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The Development and Utilization of a Radio Station in the Secondary School

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THE DEVELOPMENT AND UTILIZATION OF A RADIO STATION IN
THE SECONDARY SCHOOL

A Culminating Paper
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Faculty of the Lindenwood IV College

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by
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TABLE OF CONTENTS

CHAPTER	PAGE
I. INTRODUCTION	1.
II. HISTORY	14.
III. DEVELOPMENT OF THE RADIO STATION	21.
IV. SAMPLE SCHEDULING OF RADIO STATION PROGRAMMING	37.
FOOTNOTES	48.
BIBLIOGRAPHY	51.
APPENDIX A	54.
APPENDIX B	56.
APPENDIX C	58.

In a nation where there are 212 million people and 401 million radios, the existence and the use of radio as a mass media is taken for granted. Radio broadcasting has infiltrated every aspect of life. As has been stated by Marshall McLuhan in his book Understanding Media: The Extensions of Man:

The power of radio to involve people in depth is manifested in its use during homework by youngsters and by many other people who carry transistor sets in order to provide a private world for themselves amidst crowds...Radio affects most people intimately, person-to-person, offering a world of upspoken communication between writer-speaker and the listener. That is the immediate aspect of radio. A private experience.¹

Radio, being a very private and immediate media has been enhanced by being a very mobile media. Presently, there are 300 million portable radios in use in the United States. The mobility of this media aids in its particular assimilation into the lives of today's youth. Young people are constantly on the move. Most often this movement is accomplished by the use of the automobile. The acquisition of an automobile is the driving force and desire of many young people. Upon ownership of a car or at least use of the parents' car, comes the "mandatory" operational steps of driving the automobile: starting the engine, steering the wheel, and turning on the radio.

American youth is on the move and radios have become their constant companion. Current statistics show 100 million auto radios in existence. The infiltration of the radio does not stop when the car engine is turned off. Radio broadcasting follows the youth to the department store, the grocery store, restaurants, swimming pools and at office jobs. Very early in a young person's life, he learns that being put 'on hold' over the telephone means being switched to radio broadcasting of soothing music to aid in making his wait more palatable. This every day, all day, consumption of radio broadcasts by youth and the general public, by no means, is all inclusive of radio transmissions. Marshall McLuhan also indicated that youth listen to radio broadcasting while working on homework. This use of radio broadcasting represents only a very minor, if not wide spread application in connection with public education.

Radio programming and listening habits of the public reflect the interests of the radio broadcasting audience. For example, people interested in sports have the opportunity to listen to baseball, football, hockey and other sports events, including pre and post game interviews and commentaries. Programming also fulfills interests in general information by bring open forums, open lines and at your service format broadcasts to the audience. People continue to listen to radio broadcasts because they are able to find programs that hold interest and have meaning to their daily lives.

Being an electronics teacher and having a hobby of broadcasting, I became interested in how I could combine the elements of teaching and broadcasting in my educational setting. Besides these interest, I was also concerned with the criticisms that were being voiced about education. Currently, public education is being scrutinized by the American people. Across the country the demand is rising for traditional schooling or conservative alternatives. "Back to Basics" is a spreading slogan. The new name, "fundamental school" is growing popular. The public is complaining and demanding answers to such observations as "our youngsters aren't learning to read and write as well as they used to; the new math has wrecked their computation skills; academic standards are going down."² In addition to the measurable decline in students' performance, the public is also critical of seemingly widespread lack of respect, use of drugs and disintegration of the students' morals.

