In addition to the links to STEM, Makerspaces and D.I.Y. Amateur Radio can have a wide variety of tie-ins to the K-12 curriculum. Here is a sample:

- Math- wavelength vs. frequency with inverse ratios, the angle of radiation, calculating electronics values with Ohm's Law, Decibels and logarithmic scales, sampling rate and DSP, etc.
- Science- atmosphere & solar activity in propagation, electronic components and circuits, conductivity, energy generation (including solar) and storage (including battery technology), Doppler Shift, etc.
- Language Arts- forms of communication, phonetic alphabet, acronyms, broadcast writing and production, oratory, technical writing, etc.
- Social Studies- Geography, maps and projections, cultures, international relations & regulations, history of communication, etc.
- Music- Morse Code with drums, Frequency and tones, Doppler Shift, DSP, recording, etc.
- Computer Science, Coding, Programming & App Creation
- PE- Wavelength and Frequency demo with jump ropes.
- World Languages
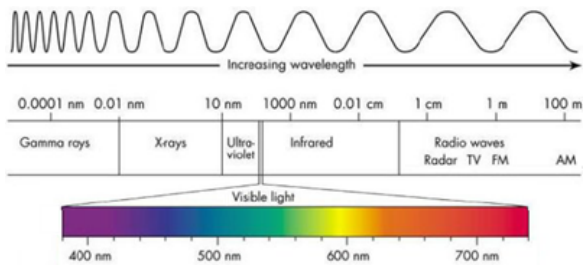
What is Amateur Radio?

tiny.cc/what-ar

K8ZT
Amateur Radio Resources
www.k8zt.com

ARRL
The national association for
AMATEUR RADIO
www.arrl.org

ARRL
AMATEUR RADIO
IN THE CLASSROOM
www.arrl.org/amateur-radio-in-the-classroom

Ham Radio- The Original Maker Movement

You might ask how the Amateur Radio service relates to the maker movement you might ask? In many ways, amateur radio is the grandfather of the maker movement. People have been tinkering and experimenting, building their own equipment and radio stations, all in the quest to communicate with each other for well over 120 years!

Today, the range of things within Amateur Radio to get involved in-- building, designing, inventing, experimenting with and operating is even broader, really only limited by your imagination!

Amateur Radio, also known as Ham Radio, involves two-way radio communication with other stations (local, regional, countrywide and worldwide). The ability to transmit requires an FCC license, but listening and experimenting with radio do not.

Although Hams still carry on many traditional forms of communication, including Morse Code and voice, today's ham radio includes digital data, digital voice, images and video. Radio contacts can be made directly by line-of-site, propagated by ionized layers of the atmosphere, relayed by repeaters, or even through Amateur Radio space satellites.

Beyond communicating with other stations, Hams enjoy building electronic devices, experimenting and tinkering. This tinkering includes metal cabinet fabrication, aluminum antenna construction, 3-D Printing, laser etching/cutting, soldering, etc.

Historically Hams have been at the forefront of experimentation in radio and electronic technology. Earlier adopters of computers, many Hams have been involved in a variety of hardware and software innovations. Recently many Hams have utilized microprocessors, like Arduino, in their projects and devices.

A number of Amateur Radio innovations have found their way into mainstream consumer products. Many of the technologies used in both Amateur Radio repeaters and Packet Radio are incorporated into making today's cell phones possible.

The word Amateur, derived from Latin for "lover of," is a person who engages in a pursuit on an unpaid basis for the enjoyment of an activity. A number of Amateur Radio licensees have been involved in inventions, technology advances and innovations:

- Astronauts- many astronauts have been Hams, including Yuri Gagarin (UA1LO), the first man in space
- Nobel Prize Winners- including the very active Joe Taylor (K1JT)
- Apple Computer Co-Founder- Steve Wozniak (ex-WA6BND) was first licensed at 10 years old
- Guillermo Marconi, considered the father of commercial radio, self-described as an Amateur Radio operator

Makerspaces and D.I.Y. Amateur Radio can have a wide variety of tie-ins:
- Electronics & Circuits
- Soldering
- Wifi & Bluetooth
- Antenna construction
- Solar Energy & battery storage
- 3-D Printing & Laser Cutting
- Metalworking & Mechanics
- Gears and drive mechanisms
- Remote Control
- Remote Sensors
- LEDs and Lighting
- Satellite Tracking & Astronomy
- Shortwave Listening
- Video & Audio Production
- Digital Signal Processing
- Microprocessors- Arduino, Raspberry Pi, etc.
- Sensors- Temp, Pressure, Motion, GPS, pH, Sound, Light, etc.
- Computer Applications
- Direction Finding & Foxhunts
- Crystal Radios
- Circuit Simulators
- Printed Circuit Design & Production
- High Altitude Balloon Launches