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Radios in the Classroom: Curriculum

Integration and Communication Skills. ERIC Digest.

Teachers have explored the use of radio in the classroom almost since radio technology entered into the mainstream of society, yet radio remains a relatively unused mode of instruction. This Digest describes several radio applications and summarizes several radio activities for the classroom.

TEACHING THE HISTORY OF COMMUNICATION

Students may begin their study of communications technology by reading about some early devices and their inventors. Radios and telegraphs are part of early communications technology history, and Samuel Morse, Guglielmo Marconi, Lee DeForest, Philo Farnsworth, and David Sarnoff were communications pioneers.

The first popular radios were called crystal radios because they used crystals to receive the broadcast signals. Building a crystal radio, either from a kit or from parts, is an engaging, hands-on science activity. In addition to building the crystal radio, earth science and chemistry teachers might consider making the galena crystals that receive the signals. Many early crystal radio listeners made their own galena crystals before radios were sold in stores. Teachers can also use radio assembly projects to help students learn about electricity, wave energy, the electromagnetic spectrum, the earth's atmosphere, and the sun's effects on the earth's atmosphere. Many popular electronics stores have a full range of reasonably priced, easy to assemble electronics and radio kits.

AM-FM RADIO: HANDS-ON GEOGRAPHY AND LANGUAGE ARTS ACTIVITIES

Depending upon your geographic location, you may hear many AM-FM radio stations from Canada, Mexico, Central America, and the Caribbean. If you are near those regions, you will hear broadcasts by English, French, and Spanish native speakers-a special opportunity for foreign language learners. Some AM-FM stations now maintain Web sites and offer their listeners real-time programming and audio archives. Listening to online audio resources requires computer software such as RealAudio, a sound card, and speakers.

Many U.S. AM stations may be heard across the country. Listening to broadcasts from

other U.S. locations makes an excellent activity for learning U.S. geography. The term DX means long-distance, so listening to faraway stations is known as "DXing" among radio hobbyists. In the evening, AM radio broadcasts are heard over great distances because atmospheric conditions allow AM radio waves to bounce between the atmosphere and the earth. Students might hear AM broadcasts from several hundred miles away if they listen to AM stations after dark.

INTERNATIONAL SHORTWAVE BROADCASTS: HEARING THE WORLD ON A RADIO

Just as an AM-FM radio is a tool for students learning about local and regional geography, a shortwave radio is a good tool for learning about world geography. Every country in the world has shortwave radio broadcast stations, and most stations have programming in English, as well as their native language. Beginning with 6th-grade social studies curriculum, the study of geography may be enhanced by listening to international shortwave broadcasts. Students will hear news and cultural programming that will enhance the information found in books, encyclopedias, and on the Internet. Topics such as latitude and longitude, time zones, continents, hemispheres, and the tropics may all be highlighted through radio listening activities.
Writing letters to international stations to give listener reports is a long-standing shortwave listening hobby activity. The writing assignment combines listening and language arts skills. Stations usually reply with letters or special postcards, brochures, posters, key chains, and bumper stickers. Teachers may use these items to prepare interesting displays in a classroom learning center.

NOAA NATIONAL WEATHER SERVICE BROADCASTS

Many people listen to a radio to hear weather reports; however, in a classroom it's not always convenient to wait for a radio station's weather report. With a weather radio, you don't have to wait. Weather radios are tuned to the NOAA (National Oceanic and Atmospheric Administration), weather channels that provide broadcasts 24 hours a day. Most NOAA broadcasts range about 50 miles from their main location. Many AM-FM radios, scanner radios, and CB radios include NOAA channels for listeners' convenience and safety. NOAA also coordinates a national program for trained volunteer weather watchers called Skywarn. Teachers may wish to consider Skywarn training for a class weather project or for individual science projects. SCANNER RADIOS: HEARING THE WORLD OF WORK A scanner radio will bring the world of work into the classroom. These high-speed scanning receivers monitor government, businesses, and nonprofit organization's frequencies in your local community. Unlike the shortwave radio, a scanner radio receives local FM communications and broadcasts within a range of about 50 miles. Since the conversations you hear on a scanner radio are between people, there is no way to know when they will occur. A scanner radio