The "Back to Basics" cry of an alarmed public is being heard by educators. Educators are beginning to question why schools seem to be failing society in some aspects. In questioning failures and investigating possible solutions, the educator must return to the past as a frame of reference. Dewey indicates this idea in the following statement:

The institutions and customs that exist in the present and that give rise to present social ills and dislocations did not arise overnight. They have a long history behind them. Attempts to deal with them simply on the basis of what is obvious in the present

is bound to result in adoption of superficial measures which in the end will only render existing problems more acute and more difficult to solve. Policies framed simply upon the ground of knowledge of the present cut off from the past is the counterpart of heedless individual conduct. The way out of scholastic systems that made the past an end in itself, is to make acquaintance with the past a means of understanding the present. Until this problem is worked out the present clash of educational ideas and practices will continue.³

Dewey's words describe the conflict that exists in education today--a war between the past and present. If the public realizes that an educator is going to use the past or the "basics" as a guide to making the present educational systems more effective, it may not feel as threatened.

I felt that I could use the development of a radio station as a means of bridging the gap between the past and the present. The radio station could be the vehicle for taking the fundamentals or "basics" in education and allowing the students to actively relate or utilize these needed skills in a current or up to date radio broadcasting situation. The basics of electronics and broadcasting could be utilized in a way which would make learning more effective in the present.

Students also are critical of present public education. They find themselves virtual prisoners in a system unrelated to their needs or desires. In Fantini's view: "The high school is the only institution in the United States, except the prison, where they count the inmates seven times a day to make sure no one escaped."⁴

Some students perceive the experience of school as being

unrelated to their life. Many times schools become a place where students are never given the opportunity to get actively involved in the educational process. Therefore, they react very passively to education. Also, some students have failed repeatedly in school and as a result, they elect to be passive.

When a torpedo shoots at a submarine, the servo-mechanism in the torpedo cranks in feedback causing the torpedo to change course, locking in on the submarine as its goal. Humans have a similar mechanism in them which can lock in on either success or failure as a goal. The more early "success experiences," the more likely that success becomes an individual's goal. When the "success oriented" individual progresses through life and approaches one of the many obstacles or by-paths leading to failure, he consciously (and often unconsciously) increases his energy and effort to get over the obstacle or by-path and stay on the path to success, his goal. The pessimist, who has made failure his goal, on the other hand, comes to one of these by-paths, takes it, fails, and says, "I failed. I knew I would!" Accordingly, it seems vital for us to allow, to inject, or even to contrive, as many success experiences in our children's and student's lives as we are able. The human teacher who has learned to feel, and hence uses feelings in his teaching, has at his or her disposal so many of the attributes helpful for giving "success experiences" to others.

The development and utilization of a radio station is a way of getting students to participate actively in their learning. It is also a means by which the student who has experienced failure, can achieve success. Students will be given the opportunity to operate the radio station and develop their programs for broadcasting. Student body listening of certain programs would be one measure of success achievement for the student broadcaster.

Application of the radio station to the high school curriculum could also aid in one of the problems that exists in our schools today, which is that knowledge tends to be departmentalized or segmented. In English class, English is taught, in Social Studies class the student learns the social process. In her book, Curriculum Development, Theory and Practice, Hild Taba makes note of this problem of segmentation or 'specialization' of knowledge by stating:

One of these is the need for creating an integral orientation toward the whole society and the whole man. Scientific and technological reasoning tends to be so compartmentalized that specialists can talk only to each other. In contrast, productive insight on social problems requires an integration of facts and insights from many areas. A society which lives by specialization requires an education which can create a balanced over-all orientation and a perspective toward the whole culture and whole man...This integrated world view cannot come about when education consists of "disordered" knowledge in which one aspect bears no relationship to another and of training composed of a bewildering array of credits, courses and requirements. Knowledge and learning need to be so selected and organized that they will provide a young adult with a sense of unity, of meaningful relationship between himself and his world.

