**
14. As an **Exit Slip** (Handout A), ask the students to answer this question, “How can digital communication like computers, video chats, and cell phones connect youth and aid in building community today?” **(2 minutes)**
15. For possible homework, ask the students to document all the ways they see communication happening today. **(1 minute)**

### PART 4 – INQUIRY TO DRAW CONCLUSIONS

12. Explain to the students that digital technology can create community like never before. One can communicate to people from all over the world instantly.
13. Ask students: *What are some forms of digital communication?* **(1-2 minutes)**

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## Citizen U Teacher Guide

**Lesson Title:** *Electromagnetism, Electric Communication, and Community*

**Subject:** *Science*

**Grade Level:** 3-5

### Overview

When you are exploring electromagnetism or electric communication, students will examine the science of communication and its role in building community in our country. Students will put the role of communication into a broad and applicable context by evaluating the place of digital communication in today's world.

### Learning Objectives

- Define the importance of communication in community building.
- Evaluate the role of communication in their own lives.
- Construct their own telegraph machine by creating an electromagnetic field with common objects.
- Assess the impact of electric communication.
- Illustrate how they can use digital communication to build community for civic purpose.

### Standards

4-PS3 Energy -. Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light.

### Teacher Instructions:

- Get all materials needed for the Telegraph Machine.
- Video: "How to Build a Telegraph" <https://www.youtube.com/watch?v=1r2eOpkBTOo>
- Make copies (one for each student) of the LOC resource The First Telegraphic Message from California <https://www.loc.gov/resource/cph.3c16943/>.
- Make copies (one for each student) of the LOC resource The Overland Pony Express/ Photographed by Savage, Salt Lake City; From a Painting by George M. Ottinger <https://www.loc.gov/resource/cph.3c27508>
- Make copies (one for each student) of the Morse Code Conversion Chart: <http://teacher.scholastic.com/lessonrepro/lessonplans/profbooks/gotmessage3.pdf>
- If students do not have access to a computer, make copies of Primary Source Analysis Tool <http://www.loc.gov/teachers/primary-source-analysis-tool/>
- Make copies (one for every two students) of Handout A – Exit Slip
  - The Exit Slip has two per page and will need to be cut.

## Library of Congress Resources

- The First Telegraphic Message from California <https://www.loc.gov/resource/cph.3c16943/>
- The Overland Pony Express/ Photographed by Savage, Salt Lake City; From a Painting by George M. Ottinger <https://www.loc.gov/resource/cph.3c27508>
- Primary Source Analysis Tool <http://www.loc.gov/teachers/primary-source-analysis-tool/>

## Materials Needed

- Library of Congress resources (listed above)
- Video: “How to Build a Telegraph” <https://www.youtube.com/watch?v=1r2eOpkBTOo>
- Morse Code Conversion Chart
- Handout A – Exit Slip
- Telegraph Machine Materials:
  - 3-inch steel nail
  - Fist-sized lump of clay
  - 20-inch-long piece of thin, insulated wire, with ends stripped bare (available at a hardware store or electronics store such as Radio Shack)
  - 5- by 1-inch strip of index card
  - Steel thumbtack
  - 3 or 4 large books
  - "D" cell
  - Tape

## PART 1 – INQUIRY INTRODUCTION

### I. Introduction

*Introduce the lesson by having the students do a quick write. Explain to them that communication has not always been easy. Reveal to them the facts about the transcontinental telegraph. Guide them to think about the role of communication in building community.*

- A. Introduce inquiry with a [quick write](#). (2-3 Minutes)

Ask the students a question: *How has talking played a part in making friends?*

- B. Explain to the students that communication hasn't always been as easy as picking up a telephone or sending an instant message. Use the example of the news concerning William Henry Harrison's death. Have the students share aloud their guesses. (2 – 3 minutes)

Ask the students this question: *How long do you think it took for this news to travel across the country in 1841?*

- C. Reveal to the students that before the Pony Express and the Transcontinental Telegraph, it took the news 110 days to reach Los from the East coast . (1 minute)

*Background info on Western Union completing the first transcontinental telegraph: <https://www.history.com/this-day-in-history/western-union-completes-the-first-transcontinental-telegraph-line>*

*Quick write is a “brief written response to a question or probe” that requires students to rapidly explain or comment on an assigned topic (Green, Smith & Brown, 2007; Nunan, 2003).*

## PART 2 – INQUIRY EXPLORATION WITH PRIMARY SOURCES

### II. Exploration with Primary Sources

Analyze the LOC primary source material using the Primary source analysis tool. Have the students discuss how changes in communication united the East and West coast. Guide students to think about the role of communication today in connecting or building communities.

