

ELA: Grade 5, Lesson 9, Electrifying Personalities: Guglielmo Marconi

**Lesson Focus:** Guglielmo Marconi’s contribution to the history of electricity; his early life and scientific explorations with wireless communication.

**Practice Focus:** Students will write a persuasive letter to demonstrate their knowledge of electromagnetic waves as well as Marconi’s idea to use them to carry wireless messages.

**Objective:** Students will use *Electrifying Personalities: Guglielmo Marconi* to learn about the history of electricity with a focus on the early life of Guglielmo Marconi, specifically, his scientific explorations concerning electromagnetic waves and their role in the development of a wireless communication system.

**Academic Vocabulary:**

- telegraph (reinforced from previous lessons)
- physics
- electromagnetic wave

**TN Standards:** 5.RI.KID.1 / 5.RI.KID.2 / 5.RI.CS.4 / 5.RI.CS.5 / 5.WTTP.1

**Teacher Materials:**

- Grade 5, Lesson 9 Teacher Packet
- Chart paper (or regular paper) for teacher graphic organizer
- Marker or highlighter

**Student Materials:**

- 2 pieces of paper
- pen or pencil
- marker or highlighter (if available)

Teacher Do	Students Do
<p><b>Opening</b> (1 min)</p> <p><b>Hello! Welcome to Tennessee’s At Home Learning Series for literacy! Today’s lesson is for all our 5th graders out there, though everyone is welcome to tune in. This lesson is the fourth in this series.</b></p> <p><b>My name is ____ and I’m a ____ grade teacher in Tennessee schools. I’m so excited to be your teacher for this lesson! Welcome to my virtual classroom!</b></p> <p><b>If you didn’t see our previous lessons, you can find it on <a href="http://www.tn.gov/education">www.tn.gov/education</a>. You can still tune in to today’s lesson if you haven’t seen any of our others.</b></p> <p><b>Today we will be learning about someone that changed the history of human communication! But before we get started, and to participate fully in our lesson today, you will need:</b></p> <ul style="list-style-type: none"><li>• 2 pieces of paper</li><li>• something to write with and a flat surface to write on</li></ul>	<p>Students gather materials for the lesson and prepare to engage with the lesson’s content.</p>

<ul style="list-style-type: none"> <li>• a highlighter or marker if you have one around, if not, your pen or pencil will do just fine.</li> </ul> <p>I'll give you a few moments to get prepared for our time together! [slight pause].</p> <p>Ok, let's begin!</p>	
<p><b>Intro</b> (6 min.)</p> <p>I bet you never thought you'd count down the minutes until you got to learn more about <b>ELECTRICITY</b>! Well, here we are and I'm just as excited! And of course, we have more to add to everything we've already learned about the exciting history of electricity, the scientists and inventors that have paved the way, and just how much our lives are impacted by it each and every day!</p> <p>We have had some great fun getting started in each of our previous lessons, and today is going to be no exception! I've had you <u>count</u> a lot! First, you counted all the things in your home that are plugged into an outlet or used batteries to work, and at the beginning of the last lesson, I had you count all the lightbulbs in your home. So, I bet you think we're going to count <u>again</u>! Well...you're so smart! Let's do it! Grab your piece of paper and something to write with.</p> <p>Okay, I'm going to say one word, just one! As soon as I say it, be ready to begin writing. Ready?</p> <p>You are going to be writing <u>everything</u> you can think of in both your school <u>and</u> your home that is... <b>WIRELESS</b>! Now, go! [pause for about a minute and make your list]. <b>Don't give up, you got this!</b> [pause]. Alright, I think I'm about done, what about you? I can't think of any more, but will probably think of some wireless things later and need to add to my list.</p> <p>Alright, what did you come up with? [pause]. How many did you get? [pause]. <b>Whoa! That's awesome.</b> I'm going to share my list with you. As I do, place a check beside anything on your list that is also on mine. Ready? Okay, in my school and at my home, the following have wireless capabilities, meaning that they might use batteries or plug in for their source of electricity, <u>but</u> that they can send signals to other devices <u>wirelessly</u>:</p> <ul style="list-style-type: none"> <li>• TV remote</li> <li>• cell phone</li> </ul>	<p>Students engage in an activity to create interest in today's focus on the invention of a wireless communication system.</p> <p>Students recall learning from previous lessons and review the information from their lesson eight graphic organizer.</p>