Instead of approaching education in terms of educating the total person or student in terms of his own interest, schools continue to divide the learning process into departments. Dewey indicates this idea in the following statement:

Again, the child's life is an integral, a total one. He passes quickly and readily from one topic to another, as from one spot to another, but is not conscious of transition or break. There is no conscious isolation, hardly conscious distinction...That universe is fluid and fluent; its contents dissolve and re-form with amazing rapidity. But, after all, it is the child's own world... He goes to school, and various studies divide and fractionize the world for him... Facts are torn away from their original place in experience and rearranged with reference

to some general principle. Classification is not a matter of child experience; things do not come to the individual pigeonholed. The vital ties of affection, the connecting bonds of activity, hold together the variety of his personal experiences. The adult mind is so familiar with the notion of logically ordered facts that it does not recognize--it cannot realize--the amount of separating and reformulation which the facts of direct experience have to undergo before they can appear as a "study," or branch of learning...The studies as classified are the product, in a word, of the science of the ages, not of the experience of the child.

It is this segmented, departmentalized approach to education which makes school systems non-reflective of life.

Departmentalization or pigeonholing of subjects can also have an adverse affect on vocational education. There is a tendency for vocational education to become too specialized and, as a result, the vocational department of the school becomes separate from the mainstream of the school curriculum and activities. In reality, it becomes a school within a school. Dewey spoke to this problem concerning vocational education:

There is doubtless--in general accord with the principles of habit--a tendency for every distinctive vocation to become too dominant, too exclusive and absorbing in its technical method at the expense of meaning. Hence it is not the business of education to foster this tendency, but rather to safeguard against it, so that the scientific inquirer shall not be merely the scientist, the teacher merely the pedagogue,⁸ the clergyman merely one who wears the cloth, and so on.

Taking all these complaints about public education into consideration, one must begin to attempt to formulate some solutions to the problems at hand. Having accumulated knowledge of the mass media of radio broadcasting and its

interrelationships with today's youth, a likely avenue of exploration into the solution of several educational problems might involve the amalgamation of the two entities--students and radios.

The relationship between American youth and the mass media of radio broadcasting has been formulated above. In radio, the teacher has a flexible media in which to apply educational objectives. The educational objectives would vary and be formulated by the subject being taught, but certain inherent advantages are gained by using radio broadcasting in the classroom. Radio broadcasting in the classroom can serve as a transmitter of materials. For example, it may include materials that are so recent as not yet to be included in text books and other available sources.

Radio may increase the number, variety, and intensity of students' interests. From musical programming the students could be exposed to a widely diverse range of musical selections--rock to classical concerts. Exposure to a multitude of programming as far ranging as to include such topics as growing plants to abortion to solar energy, would aid in opening and focusing the students' interests and suggest future avenues of study. This probably is radio's greatest contribution to school life. The radio offers such a wide variety of materials that it may stimulate hundreds of new interests and at the same time increase the intensity of existing interests. Wisely selected programs, scheduled and prepared by both students and faculty, may

broaden the students' horizon and extend their interest over an almost limitless field.

Radio may expose the students to conflicting points of view. Usually, students are limited, in studying controversial issues, to the viewpoint expressed in their text books, or by the teacher, or to evidence available in the local community. Utilization of panel discussions and formal debates on a given topic could be scheduled to expose the students to various viewpoints of the topic.

Together with newspapers, radio programs offer some of the best material available on current events, but most important, happenings are broadcast or described at the time they happen. Students could be encouraged to participate in preparation and programming of on-the-spot interviews of interest stories whenever possible.

Students should learn to judge and evaluate radio programs, the various forms of radio production, the actual material included in programs and, especially if the radio station broadcasts it, the advertising and publicity which is so much a part of the American system of broadcasting.

Radio broadcasting and the introduction of the radio station into the high school curriculum enables the students to be active participants in the various aspects of learning involved with this educational tool. Students are able to participate on all levels of involvement--from program planning, scheduling, writing to actual broadcasting. This

active role of the students in the learning process is vital for making their education more meaningful. As

John Dewey stated:

There is, I think, no point in the philosophy of progressive education which is sounder than its emphasis upon the importance of the participation of the learner in the formation of the purposes which direct his activities in the learning process, just as there is no defect in traditional education greater than its failure to secure the active cooperation of the pupil in construction of the purposes involved in his studying.