scans through many frequencies and stops when a transmission signal is detected. The listener will hear many transmissions, and it is important to program the scanner radio to listen to the public service agencies desired. Some occupations that use scanner radios include: police, fire, hospitals, ambulances, aircraft, schools, universities, factories, warehouses, boats, taxis, city buses, delivery trucks, utility companies, TV and radio news crews, the FBI, mall security, hotels, and construction crews.

AMATEUR RADIO: PRACTICING HANDS-ON COMMUNICATION SKILLS

Many students today build their own web pages; however, students in the 1950s and 60s, built stereos and radios with kits from companies like Heathkit. Many students earned amateur radio licenses from the Federal Communications Commission (FCC) and built their own ham radio stations. Today, most ham radio operators buy ready-made radio equipment, and many enthusiasts listen to packet radio (connections between radios and computers) or participate in ham satellite communications. Other ham radio operators communicate with the NASA Space Shuttle and the Mir Space Station via amateur radio. Not long ago, the FCC eased the requirements for the entry-level ham license by eliminating the Morse code requirement. Students and teachers can now become No-Code Technician Class operators by passing two multiple-choice exams. Study guides for these exams include the entire FCC question pool, as well as full explanations for each answer. Kindergarten-age students have earned licenses, however most young hams are in the middle and high school grades. Many schools across the country and around the world have amateur radio stations. Students can practice speaking, interviewing, listening, and writing skills in an amateur radio school club or classroom activity. Some teachers use the amateur radio as the communications link for school-to-school projects. Real-time radio conversations allow students to practice listening and speaking skills-a valuable experience that is not found with an e-mail connection.

SUMMARY

Radio technology offers a unique way for K-12 teachers to integrate technology into the curriculum. Elementary teachers can help students learn basic electricity and regional geography in entertaining ways using AM radios. Social studies teachers will appreciate shortwave radios as a tool for teaching U.S. and global topics. Science, physics, and earth science teachers can use radios to demonstrate the properties of electricity, wave energy, weather, and the earth's atmosphere. English and language arts teachers will be able to use radios to reinforce listening, writing, and speaking skills. With a shortwave radio, foreign language teachers can provide advanced students with an opportunity to hear the authentic language demonstrated by native speakers. Teachers without Internet connections will find radios an accessible technology for bringing the world to their students.

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WEBSITE

American Radio Relay League (Ham radio)

http://www.arrl.org/ead/teacher/

AskERIC Lesson Plan: Integrated Learning with AM Radio

http://ericir.syr.edu/Virtual/Lessons/Interdisciplinary/INT0093.ht ml

The Complete Shortwave Listener's Handbook, 5th Edition

http://www.rnw.nl/realradio/book_yoder.html

http://www.universal-radio.com/catalog/books/1301.html

Crystal Radio Page

http://freeweb.pdq.net/headstrong/crystal.htm

Grove Enterprises & Monitoring Times magazine:

http://www.grove-ent.com/grove/hmpgmt.html

How Things Work--Radio

http://landau1.phys.virginia.edu/Education/Teaching/HowThingsWork /radio.html

http://ericae.net/db/riecije/ed364216.htm

Morse Code Translator

http://www.soton.ac.uk/~scp93ch/refer/morseform.html

Museum of Broadcast Communications

http://www.neog.com/mbc/

NOAA Weather Homepage

http://www.noaa.gov/

Ontario DX Association

http://www.durhamradio.ca/odxa/

Radio Days - A Sound Bite History

http://www.otr.com/

Radio Netherlands-SWL Resources

http://www.rnw.nl/

Universal Radio Company (shortwave radios and books)

http://www.universal-radio.com/

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