MAKING WAVES with radio

FACILITATOR GUIDE
Titanic Problems & Solutions

Learning Objectives

1. Radio is widely used on ships for communication and navigation.
2. Radio communication systems are designed by people that use conventions and agreed upon uses of technology..
3. Policies govern how radio is used. Significant events can change policies.

Materials

- One computer, laptop, or other streaming device connected to the Internet
- One computer projector or large display monitor
- White board or large post it paper
- Pencils and paper
- Activity guide
- YouTube Link: The Radio Act of 1912 and its Connection to the Titanic Disaster

Safety

- No safety concerns are present in this activity.

Activity Procedure

1. Introduce the video as a historical piece that presents several problems to communications that led to the RMS Titanic disaster. Ask learners to note some issues on paper as they watch the video.

2. After showing the video, use the following prompt to elicit learners' ideas:
    a. What problems in the communication system did the Titanic encounter?

3. Keep a record of the ideas the group shares on the board as a list of problems.

4. Ask learners what might be solutions to those problems that could have prevented miscommunications. Use the following prompts for this:
    a. What is different about communications today compared to 1912?

b. How can people and society help present future disasters involving uses of radio communications?

Content Background

In 1912, radio technology was still in its infancy, but was not without its enthusiasts. Guglielmo Marconi had seen the possibilities of wireless radio communication during a lecture in 1895. Fascinated by the technology, he set out to develop a system of wireless transmission and formed the Wireless Telegraph and Signal Company in 1897. By the time of Titanic's maiden voyage, most passenger ships had a radio room on board that was staffed by a Marconi Company operator. These Marconi rooms were used mainly for passenger communications like sending a note home to loved ones.

These first radio transmitters, spark gap transmitters, were used as wireless telegrams. They worked by charging and discharging a capacitor and shooting a spark across a gap producing radio waves over a range of different frequencies and amplitudes. The system could not send audio messages, but rather a code, such as Morse code, when the operator switched the transmitter on and off. However, these pulses of radio waves caused a lot of interference making complex communication very difficult.

On the night of April 14, 1912, the RMS Titanic ran into an iceberg. Through a series of unfortunate events, the ship sank into the frigid waters. This accident was caused because of many factors: a lack of conventions for using radio technologies, different ways to communicate distress signals, the non-uniform work practices of early radio operators, and the radio interference produced by spark gap transmitters that contributed to the loss of life.

Four months later, on August 13, 1912, U.S. Congress passed the Radio Act of 1912. The law provided for the setting of radio frequencies, for penalties against interference with

emergency communications, for an international distress signal (SOS), and for interoperability of radio stations. Everyone using radios for communication and their messages needed to be all considered even if they were not Marconi radios nor Marconi operators.

About the video

The Radio Act of 1912 and its Connection to the Titanic Disaster (runtime 5:58) is a YouTube video produced by learner Linsey Prahl. In the video the learner shares what she learned about how the Radio Act of 1912 addressed a number of issues that contributed to the sinking of the Titanic.

Video Timeline

0:00	0:27	Introduction at the Titanic Museum Attraction in Branson, MO
0:28	0:39	Status of radio regulations before the sinking of the Titanic
0:40	0:56	Introduction to Radio Act of 1912
0:57	2:08	First problem: improper staffing
2:09	3:10	Second problem: confusion about use of rockets
3:11	3:59	Third problem: radio operators interfering with one another
4:00	4:23	Fourth problem: inadequate radio equipment
4:24	5:28	Final thoughts and summary
5:29	5:58	Closing credits

Notes to the Presenter

Language Support: To aid those with limited English proficiency or others who need help focusing on the video, subtitles/closed captions may be turned on. Additionally, an edited for accuracy transcript is provided below.

Extension: This activity can be paired with **Make a Lighthouse** to connect the idea that sea to land communications took place by Morse Code. Following the sinking of the RMS Titanic in 1912, a memorial lighthouse was built in New York city to remember the victims which included many prominent New Yorkers.

Conversational Prompts

- What problems in the communication system did the Titanic encounter?
- What is different about communications today compared to 1912?
- How can people and society help present future disasters involving uses of radio communications?

Content Background

The Radio Act of 1912 and Its Connection with the Titanic Disaster Video Transcript [edited for accuracy]