- A. Introduce the LOC resource material [The Overland Pony Express](#) and [The First Telegraph from California](#). (1 minute)
- B. Distribute LOC [primary source analysis tool](#). Have the students use the primary source analysis tool to observe, reflect and create a new question for the LOC material. (1 minute)
- C. Have the students use the [primary source analysis tool](#), to observe, reflect and create a new question for the LOC material. Students can use questions directly from the tool. (10 minutes)

Ask the students a question: *What do you notice first? If someone made this today, what would be different?*

- D. Ask the students about the evolution of communication and its effects. Have the students share aloud in pairs. (5 minutes)

Ask the students: *How did communication change the world?*

- E. Ask the students how easier and faster communication brought together a community. (5-7 minutes)

Ask the students: *In what ways did the invention of the telegraph bring people together from the East and West coast?*

*“Primary sources are the raw materials of history — original documents and objects which were created at the time under study. They are different from secondary sources, accounts or interpretations of events created by someone without firsthand experience.*

*Examining primary sources gives students a powerful sense of history and the complexity of the past. Helping students analyze primary sources can also guide them toward higher-order thinking and better critical thinking and analysis skills.”*

*(Using Primary Sources, Library of Congress, <https://www.loc.gov/teachers/usingprimarysources/>)*

## PART 3 – APPLYING INQUIRY AND ACTION

### III. Applying Inquiry and Action

Have the students construct their own telegraph machine and practice tapping in Morse code. Have the students explore electromagnetism and electric messaging by building their own telegraph tapper. NOTE: If you feel this is too difficult for your students, you may choose to show them a video on how to construct a telegraph tapper (B).

- A. Assemble the telegraph tapper. Split students into two groups, both equipped with all of the materials and aid them in constructing a telegraph tapper: **(15-20 minutes)**
1. Wrap at least 40 turns of wire around the middle of the nail to form the electromagnet. Make sure to leave at least 5 inches of wire on each end of the coil to attach to the "D" cell.
  2. Push the thumbtack through the middle of the index card strip, about ¼ inch from one end.
  3. Set up your telegraph sounder (*as shown*). Make sure the nail rests directly under the thumbtack. The gap between the two should be about 1/8 inch.
  4. Securely tape one end of the wire coiled around the nail to the flat end of the "D" cell. Briefly touch the other end of the wire to the bumpy end of the cell. The electromagnet will attract the thumbtack and make a "click." Lift the wire and the thumbtack should release.
- B. Have the students experiment by sending messages to each other or craft their own message to a civic leader with the [Morse code conversion chart](#). **(5 minutes)**
- C. If time allows, follow up with scientific questions. **(2 – 3 minutes)**

*Supplemental science questions:*

1. *Why does the wire need to be wrapped around the wire to make the sounder work?*
2. *Could a brass tack be used instead of a steel tack?*

**OR**

Have the students view the video: [“How to Build a Telegraph”](#)

#### **PART 4 – INQUIRY TO DRAW CONCLUSIONS**

#### **IV. Draw Conclusions**

*Explain to the students that digital technology can create community like never before. One can communicate to people from all over the world instantly. Guide them to think about how communication technology can be used as a tool to create community.*

- F. Ask: *What are some forms of digital communication?* **(1-2 minutes)**
- G. Ask the students to complete an **exit slip** ([Handout A](#)) **(2 minutes)**  
Ask the students a question: *How can digital communication like computers, video chats and cell phones connect youth and aid in community building today?*

*For possible homework: Ask the students to document all the ways they see communication happening today.*

## Exit Slip: Creating Community

Answer the following question:

*How can digital communication like computers, video chats, and cell phones connect youth and aid in community building today?*

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## Exit Slip: Creating Community

Answer the following question:

*How can digital communication like computers, video chats, and cell phones connect youth and aid in community building today?*

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