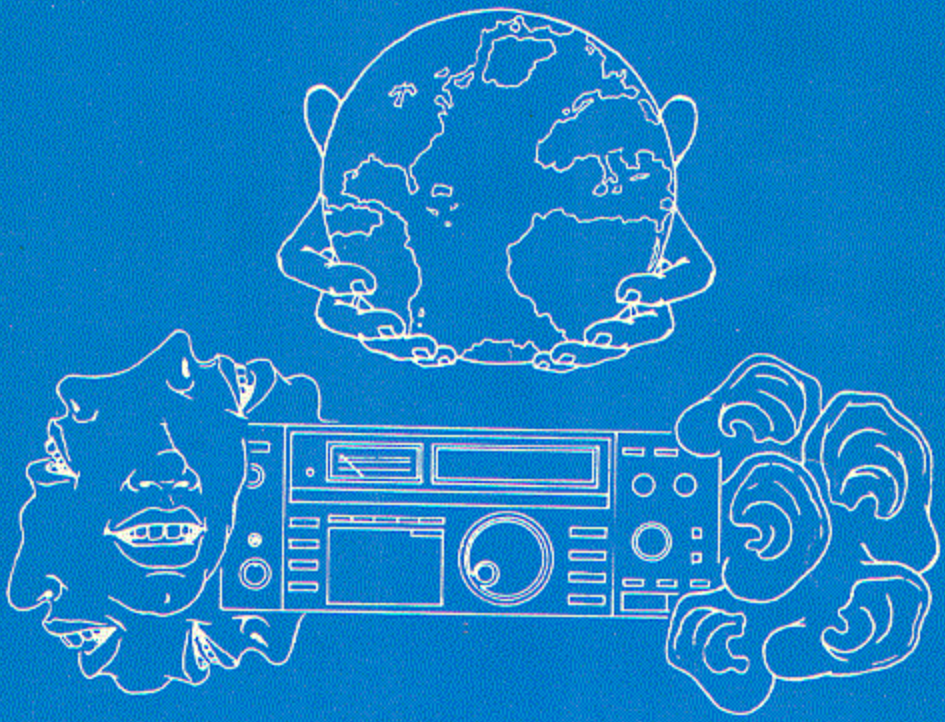
You're On the Air

Amateur Radio in the School Curriculum



New York City Board of Education
Office of Media and Telecommunications

You're On the Air

Amateur Radio in the School Curriculum

New York City Board of Education
Office of Media and Telecommunications

NEW YORK CITY BOARD OF EDUCATION

Robert F. Wagner, Jr., President
Dr. Irene H. Impellizzeri, Vice President

Dr. Gwendolyn C. Baker
Amalia V. Betanzos
Dr. Stephen R. Franse
James F. Regan
Edward L. Sadowsky

Joseph A. Fernandez, Chancellor

Copyright 1990
by the Board of Education of the City of New York

ISBN 1-55839-116-9

Application for permission to reprint any section of this material should be made to the Chancellor, 110 Livingston Street, Brooklyn, NY 11201. Reprint of any section of this material shall carry the line, "Reprinted from *You're On the Air* by permission of the Board of Education of the City of New York."

It is the policy of the New York City Board of Education not to discriminate on the basis of race, color, creed, religion, national origin, age, handicapping condition, marital status, sexual orientation, or sex in its educational programs, activities, and employment policies, as required by law. Inquiries regarding compliance with appropriate laws may be directed to Mercedes A. Nesfield, Director, Office of Equal Opportunity, 110 Livingston Street-Room 601, Brooklyn, New York 11201; or to the Director, Office for Civil Rights, U.S. Department of Education, 26 Federal Plaza, Room 33-130, New York, New York 10278.

FOREWORD

The Office of Media and Telecommunications and the Council for the Advancement of Amateur Radio in the New York City Schools are pleased to present this collection of lessons and other instructional information prepared by teachers who are also active amateur radio operators.

There are few hobbies that combine high technology and human interaction in the way that amateur radio does. Long recognized as an outstanding means of fostering understanding among the many countries (currently more than 300) in which radio amateurs are active, this communications medium has become more significant through its active relationship with NASA's astronaut program, and the launching of a series of amateur radio satellites.