The use of commercial radio broadcasts in the classroom has certain inherent drawbacks. Among the most obvious involves classroom scheduling and classroom topics to be covered. Radio broadcasting is a twenty-four-hour activity; the public school day includes only approximately six hours. In many cases, desired or interesting information broadcast over the radio does not air in the hours covered by the school day. Relevant topics may also be presented at an inopportune time or may not be included in the public radio broadcasts in such a manner as to be of service to the classroom teacher.

Such stumbling blocks to the use of radio broadcasting in the classroom can be overcome. One solution to scheduling problems might involve the teacher in taping the broadcast for future use in the classroom. The second stumbling block is not so easily overcome by the teacher.

The refinement of the use of radio broadcasting in the classroom and the solution to the inherent problems involved with the use of the public radio broadcasting stations could be aided or solved by the introduction of an

actual school radio station.

The ability of the teacher to control the airwaves of radio broadcasting could make radio a truly valuable teaching aid. The problems of classroom scheduling and topics could be eliminated by the use of a school radio station. Teachers and students would have direct input into the programming or scheduling and topics broadcast over the school radio station. Flexibility and program quality would be in direct control by the teachers and students. Interdepartmental use and cooperation in programming and topics explored could aid in eliminating segmentation of learning. Having a radio station at their disposal could further involve students in their schooling and assist in making their education more reflective of life. They could be in direct control of an integral part of the everyday mass media. With the addition of a radio station into the public school, teachers and students would also be involved with the more technical and electronic aspects of running a radio station. The building of the components needed for broadcasting, the maintenance necessary for broadcasting and the actual manning of the microphone could all be responsibilities the teachers and students would share.

In my view point, I see the high school as a sheltered training ground where students should be able to constructively experience a wide variety of learning situations. It is the responsibility of the faculty to provide a learning environment in which the student can experience real life experience with-

in the security of the high school. Such a real life situation could be experienced by the students' participation in the radio station and radio broadcasting. The high school environment should allow students to experience as many learning situations as they choose without fear of loss of personal investment. Schools should be a place where students can try a wide variety of interests. Hopefully, they will find areas of interest to pursue later in life. The students experiences should be guided by freedom of choice in extra curricular activities. Such an extra curricular activity open to the student would be the radio station. The radio station would afford the student the unique opportunity of a hands-on manipulation of a learning tool.

From a personal point of view, the radio station project has served as a learning aid for my professional and personal development. I have gained confidence in the ability to complete a large scale project. I have successfully adapted and fabricated electronic circuits for use in the radio station. Application of the radio station into the high school curriculum has afforded me the opportunity to become involved with various departments within the school and to become aware of their operations and relations with other departments. This awareness of departmental functions has helped me see the need for curriculum structure and interdependence between subjects and departments. The radio station project has become a tool for student motivation within my field of

teaching. Students have shown open interest in participating in the radio station project. Their interest has opened the way for interaction between myself and the students on both a personal and curriculum level.

The importance of a radio is expressed by Berthold Brecht:

You little box, held to me when escaping
 So that your valves should not break,
 Carried from house to whip from ship to train,
 So that my enemies might go on talking to me
 Near my bed, to my pain
 The last thing at night, the first thing in the morning,
 Of their victories and of my cares,
 Promise me not to go silent all of the sudden.¹⁰

HISTORY

An understanding of past achievements and technical developments in the field of radio and radio broadcasting appeared to be a logical focal point, as I began to refine my radio station project. After doing reading and research into the historical development of the mass media of radio, it became apparent that radio and radio broadcasting was the result of a combined effort on the part of numerous men in the nineteenth and twentieth century.