0:08 Hi, I'm Lindsey Prahl and right now I'm
0:09 standing in front of the mall of the Titanic in
0:10 Branson Missouri to commemorate the
0:12 hundredth anniversary of the Titanic
0:14 disaster that occurred on April 15th
0:16 1912. Most everyone knows what happened
0:19 to the so called "unsinkable" ship the
0:21 Titanic, but what most people don't
0:23 realize is how great the loss of life
0:25 hurried along the Radio Act of 1912.
0:28 Before the Titanic tragedy occurred the
0:31 US Congress had already been debating on
0:33 whether or not to put boundaries on
0:34 radio operators. They also couldn't agree
0:37 if on if the government should control
0:39 the wavelengths. The Radio Act of 1912
0:42 solved quite a few problems with
0:44 maritime ships and their ability to
0:45 communicate with one another
0:47 appropriately. In this documentary I will
0:50 attempt to show how the Titanic disaster
0:52 could have been avoided if the Act had
0:55 already been established. The first
0:57 problem was the improper staffing with
0:59 the radio operators. At this time in
1:02 history there were no guidelines for how
1:04 long a radio operator could stay on duty.
1:06 The radio operators obviously had to
1:09 sleep and go to the bathroom and cannot
1:11 be on duty for 24 hours straight. This
1:14 proved to be a problem for the Titanic.
1:16 The Titanic sent out distress calls and
1:19 one of the ships, the SS Californian, did
1:22 not receive it because the sole radio
1:24 operator on that ship was not on duty.
1:27 Unfortunately the SS Californian, which
1:30 was less than nine miles away from the
1:31 Titanic, could have saved the majority of
1:34 the people who did not make it onto
1:37 lifeboats.
1:37 As witnessed by Eva Hart one of the few
1:41 remaining people that were on Titanic, "I
1:43 mean I saw that ship terribly close out,
1:47 and the other thing I'm saying is that I
1:48 didn't see a ship 19 miles away, I saw a
1:52 ship that was so close, and they said at
1:54 the time it was less than nine miles
1:56 away now they're trying to say it was 19,
1:58 and I saw it you know it wasn't just
2:01 lights on the horizon you could see it
2:03 was a ship." The Radio Acts solved this
2:05 problem by ordering all ships to employ
2:07 at least two operators to take turns
2:09 sleeping and using the restroom. Secondly,
2:13 there was confusion about what the
2:14 rockets meant. We know the Titanic was
2:17 using them
2:17 to show they were in distress or danger.
2:20 Also seen by Eva Hart, "and I saw our
2:24 rockets being fired which that ship must
2:26 have seen. Well, this enquiry says that
2:29 they did see it but they didn't think it was
2:30 a portent of danger. But I would have
2:33 thought in the middle of the Atlantic in
2:34 the middle of the night that rockets
2:39 must mean trouble." The officers on the SS
2:43 Californian assumed that the rockets were
2:46 being used to show that they were in
2:48 nearby so they would not collide. During
2:51 the sinking of the Titanic it was
2:53 conventional for vessels that don't have
2:55 wireless radio transmission to use
2:57 flares to associate themselves to the
3:00 other liners. After the Radio Act of 1912
3:03 was established, all confusion between
3:06 the meanings of rockets have vanished
3:08 for it was agreed that all liners must
3:10 assume that they are distress signals.

3:12 Among the other problems
3:15 one of the worst difficulties was
3:16 amateur radio operators interfering with
3:19 professional radio operators. Here is a
3:21 reenactment of a conversation between
3:23 two liners, the Californian and the
3:25 Titanic. “Say old man, we are stopped and
3:29 surrounded by ice.” “Shut up. Shut up. I'm
3:33 working with Cape Race. You were jamming
3:35 me. Sorry, please repeat, I am jammed.” But
3:41 they weren't the only ones who were
3:42 having problems with interference. The
3:44 Carpathia and Shore stations were also
3:46 interrupted by other battling operators.
3:48 The solution to this was giving amateurs
3:51 lower wavelengths than professionals and
3:54 decreed that if an amateur goes beyond
3:56 his given wavelength his permit could be
3:59 taken away. The last problem, but not
4:02 least, is wrongly used equipment. Part of
4:06 this issue was that some liners didn't
4:08 even have a single radio. Another part
4:10 was if a ship's generator blew up there
4:13 was no way of getting power. But the
4:16 Radio Act of 1912 solved these
4:17 difficulties by making all ships include a
4:20 radio and an extra generator. It is of
4:24 course unfortunate that all these laws
4:26 and rules weren’t established before the
4:27 Titanic sailed and that thousands of
4:29 people died.
4:30 But after the catastrophe on the
4:32 Titanic, the Radio Act of 1912 assured
4:35 that anyone who gets on a ship including
4:36 me doesn't have to worry about
4:38 communication problems anymore because
4:40 all these problems were removed by the
4:42 Radio Act of 1912 and the decisions that
4:44 were made. Today we have at least two
4:47 radio operators on duty at all times and
4:49 we don't have confusion with distress
4:51 rockets and what they mean.
4:52 It is also mandatory that all ships are
4:55 equipped with backup generators. The
4:57 Radio Act of 1912 also made it illegal
5:00 for amateur operators to interfere by
5:02 determining what wavelength they could use.
5:05 A radio operator can lose his license if
5:08 he goes beyond his given wavelength.
5:09 These laws could have prevented so many
5:12 deaths from the Titanic. So from now on I
5:15 hope that when you hear the word
5:17 Titanic you won't think of the terrible
5:19 and disastrous thing that happened,
5:22 but the little bit of good that came out
5:24 of it - the Radio Act of 1912.
5:28 {credits}

List of Terms Found in the Radio Act of 1912 Video

Radio operator: a person who is responsible for the operations of a radio system.

Radio waves: a type of electromagnetic radiation used for communication devices, e.g., televisions, mobile phones, radios, and Bluetooth. The longest wavelengths and lowest frequency waves on the electromagnetic spectrum with frequencies from 30Hz to 300GHz.

Wavelength: the distance between successive crests of an electric field’s wave. Wavelength is inversely related to the frequency of the radio wave: a radio wave with a frequency of 30Hz has a wavelength of 10,000km; whereas a radio wave with a frequency of 300GHz has a wavelength of 1mm.

Wireless radio transmission: Often known as wireless telegraphy in the early days of radio, this is the transmission of text messages by radio waves.