Teachers involved in classroom amateur radio instruction find that students are eager to communicate with their peers in other cities, states, and countries. The acquisition of geographic knowledge, the use of foreign languages, and the study and appreciation of cultural and ethnic differences become the norm rather than the exception. Students who are normally verbally reticent compete with their more outspoken peers. Those interested in the technological intricacies that make amateur radio work find ample opportunity to work with mentors who often become personal and career role models.

Your comments and suggestions are most welcome.

Nola Whiteman
Director
Office of Media and Telecommunications

ACKNOWLEDGMENTS

This curriculum bulletin is a project of the New York City Board of Education, Joseph A. Fernandez, Chancellor. The bulletin was prepared by the Office of Media and Telecommunications, Nola L. Whiteman, Director.

Martin Smith, Assistant Director, Guidance Services Unit, and Jerry Eisenberg, Assistant Director, Office of Media and Telecommunications, served as coordinators for the project.

The writers directly responsible for planning, designing, researching, and field testing the lesson plans are:

Joseph Fairclough, Teacher, JHS 22M
Jeffrey Feigenbaum, Teacher, PS 139K
Albert Misunas, Teacher, Queens Vocational HS
Richard Wolfert, Teacher, PS 309K
Leonard Zuckerman, Principal, PS 225Q (Retired)

Special thanks to Rosalie White of the American Radio Relay League for her many valuable sugggestions during the preparation of this bulletin.

This manuscript was prepared for production by the Editorial and Production Unit, under the direction of Alaire Mitchell, Assistant Director of Curriculum Research; Elaine Bennett, Production Coordinator; Regina Paleski, Copy Chief; Kent Beaty, Desktop Publishing Specialist. The Project Editor was Linda Lewin. Copyediting assistance was provided by Bette Birnbaum; word processing by Malika Iman-Stanley and Patricia DePalo. Hippocrates Koutsoupakis designed the cover and the graphics are by Daniel Baxter.

TABLE OF CONTENTS

INTRODUCTION

Amateur radio offers educators a unique chance to weave a common thread through many subject areas and to introduce new, exciting, and often very self-motivating lessons as well.

Most people, when they hear the term "amateur radio," are aware that it involves people who speak through a microphone and a radio to places near and far. There are, however, many other forms of communication. Messages can be sent via television, Morse code, computers, and even through satellites out in space. With the proper equipment, one can leave messages on computer bulletin boards and receive weather information that can be printed in the form of weather maps.

There are a large number of amateur radio operators in the New York-Long Island-New Jersey area. They each passed an examination in order to get a license from the Federal Communications Commission. These people work in many and varied careers and have a common hobby–amateur or "ham" radio. Although they may work in jobs such as engineering, computers, radio, and television, many are working in fields having nothing to do with the hobby. Their common interest in communicating with others is the glue that binds them. They spend many hours not only "on the air," but helping each other when the need arises.

Amateur radio includes many types of activities. Among these are participating in contests, earning awards, doing public service at such events as the New York City Marathon, participating in a radio club, "rag chewing" (holding conversations with other operators), "DX-ing" (meeting people from other states/countries over the airwaves), teaching others through courses aimed at preparing them to pass the license examination, participating in training programs to prepare for emergencies needing expert radio communication services, and doing experiments to see how new modes of operation, such as satellite transmissions, will work. Every day, new and more interesting equipment is being invented to whet the appetite of the amateur operator.

Many educators are licensed amateur radio operators. They work hard to involve students and parents in this exciting hobby. Through the assistance of individuals who enjoy helping others to learn about amateur radio (often called "Elmers"), local radio clubs such as the Council for the Advancement of Amateur Radio in New York City Schools and the American Radio Relay League and organizations such as the Junior Astronaut program, which is sponsored by the engineering association, help children get tuned in and turned on to the wonders of being a "ham."

This curriculum bulletin is offered as a guide to teachers, administrators, guidance counselors, and department chairpersons, who can all become active in amateur radio by using it as a means of getting started, organizing a program and initiating exciting activities. The possibilities are endless!