- wireless headphones
- wireless game consoles and controllers
- laptop
- computer mouse

**Did you get some of the same things that I did?** [pause]. **Did you get anything different?** [pause]. **Cool! So, keep you list close by. We will definitely pull it out again.**

[The following section is intended to review the previous lesson: beginning with a check-in on the independent practice assignment, moving to key ideas and takeaways from the reading, and then connecting and transitioning to today's focus on Guglielmo Marconi].

**Before we really dig into today's lesson, I want to check in on what we learned about in our last lesson, and I am especially excited to hear about your newspaper story on Thomas Edison and his new lightbulb invention. Was it a total hit? What did everybody think about all the details you were able to provide since you were actually there, in his laboratory at Menlo Park? Not to mention, you even grabbed a couple of quotes from the man himself! Please make sure to save me a copy so I can sit down one morning soon and give it a good read, of course while I sip a hot cup of coffee by the light of my favorite desk lamp.**

**Speaking of lamp light, in our last lesson we found out that the journey to electrical light was so interesting! Like Alexander Graham Bell, Thomas Edison was not the best student in school, but had a great sense of curiosity. This curiosity led him to experiment and make improvements to Bell's telegraph. Do you remember what the telegraph did?** [pause]. **Good memory! A telegraph was a machine that could send messages across wires. Do you remember how Edison improved Bell's telegraph?** [pause]. **Right! Edison's telegraph could send up to four messages at once! And, at that time in history (remember this was the late 1800s) this was an amazing feat! During his years at his Menlo Park research laboratory, Edison and his team even made the first recording of a human voice with a machine called a phonograph. But neither of these inventions are what Edison is famous really for. Do you remember what he is famous for?** [pause]. **Yes! Thomas Edison and his team discovered that electric light was possible. In 1879, they got a lightbulb to burn for a whole day, then longer and longer and longer. Soon, homes and businesses everywhere wanted to trade out their gas-lamp lighting for electric lighting. Lightbulbs**

were the wave of the future and they are still all around us today!

So, let's take a moment to think back to all that we've learned about this specific time in history, the Electrical Age, particularly the scientists that were inventing things to make people's lives better. Alexander Graham Bell, inventor of the telephone, and Thomas Edison, inventor of the lightbulb, were just two of the great minds of the time. Grab your organizer from our first lesson on electricity? Yes, the one that with the word electricity really big, right in the middle of the paper. I'll give you a moment to find yours while I find mine too. [pause]. Here's mine. Do you have yours? [show your organizer from lesson six]. Great! Now let's see. We've used the names of these three really important inventors, right here, to dive deeper and learn more about how our lives have been changed by the things they developed so long ago. [point to the list of inventor names on your graphic organizer]. So...I'm thinking we can move on to the next inventor in line: Guglielmo Marconi! [point to Guglielmo Marconi on your graphic organizer]. It's kind of hard to pronounce his first name, but it sounds like this: gool-YAY-moh. I see that we wrote down that Marconi invented wireless communication. Wow...didn't we just make a list of all the things in our school and home that work wireless? Yep, we did! Hmmm? But, in 1875, Alexander Graham Bell, had develop a way for people to communicate across long distances, however at this time, it was only possible across wires!

This really has me wondering:

- What drove Marconi to invent something like wireless communication?
- Well, he must have had experiences along the way that influenced him to keep trying. What were they?
- Likewise, were there other inventors that inspired him?

Okay! Now I'm really curious *and* ready to head into today's text to find out what was so cool about this Marconi guy. I want to know how he developed a way for people to communicate wirelessly! I want you to listen closely as I read. I wonder if we'll find any evidence that Marconi's life was anything like Bell or Edison's? Let's get going!

Teacher Model/Read-Aloud (12 min.)

**Guglielmo Marconi (1874-1937)** Let's take a look at a picture of Marconi. Here he is as a young man. [show image L9-A].

