

Science Strand 8: Impact of Science, Technology and Human Activity

CLE: 8.2 Historical and cultural perspectives of scientific explanations help to improve understanding of the nature of science and how science knowledge and technology evolve over time.

Health Profession: X-ray Technologist

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References:

<http://en.wikipedia.org/wiki/X-ray>,

<http://science.hq.nasa.gov/kids/imagers/ems/xrays.html>

<http://health.howstuffworks.com/x-ray1.htm>

Objectives:

At the completion of this presentation the high school student will be able to:

- 1. Recognize contributions to science are not limited to the work of one particular group, but are made by a diverse group of scientists representing various ethnic and genders**
- 2. Recognize gender and ethnicity of scientists often influence the questions asked and/or the methods used in scientific research and may limit or advance science knowledge.**

Background Summary of Information as Related to X-ray Technologists and CLE.

X rays were discovered by accident as are many things in life. A German physicist named Wilhelm Roentgen actually came across this discovery while with electric beams in a tube much like a vacuum cleaner. To make a long story short, he saw a glow from the beam which should not have been there. He began to put things in front of it to see what it would do. Finally he put his hand in front and saw his bones. He named it the x-ray because he had no idea what this machine was capable of doing good and bad. Thus came the x-ray and the most important use of radiation and x-rays. This scientific discovery is one of the most beneficial scientific projects to be used for medicine and the health care field. Mr. Roentgen may have discovered this complex process but many people such as Thomas Edison, Fernando Sanford and many others have helped to perfect. Each has used his work to discover different avenues of radiation and x-rays. One such example is the x-ray microscope and x-ray laser. This accidental invention has taken many people and many walks of life to discover it many important features and aspects.

How does the X-ray work on humans you ask? Simple. The soft tissue in your body is composed of smaller atoms, and so does not absorb X-ray photons particularly well. The calcium atoms that make up your bones are much larger, so they are better at absorbing X-ray photons. X-rays are much like visible light rays. The wavelike forms of electromagnetic energy carried by particles called photons. The difference between X-rays and visible light rays is the energy level of the individual photons. This is also expressed as the wavelength of the rays.

Scenario:

Joe is a teenager who comes into the E.R. with pain to his right leg. He says he was hit in the leg during football practice and heard a snap and felt a sharp pain. He tried to walk on it but that was not possible. His mom decided to bring him to the Emergency Room to obtain x-rays. Tell me using scientific knowledge how you as a radiography technician would explain to Joe what was about to be done. You must explain it in terms he can understand. Also during the x-ray procedure, explain to him the many important faces and facts of how x-ray's came to be.

Activities:

Have the class split up into even groups. Talk about the scenario and what would be said to Joe. Also, have the group come up with a new name for an X-ray. They know why the inventor named it the x-ray. We now know what the x-ray is capable of doing, so using that knowledge a new name can now emerge.

OR

www.exploratorium.edu/spectra_from_space/xray_activity.html

Because X rays can damage human tissue severely, it is not possible to do a hands-on activity with this type of radiation. There is a "simulated" X-ray activity included below. So called "soft" X rays are used for medical examinations and shorter wavelength X rays are used to inspect industrial products. X-rays from space occur in a large array of wavelengths, and special mirrors and detectors are required to obtain images from space. On earth, an object to be X-rayed is placed close to a piece of photographic film and the X-ray source turned on for few seconds. The developed film is dark where the X rays strike it and white where the object absorbs the X rays.

The effect of X rays can be simulated by the following activity: Place a piece of ordinary window screen over a box. Place a pattern made of cardboard on top of the screen. Sprinkle sand over the area of the box. The sand (X rays) will pass through the screen to the bottom of the box, except where they are blocked by the pattern.



Set up for the activity.

An outline of the pattern can be seen in the bottom of the box. The photographs show the set up and an example of the pattern in the bottom of the box.



An area of no sand shows the shape of the blocking pattern.