STRATEGIES AND LESSON PLANS FOR HIGH SCHOOL

LESSON H-V

Social Studies–Amateur Radio in Public Service

Aim:

To help students examine the role of amateur radio in public service.

Materials:

Newspaper articles about various disasters, such as tornadoes, floods, forest fires, and plane crashes, where amateur radio provided communications assistance. (Three such articles are included in this lesson. More can be obtained from *Worldradio*–see bibliography).

Motivation:

Read articles about amateur radio operators helping in emergency situations. When all other means of communications are out, hams often assist in getting medical help, locating lost mountain climbers, finding lost children, and providing logistical and medical communications. Hams can also work at marathons and various parades to provide communication services. These are called public service and/or emergency communications activities.

Procedures:

Explain that the Federal Communications Commission defines amateur radio as a service—a public service performed without financial gain and on a voluntary basis. Ask, "Why would anyone spend money purchasing equipment and put him or herself in danger just to supply communications?" Elicit and discuss answers.

Describe the radio club concept to the class. Point out that most ham operators who perform public service activities belong to radio clubs. These clubs establish procedures for emergency situations. These procedures involve setting up certain radio frequencies and ways of operating which will be used in times of emergency. Nets (meetings of groups of ham operators on a prearranged frequency) are arranged, and ham operators practice emergency procedures on them. Explain that Field Day is another annual event during which hams prepare themselves for possible emergencies. (Field Day means operating without commercial power, e.g. using generators and setting up stations in woodlands and fields so as to duplicate severe emergency conditions.)

Ask, "Why do radio operators perform these services? What makes it all worthwhile? Tell about the recent emergency in San Francisco, when an earthquake struck quickly. Describe how hams got the first word out and maintained communications with the rest of the world. Also note that when southern Italy was devastated by an earthquake, it was the ham operators who called for help.

Summary and Review:

Ask, "Why do hams get involved and volunteer their services?" Elicit that it is because they have the skills, and the desire to do the job, and because they enjoy the satisfaction of being there to help.

Review the following information by questioning the class: Ham radio is considered a public service by its governmental licensing agency, the Federal Communications Commission. Hams help in all forms and modes of operation in all situations where communications are necessary. Hams set up procedures through their radio clubs and practice using these procedures to prepare themselves for future events. All this is done on a voluntary basis, using their own equipment and on their own time. Hams also volunteer their services for public events such as marathons and parades.

Follow-up Activities:

At the school library, have students find some of the publications of the American Radio Relay League on amateur radio, such as *QST* Magazine. They should read articles that describe how amateur radio helped in an emergency. Each student can write a summary of an article. Invite an amateur radio operator to come to the school to speak about Field Day. Show a movie or videotape on Field Day (which can be borrowed from the American Radio Relay League).

LESSON H-V
Article 1

The 'Big One' comes to Santa Cruz — an eyewitness account

Disaster strikes

At 5:04 p.m. Tuesday, Oct. 17, 1989, the second largest earthquake to hit the United States in this century — the largest since the beginning of Amateur Radio — hit Santa Cruz County. The temblor was felt throughout the length of California. Major damage occurred along a 75 mile length of the San Andreas Fault.

The shaker measured 7.0 on the Richter scale. Early estimates of total damage exceed $7.1 billion, making this the most costly natural disaster in US history. The 1906 San Francisco earthquake had damages of $5.1 billion and Hurricane Hugo's damage to the Carolinas is estimated by the insurance industry at $4 to $5 billion.

The heart of the disaster area

The city of Santa Cruz is situated on Monterey Bay, 60 miles south of San Francisco. The Santa Cruz Mountains cover most of this county, which has a population of 230,000. The mountains form a natural barrier between the county and "Silicon Valley."

The San Andreas Fault runs roughly along the crest of this range. Only a few roads span these mountains. Highway 17, which provides the principal access to the Santa Clara Valley and the San Francisco Bay region, carries many of the 20,000 commuters who work in Silicon Valley. With the advent of the earthquake, the highway was at once closed by slides involving some half million cubic yards of rock, soil and trees.