Guglielmo Marconi was born in the city of Bologna, Italy, on April 25, 1874. His mother, Annie, was Irish, and his father, Giuseppe, was Italian. Giuseppe Marconi was a wealthy man.

When Marconi was very young, his mother took him and his brother, Alfonso, to southern Italy during the winter. There he learned to love the sea.

- So, this is a very interesting start! Marconi was born 30 years after Bell and Edison. I wonder if this is still be a time of invention, particularly inventions involving the use of electricity?
- We also read that Marconi was born into a wealthy family. Do you think this might be an advantage for him later in life, when he begins to experiment and invent? [pause]. How so? [pause]. I'm thinking that being an inventor could get pretty expensive, with all those gadgets and chemicals! Having the money to support it would be nice!
- What do you think it means that Marconi "*learned to love the sea*"? [pause]. Right, that he enjoyed the sea, the water, the waves. He just liked to be there.

Tutors taught Marconi and his brother, but the young Marconi did not like to do schoolwork. He preferred to pursue his own interests instead. At the age of 12, he was sent to school in Florence, Italy. He was serious and shy, and his teachers were often frustrated by his lack of interest in his studies.

- Who does this remind you of? [pause]. Me too! Now we know that Bell, Edison, and Marconi did not like school. Isn't that interesting! I'm happy to know that these days, the curiosity that drove the three of them is valued in school!
- Ahhh, you're right! This looks like a perfect time to start our organizer! We're already learning some important information about Marconi and don't want to get too far along and possibly forget it. So, grab a piece of clean paper. Let's give ourselves a header at the top: *Guglielmo Marconi*. I'm going to write mine in all capital letters, like this. Feel free to use your marker or highlighter if you'd like it to stand out. [model starting your organizer with the header: GUGLIELMO MARCONI].

Students will learn about the life and inventions of Guglielmo Marconi and capture this information on a teacher-led graphic organizer.

Throughout, students will:

- be probed to think about how Marconi's path was paved with influences and experiences that led to the invention of wireless communication.
- Consider how his life experiences are similar to those of Alexander Graham Bell and Thomas Edison.

- **Okay, let's write down his year of birth and death.**  
[model adding to your organizer: 1874-1937: 63 years old]]. I'm also going to add that he was born 30 years after Bell and Edison. I think this will help us as we think about his life in relation to what has already happened in the world of invention. [model adding to your organizer: born 30 years after Bell and Edison].
- **Before we move on, let's add a few other details: Marconi loved the sea, but he did not love school!**  
[model adding to your organizer: loved the sea, did not like school].
- **Alright, I'm so excited to learn more. Let's get back to the text!**

In his free time, Marconi devoured books about science. He like to tinker with wire and batteries, and take things apart and put them back together. His father thought he was wasting his time, but his mother supported his interests.

- This says that Marconi "*devoured books about science*" during his free time. What do you think this means, that he devoured books about science? [pause]. Yes! The word devoured means to consume as much as possible. So, I'm thinking this means that Marconi simply couldn't read enough about science. Could this be a clue to what Marconi's future interests might be? [pause]. Hmmm?
- I think we might have read about another clue in this section. Do you know what it is? [pause]. Right! Marconi liked to tinker with wires and batteries...electricity! Like Bell and Edison, he liked to take things apart and put them back together. He was finding a way to nurture his curious nature.
- Why do you think Marconi's father thought his interest in science a waste of time? [pause]. Maybe...but, I think we're going to have to read more. At this point, it seems like his father doesn't really value science, or at least tinkering around and experimenting. Who did we find out does support him? [pause]. Yes, his mother. Let's take a look at a picture of Marconi as a child. He's pictured here with his mother. [show image L9-B].

Much to his father's disappointment, Marconi began attending the Leghorn Technical Institute in 1887. Giuseppe Marconi had hoped that his son would attend the Naval Institute to become a naval officer. At Leghorn, a change

took place in Marconi. He began to enjoy his schoolwork. He was able to study science. One of his interests was electricity.

