Lesson Plan

Title
"Communication- Then & Now"

Primary Subject Area
Technology & Engineering

Grade Level
7 (6-8)

Overview
The communication module will introduce the students to the eight major components of the communication systems model. The students will send a message using three different methods of communication, including Morse code transmitted over a copper wire, voice modulation using a free space laser, and voice modulation transmitted over fiber-optic cables.

Approximate Duration
7 class periods X 50 minutes

MA Frameworks
Technology/Engineering 6-8

3.1 Identify and explain the components of a communication system, i.e., source, encoder, transmitter, receiver, decoder, storage, retrieval, and destination.

1.1 Given a design task, identify appropriate materials (e.g., wood, paper, plastic, aggregates, ceramics, metals, solvents, adhesives) based on specific properties and characteristics (e.g., strength, hardness, and flexibility).

Interdisciplinary Connections
During the course of the communication module the students will be exposed to communication in various other areas of the curriculum; including science, math, and social studies. The improvement of communication devices through history and their impact on society. The students will also be looking into the physics of the light traveling through free space and within the fiber-optic cable.

Lesson Objectives
The Students will be able to…

- Recognize the common components within historical and cutting edge communication systems
- Identify the major components of a communication system

Lesson Materials and Resources

Worksheets

- Communication Module direction book
- Morse code worksheet
- Free-space laser worksheet
- Laser path worksheet
- Fiber-optic worksheet

Materials

- Morse code project board
- Laser boards
- Laser pointer
- Light path model
- Mirror set
- Fiber-optic kit

Videos

- *The Telegraph and Telephone* (4 min), http://www.history.com/topics/telegraph/videos#the-telegraph-and-telephone
- *Greatest Inventions with Bill Nye: Communication (56 min).* Thinkfilm Inc., 2007. Full Video. 2 August 2011. <http://www.discoveryeducation.com/>.

Technology Tools and Materials

Computer
Projector

Background Information

The students taking part in this activity will have very limited information about the communication systems model, the telegraph, free space laser communication nor fiber optic cables. The module is designed to be primarily self-guided and the student groups will move through the projects at their own pace. The teacher will function as a "go to person" offering advice and information on an "as needed" basis.

Useful Vocabulary

New Vocabulary Word	Meaning
source	a process that generates message data that one would like to communicate, or reproduce as exactly as possible somewhere else in space or time http://en.wikipedia.org/wiki/Communication_source
encoder	a device, circuit, transducer, software program, algorithm or person that converts information from one format or code to another, for the purposes of standardization, speed, secrecy, security, or saving space by shrinking size http://en.wikipedia.org/wiki/Encoder
transmitter	an electronic device which, with the aid of an antenna, produces radio waves http://en.wikipedia.org/wiki/Transmitter
receiver	converts signals from a radio antenna to a usable form http://en.wikipedia.org/wiki/Receiver_(radio)
decoder	a device which does the reverse of an encoder, undoing the encoding so that the original information can be retrieved http://en.wikipedia.org/wiki/Decoder
laser	A **laser** is a device that emits light (electromagnetic radiation) through a process of optical amplification based on the stimulated emission of photons http://en.wikipedia.org/wiki/Laser
fiber optic	An **optical fiber** is a flexible, transparent fiber made of very pure glass (silica) not much wider than a human hair that acts as a waveguide, or "light pipe", to transmit light between the two ends of the fiber http://en.wikipedia.org/wiki/Optical_fiber

Essential Questions to be answered; Grand Challenges

1. What are the major components of all communication systems?
2. What material characteristics are considered when choosing materials for a specific design task?

Misconceptions

Lesson Procedures

When the students begin the module they should look through the direction book and the project materials. After they have familiarized themselves with the module they should start with the telegraph portion of the module.

Assessment Procedures

During the course of the module the students will formatively assessed through small group discussions and review of their worksheets. The students summative assessment will be a series of open response, short answer and multiple choice questions from past MCAS tests that relate to the communication standards.

Accommodations/Modifications

Student groups will be selected by the teacher. The selection will be based on student strengths and weaknesses allowing all groups and students to be successful at their own level.

Reproducible Materials

- Morse code worksheet
- Free-space laser worksheet
- Laser path worksheet
- Fiber-optic worksheet

Explorations and Extensions

Lesson Development Resources

http://www.mathinscience.info/public/0%20kits/light_color_lasers/laser_pattern_ws.pdf (7/28/2011)

Reflections

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