Slides and damaged bridges closed most of the other highways and rural roads to the east and south. Severe damage to the Moss Landing power plant resulted in loss of electricity throughout the central coast area and hundreds of people were suddenly without jobs and as many as 10,000 were homeless. This all took place in a mere 15 seconds.

I was babysitting my daughter's children while she ran an errand. The experience of riding out the quake on the second floor of her condominium, with crashing furniture, flying glass and the noise of the temblor is unforgettable. We were about six miles from the epicenter.

As soon as the three children were safely outside, I was on the air from my car. Hank Bond, KG6EE, was already taking damage reports. The enormity of the situation became apparent as about a dozen Amateurs reported in. Within minutes my daughter returned.

Early reports indicated that the downtown Santa Cruz business district was severely damaged. My wife was working on the third floor of the major store in that area.

Traveling toward the downtown area, sometimes in the wrong lane, the most obvious damage was the many broken store windows. There were no working traffic signals and the downtown mall was reminiscent of WW II era European cities. Broken glass and fallen brick lay on the streets and sidewalks. A few automobiles were under rubble. Most people had already fled the area.

Co-workers confirmed that my wife had escaped injury and already departed. At that point I was faced with a dilemma — proceed to my home or go to the emergency operations center. When I saw that outbound traffic was gridlocked, I drove the two blocks to the County Government Center. It wasn't until midnight that my wife finally learned of my whereabouts. It was another three days before I had a

Excerpted from Wayne Thalls, KB6KN, "The 'Big One' comes to Santa Cruz—an eyewitness account," *Worldradio* (Sacramento, CA), January, 1990. Reprinted, courtesy of *Worldradio*.

LESSON H-V
Article 1 Continued

chance to fully assess damage to my own house.

Amateur Radio operations

I was met at the County Center by Rich Hansen, KI6EH, Emergency Coordinator for Santa Cruz. We opened the station at OES and I assumed net control. We didn't know consideration was then being given to abandoning the building.

Within minutes we were joined by Hank, who had ridden a bicycle on sidewalks the mile or so from his house. What followed is literally a blur. For the next seven hours I was on the air virtually non-stop. We were much too busy to keep logs or record all communications. Messages were passed and acted upon instinctively. We provided sole communications between the OES and many locations, including medical facilities, the State OES and local governments. This situation continued sporadically for several hours.

Somehow we found enough operators for the radio equipped locations. Sharon Cooper, N6TUZ, and Dave Taylor, K6GHA, reported in from Red Cross. John Rider, N6TYH, came on the air at Watsonville Community Hospital. We learned it had sustained significant damage. Evacuation of patients from the critical-care areas, on the third and fourth floors of the building, began immediately. We summoned ambulances and helicopters from surrounding counties. Because many of the civilian and army helicopters could not communicate directly with the hospitals, we were forced to coordinate landings via the home bases of the aircraft.

As patients were being transferred, the other hospitals also began to receive quake victims. Shortages of medical personnel and supplies developed almost immediately. Fresh water for sterilization soon became a critical need. Amateur Radio played the key role in handling messages between local medical facilities and those in surrounding counties.

Ruptured gas lines caused numerous fires. Many additional reports of broken gas, water and sewer lines were conveyed via Amateur Radio throughout the following day. Road and bridge damage reports poured in. The morning after the quake we provided Amateurs as shadows for the engineers who came to inspect damaged buildings in Santa Cruz and Watsonville.

About an hour into the operation, the OES emergency generator failed and we were plunged into total darkness — there were no emergency lights. Fortunately, someone managed to find a flashlight. After being off the air some 10 minutes, we plugged our principal radios into the Uninterruptable Power Supply for the packet radio computer. The rest of the center was without power for at least another 15 minutes.

After several hours we were able to begin planning additional locations and staffing for continuing operations. The realization came that a relatively small number of local Amateurs had reported.

Personnel shortages plagued us for the next eight days. We were forced to rely heavily upon volunteers from out of the county, some from as far away as Los Angeles. Most came from the adjacent counties of Santa Clara and Monterey, where the quake effect was less severe. They manned Red Cross shelters and other temporary facilities. Many helped to maintain operations at the most crucial locations — County OES and the Red Cross. All told, nearly 400 Amateurs served during the days following the quake. They did a magnificent job.