- Hmm, it sounds like Marconi's father wasn't the most supportive and had other plans for him. However, we see that, at 13, Marconi ended up attending school at Leghorn Technical Institute.
- Let me reread this: "At Leghorn, a change took place in Marconi. He began to enjoy his schoolwork." Why do you think he started to enjoy school? [pause]. Yes, I think you're right! We read that, at Leghorn, he was able to study...what? [pause]. Yes! Science! He was finally given the chance to study something that he really enjoyed. But even better...he now had time to devote to one of his favorite interests: electricity!
- Let's get back to the text!

At 18 years old, Marconi hoped to go to the University of Bologna. Unfortunately, he did not get in. His mother convinced a physics professor there to allow her son to use the university library. With access to the university's books, Marconi began to focus on the idea of creating a worldwide communication system.

- What, a kid this smart didn't get into college? How interesting!
- But, thank heavens for his mother! What did she get him access to? [pause]. Yep, access to the university library. This way Marconi would have access to all the books about science that he could ever want!
- Before we move on, let's back up for just a second and talk about this word: *physics*. We read that Marconi's mother convinced a physics professor to give her son access to the university library. Well, this professor, or college teacher, must have had some sort of connection to Marconi's interest in science and electricity. What kind of professor do you think he might have been? [pause]. I think so too – a professor of science. So, physics must be a specific type of science. Let's write this word down on our organizer and I'll give you a good definition that you can use to remember what it means. [model adding to your organizer: *physics*]. Right beside the word, write: a type of science that studies matter and energy, including electricity. [model adding to your organizer: *a type of science that studies matter and energy, including electricity*]. Great job!
- But hold on, we read that, with access to the university library, Marconi could now "focus on the

idea of creating a worldwide communication system". What do you think that means? [pause]. Right! Like Bell and Edison, Marconi had an idea that he wanted to chase. And, like Bell and Edison, Marconi was also intrigued by the idea of communication. For Marconi, he wanted to develop a system for people to be able to communicate all across the world, across lands, and across oceans! How cool!

- Let's add this to our organizer. I'm going to write the word idea, like this, all in capital letters. And then I'm going to say that Marconi's idea was to create a worldwide communication system. [model adding to your organizer: *IDEA: create a worldwide communication system*]. Let' not forget, all great things start out as just ideas! It's hard work and dedication that push it further.
- So, I'm dying to know! Do you think Marconi is going to be able to create a whole system that allows people to communicate from all across the world? Let's find out!

#### Wireless Communication:

Marconi become extremely interested in telegraphic communication. Telegraphic wires had been strung all over the United States and Europe.

- Okay, we've been talking a lot about the telegraph, and here we see that Marconi was really into learning more about telegraphic communication, or how people use telegraphs to communicate. Remember, Marconi was born 30 years after Bell and Edison, so the telegraph wasn't a new thing any more. People were used to receiving messages through telegraphs. What do you think this might have looked like...wires everywhere, strung from here to there? Want to see a picture? Look at this! [show image: L9-C]. Here we can see that telegraphic communication was so popular that telegraphic wires had been strung all over the place! Can you believe how many wires there are?
- Do you think all these telegraphic wires ever got in the way? [pause]. I'm thinking so! Do you think anyone would ever want to do something about it? [pause]. Hmmm? Let's find out!

Marconi wondered if it might be possible to communicate over long distance without those wires. During this time, he



learned as much as possible about telegraphs, including Morse code.

- So, what did Marconi wonder? [pause]. Yes, he wondered if communication without wires was possible! His curiosity was on a roll.
- Before we move on, I want to fill your brain with some neat information from something that we just read. We haven't had much of a chance to talk about the code that was used by telegraph operators. They used Morse code, which was a series of dots and dashes that represented letters of the alphabet. The operator on the sending end would tap, tap, tap out the message in code, then it would travel across the wires to an operator at the receiving end. That operator would translate the dots and dashes into the words that made the message. Here is a picture that shows you the dots and dashes that make up Morse code. [show image L9-D]. Isn't this neat! See how the letter 'A' is represented with a dot and a dash. Marconi believed that he would need to know as much as possible about the telegraphic communication system.
- Okay, so Marconi was like...enough with all these wires - let's see if we can do the same thing without them! I believe this definitely belongs on our organizer. Let's add that Marconi wanted to see if people could communicate long distances without wires. You add to your organizer while I add to mine. [model adding to your organizer: *telegraphic communication, but without wires*].

