

The Hubble Space Telescope
Inventions that Shook the World Series

Grade Levels:

5-12

Subject Areas:

Science

Technology

Engineering

Synopsis:

One of the issues with viewing stars from Earth is that the atmosphere makes images blurry. To get around this, the Hubble Space Telescope was built to take pictures from space. Hubble's first images came back to Earth a blurry disappointment. Jim Crocker, Senior Engineer on the Hubble project, takes inspiration from a European showerhead and invents the "fix" that clears up Hubble's images.

Learning Objectives: Students will:

- Explain why we wanted a telescope to take pictures from space.
- Explain what went wrong with the initial Hubble telescope.
- Understand how Jim Crocker designed a "fix" for the telescope.

Vocabulary:

Hubble Space Telescope, image, camera, light, mirror, Jim Crocker, COSTAR

Pre-Viewing Discussion:

What do you know about the Hubble Space Telescope? Why are the pictures so much better from this telescope than from telescopes on Earth?

What do you think it took to get the Hubble into space? What problems do you think had to be overcome?

Post-Viewing Discussion:

What was causing the images from the Hubble Telescope to be blurry? What were some of the challenges encountered when trying to fix it?

How did the showerhead provide inspiration for Jim Crocker? How did he solve the problem with the telescope?

Further Activities:

Find several images taken by the Hubble Space Telescope. Research what astronomers learned from these images. Then, write a list of other discoveries that might be made in the future, due to the images provided by the telescope.

The Windup Radio

Inventions that Shook the World Series

Grade Levels:

5-12

Subject Areas:

Science

Technology

Engineering

Synopsis:

When Trevor Baylis sees a documentary about the spread of AIDS in Africa, he believes that communication and information can help stop the spread of the disease. He needs to create a radio that does not require electricity and batteries to run. Using the gramophone for inspiration, he builds a windup radio that runs off a hand crank, and eventually gets it into the hands of people who need it the most.

Learning Objectives: Students will:

- Explain what drives Trevor Baylis to invent new things.
- Explain how he created a windup radio.
- Understand why the windup radio is an important communication device in today's tech-immersed world.

Vocabulary:

Radio, electricity, Trevor Baylis, dynamo

Pre-Viewing Discussion:

Why do you think Trevor Baylis created a windup radio in the 1990s, with all the technology and electronics available to us?

What role does communication play in combatting disease around the world?

Post-Viewing Discussion:

Why does Trevor Baylis invent new things? What did you notice about his personality that you think makes him successful?

How did Baylis create a radio that did not require electricity or batteries? How successful was he in getting his invention into the hands of people who needed it?

Further Activities:

After watching Trevor Baylis in the program, write a fictional biography of his life. Take into account the information in the video, his personal characteristics that stood out, and the other kinds of items he may have invented. Be sure to include his childhood, education, and other achievements in your fictional biography.

The Camera Phone

Inventions that Shook the World Series

Grade Levels:

5-12

Subject Areas:

Technology

Engineering

Synopsis:

Philippe Kahn makes a promise he may not be able to keep. He promises to email a photo of his brand new baby. While his wife is in labor, Kahn works to connect his digital camera, laptop computer, and cell phone. Once complete, the picture is downloaded to the laptop, which is connected to the phone, which transmits the image over the cellular network.

Learning Objectives: Students will:

- Explain what Philippe Kahn's specialty is and how that helped him create the camera phone.
- Explain how he transmitted the picture of his baby.
- Understand the implications of his transmission for our lives today.

Vocabulary:

Camera, phone, network, Philippe Kahn

Pre-Viewing Discussion:

Do you know someone who has a camera phone? How do they use it?

What technology is slowly being replaced by the camera phone? Do you think that technology will ever be fully replaced?

Post-Viewing Discussion:

How does Philippe Kahn's specialty make him uniquely suited to creating a camera phone? How does he bring that experience in to help him send the picture of his daughter?

How did Kahn accomplish his transmission? What pieces did he need?

How are camera phones used today? What are some of the benefits and challenges of always having a camera in your pocket?

Further Activities:

Trace the development of digital photography from the 1990s to today. How has it changed and how is it the same? How has this development changed our culture and the way we interact with our friends and family? Do you think this is a good development or a bad one? Why?

The Mars Pathfinder
Inventions that Shook the World Series

Grade Levels:

5-12

Subject Areas:

Technology

Engineering

Synopsis:

Tom Rivellini was a junior space engineer at NASA when he's tasked with finding a way to safely land the Pathfinder on Mars. With such a thin atmosphere, a parachute won't slow the Pathfinder enough to land safely on the surface. Tom gets the idea of using airbags and allowing the lander to bounce to a stop; the question is, what material will work for the airbags?

Learning Objectives: Students will:

- Explain the challenges associated with landing a rover on Mars.
- Explain how Tom Rivellini and his team overcame those challenges.
- Understand the implications of the Mars Pathfinder and its findings on our world today.

Vocabulary:

NASA, Mars, Tom Rivellini, Mars Pathfinder, NASA Jet Propulsion Laboratory

Pre-Viewing Discussion:

What do you know about the Mars Pathfinder? What information has it sent back to Earth?

How do you think most Americans feel about NASA today? How do you think our feelings might be different than in the 1970s and 1990s?

Post-Viewing Discussion:

Name some of the challenges associated with landing the Pathfinder on Mars.

What were some of the benefits to the shape of the balloons around the lander? What challenges did Tom's team face when trying to design the airbags?

Why could the launch not be moved to a later date?

How successful was the launch of the Pathfinder?

Further Activities:

Research the information sent back to Earth from the Pathfinder. What do we know now about Mars that we did not know before the mission? How does that affect our understanding of the universe?

Look at NASA's plans for the future. What do you think our next steps in space will be? How do you think that will affect our daily lives?

The Neurotrophic Electrode
Inventions that Shook the World Series

Grade Levels:

5-12

Subject Areas:

Science

Technology

Engineering

Synopsis:

When Dr. Philip Kennedy was a medical student, he met a polio victim who was paralyzed. That experience affected him to the point that he wanted to try to help patients with “locked-in” syndrome communicate. Dr. Kennedy designed an electrode that would send signals from the brain to a computer to help patients communicate.

Learning Objectives: Students will:

- Understand the communication challenges associated with “locked-in” syndrome.
- Understand Dr. Kennedy’s inspiration and dedication to helping these patients communicate.
- Explain how the neurotrophic electrode works to help patients communicate.

Vocabulary:

Medical research, neurotrophic electrode, neurology, locked-in syndrome

Pre-Viewing Discussion:

What is locked-in syndrome? How do you think it is treated?

What do you think a neurotrophic electrode is? What do you think it does?

Post-Viewing Discussion:

What personal characteristics drove Dr. Kennedy to try to help patients with locked-in syndrome communicate? What experiences pushed him toward this goal?

What does the neurotrophic electrode do?

How does the neurotrophic electrode help patients communicate?

What future applications might there be for this device? How is Dr. Kennedy pushing toward those goals?

Further Activities:

Medical technology and research is always moving forward. Research a new treatment or technology that is in the testing phase. What are the challenges being experienced by the doctors and scientists, and how do you think they might get around them?