One thing that caught Marconi's attention was the idea of electromagnetic wave. Though the idea itself was not new, the possibility of using these waves to communicate was.

- Oooo! That's a cool word. Let's look closer at that word: *electromagnetic wave*. Well, we know what a wave is, that's simple, but an electromagnetic wave! What two words do you see represented in electromagnetic? [pause]. Great! Electric and magnetic. Hmm...so, this is some sort of wave that is both electric and magnetic. This word is way too cool – let's add it to our organizer. I'm going to write *electromagnetic wave* right under the words we wrote earlier: *telegraphic communication*. [model adding to your organizer: *electromagnetic waves*].
- I'd like for us to take a side road for just a moment. Let's investigate these electromagnetic waves a bit

more. Since Marconi is so interested in them, I really want to know more about their discovery! Did you know that in the mid-1800s, a scientist named James Clerk Maxwell discovered that magnetic force moved in waves, like the waves that move through water? Can you make a wave with your hand, like this? [move a waving motion with your hand]. However, unlike water waves, magnetic waves could travel through empty space. He suggested that since electricity and magnetism were related, electricity might be made to travel in waves too. The secret was to create a wave that was electric and magnetic - an *electromagnetic wave*! One way to do it was to switch an electric current back and forth very quickly. This would essentially *make the wave*!

- So, even though the idea of electromagnetic waves was not new, Marconi wanted to see if he could do something new with them. He wanted to build upon someone else's discovery. What was it? [pause]. Yes! No one had ever tried to see if they could use electromagnetic waves to communicate. And, yes, Marconi wanted to be the first to make it happen!

Marconi began to wonder whether electromagnetic waves could be used to carry messages as a telegraph did, but without wires. Although his professor in Bologna was not impressed by the idea, Marconi was not discouraged. He was fascinated by the idea of wireless communication. Scientists had already proved that electromagnetic waves could travel very short distances. Marconi set out to get the waves to travel much longer distances—even across oceans.

- Okay, so like other inventors before him, Marconi planned to take someone else's idea and built upon it. What did he want to try? [pause]. Right! To see if he could get these electromagnetic waves to travel farther; he wanted them to travel much longer distances.

With his mother's help, he set up a laboratory in the attic of his parents' house. His father reluctantly provided money for the equipment.

- Marconi's dad still isn't too excited, is he...but he handed over some money and then, in swoops mom to help out. What did she help him do? [pause]. Yep, set up a laboratory in the attic of their home! How cool!
- So, does this remind you of anyone else we've talked about recently? [pause]. Good memory! We learned

<p>that Thomas Edison had a cool laboratory in Menlo Park, New Jersey. It was big enough for him and his team to experiment like crazy! I wonder what Marconi's attic laboratory looked like? Want to see? [pause]. Let's look at a picture of his laboratory. [show image: L9-E]. Wow! They are really different! Marconi's laboratory is so much more simple than Edison's. I guess he was just trying to figure things out and working with what he had available.</p> <ul style="list-style-type: none"> <li>• Alright, we'll have to pump the breaks right here! This is a perfect place to stop our reading today. And, since Marconi finally has his own laboratory, watch out world! Who knows what will happen!</li> </ul>	
<p><b>Guided Practice</b> (5 min.)</p> <p>Let's take a few minutes, put our brains together, and get you ready for your independent practice.</p> <p>Look over all of your notes on your organizer. [pause and begin looking over your organizer, then read the following script as you orally review your notes]</p> <ul style="list-style-type: none"> <li>• I see that Marconi was born 30 years later than Alexander Graham Bell and Thomas Edison.</li> <li>• He loved the sea, which would be important to his work later in life.</li> <li>• I also notice, like Bell and Edison, Marconi was not a good student and had his own interests: science and electricity!</li> <li>• We found out that Marconi did not get into college, but due to the kindness of a physics professor there, had access to the library's books.</li> <li>• We see that the telegraph was also an important device for Marconi, but his IDEA was to send messages long distances, and wirelessly!</li> <li>• He wanted to explore the use of electromagnetic waves as a way to send wireless messages. And he did! First, in his attic laboratory, then eventually, miles away.</li> </ul> <p>Like both Alexander Graham Bell <i>and</i> Thomas Edison, Marconi's early life was very interesting, full of challenges and lots of hard work. He was a curious child, but set his mind to something and didn't give up. He even liked building upon the ideas of others to make something even better! Let's take some time to think about the early <u>path</u> that was being set before Marconi.</p>	<p>Students will engage in a review of facts and information recorded on their organizer.</p>

<p>Grab a piece of paper and jot down your thoughts as I ask you a few guiding questions.</p> <ul style="list-style-type: none"> <li>• What do you think were Guglielmo Marconi's earliest influences? In other words, what were the things in his childhood that may have driven him to a life of experimentation and invention? [pause].</li> <li>• What were some of the challenges that he faced along the way? How did he navigate them him? [pause].</li> <li>• How did believe these challenges shape what he will do next?</li> </ul> <p>I'll give you a few moments to go back and look over your answers before moving on. [pause].</p>	<p>Students will write short responses to the guiding questions to more deeply think about the early life challenges and experiences of Marconi, and how they led to his need for a laboratory of his own.</p>
<p><b>Independent Work</b> (3 min.)</p> <p>Now, I'd like for us to make sure that we have everything we need to do for our independent practice</p> <ul style="list-style-type: none"> <li>• We just completed a great review of our organizer notes. Another nice job capturing so much neat information about Marconi!</li> <li>• We also just took some time to think deeply about how Marconi's early life is shaping up to lead to a life of discovery and invention.</li> <li>• I think you're ready!</li> </ul> <p>After our lesson is over today, I want you to take some time to complete another cool activity. I'm going to set up a really fun scenario for you. You can read along with me here if you'd like. [show image L9-F: student independent practice scenario and prompt].</p> <p>Imagine you are 20-year-old Guglielmo Marconi! Since you were young, you have immersed yourself in everything <i>science</i>. You read books about science, you tinker with wires and batteries, you take things apart and put them back together, you even know all about the famous inventions that inspire your curiosity, like Alexander Graham Bell's telegraph.</p> <p>Just two years ago, you had a wonderful idea: to create a worldwide communication system! As you work toward making your idea a reality, you have been focused on the electromagnetic wave. Although scientists have been able to prove that electromagnetic waves can travel a very short</p>	<p>Students will prep for their independent practice.</p> <p>Students write engage in the set-up of a scenario then write a persuasive letter.</p>

<p>distance, you are convinced that they can travel much, much further. Not to mention, you believe electromagnetic waves are the key to sending messages far distances, and sending them <i>wirelessly</i>!</p> <p>However, you don't have a good place to continue your research and experimentation. You need a laboratory! Your mother agrees and says you can use the attic, but warns you that your father will likely not support your new endeavor. She suggests you write him a letter and leave it on his desk, convincing him that your laboratory could lead to an amazing invention! You agree and get started writing your letter.</p> <p>Use a clean piece of paper to write your <i>very convincing</i> letter. Don't forget to reference your organizer for facts and details. Be sure to include:</p> <ul style="list-style-type: none"><li>• why you really need a laboratory to continue your work.</li><li>• how close you are to making an important discovery: that electromagnetic waves can travel much further than anyone knows.</li><li>• what you already know about electromagnetic, how they work, and why you believe they are the key to sending messages far distances, <i>wirelessly</i>.</li></ul> <p>So again... [Repeat directions another time].</p> <p>I just know that you're going to be able to convince him! And when you do, I'll be sure to swing by and check it out.</p>	
<p><b>Closing</b> (1 min)</p> <p>I enjoyed learning with you today and am glad we know a little bit about Guglielmo Marconi! Thank you for inviting me into your home. I look forward to seeing you in our next lesson in Tennessee's At Home Learning Series! Bye!</p>	



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