Radio is a new agency brought by science to our people which may, if properly safeguarded, become one of our greatest blessings...To the control of these channels we should maintain the widest freedom of their use.--Calvin Coolidge

The story of radio broadcasting is one of natural evolution of an art and industry born of science. It did not happen overnight, nor was it any one man's conception.

Broadcasting grew out of wireless. Wireless refers to a phenomena developed by such nineteenth century men as Maxwell, Hertz, and Marconi. In the mid 1800's a scientific theory existed involving the concept of "the ether." "The ether" was defined as an imponderable, electric medium supposed to pervade all space as well as the interior of solid bodies; an invisible, odorless, tasteless substance was assumed to exist, through which light, heat and radio waves could be transmitted.

In 1867, James Clerk Maxwell, physicist and mathematician at the University of Edinburgh, mathematically reasoned and

theoretically outlined, the action of "ether" waves. Inspired by an idea that the attraction or ^Prepulsion produced by electricity and magnetism were caused by some "action at a distance"--by an unseen medium space--Maxwell set out to find, mathematically at least, the missing link. As a result, he identified what he called "the ether" believed to permeate the universe. He concluded that light and heat were electromagnetic undulations in the "ether." He was credited with having discovered "an elemental ocean in which the truth may yet be found."¹¹

Fascinated by Maxwell's theory, Heinrich Rudolph Hertz, a German physicist, took up the task of confirming it. As a result, he was the first to create, detect, and measure electromagnetic waves. He found a close kinship between these invisible waves and light; he concluded that the velocity of the electromagnetic impulses was the same as that of light--186,000 miles a second.

By the end of the nineteenth century the existence of wireless remained an electrical theory. In 1864, Guglielmo Marconi, a young Italian experimenter, put together an induction coil, the Hertz wave emitter, the spark-gap, a telegraph key, batteries, and a coherer. He hoped that the combination might enable him to send and receive signals across his father's estate. Marconi succeeded where others had failed by making use of the so-called ground return; i.e., both the transmitter and the receiver had

connections with the ground. He heard cricket-like sound across three-quarters of a mile--that marked the beginning of wireless telegraphy.

Experimenters were confident that if dots and dashes could be broadcast so could spoken words and music. So they set out to develop the wireless telephone, primarily for point-to-point communication, from shore-to-ship and ship-to-shore. Their objective was not a medium of mass communication; in fact, there is no evidence that they thought of such a thing. Their goal was to make wireless talk. It was no easy job. They had no electron tubes, no microphones.

One of the first Americans to accept the challenge of radio broadcasting development was Reginald Aubrey Fressenden. His testing of 'prolonged oscillations' or continuous waves, led him to wireless telephone experiments. In 1906, Fressenden used telephony to communicate from Plymouth, Massachusetts, to Long Island, New York, a total distance of 200 miles.

Radio broadcasting development was furthered by Lee deForest. This electronic experimenter introduced a 3-element tube which he named the audion. Invention of the audion was the main step in development of a practical radio, but it created engineering challenges to develop circuits, or hook-ups as they were called, in which the tube could perform; that in itself became a new technology. DeForest made another major contribution when he connected the "B" battery in the circuit with the plate, filament, and earphones, there-

by gaining greater amplification. He developed the famous regenerative, or feedback circuit, which was used in millions of broadcasting receivers.

"The year 1916, was memorable in my life. It marked very definitely the actual beginning of planned and systematic radio broadcasting and of the use of the three-electrode tube as transmitter."¹²

Up to this time, the main purpose of broadcasting was to stimulate the sale of radiophone apparatus, chiefly to the already established audience comprised of wireless amateurs. Communication needs of World War One necessitated and facilitated mass development and production of radio apparatus. During the war, the Westinghouse Electric and Manufacturing Company, by special license from the government, was permitted to build and operate two experimental stations for both telegraphic and telephonic communications. One was located at the company's East Pittsburgh Plant and the other in a residential section five miles away, at the home of Frank Conrad, an engineer. When wartime restrictions were removed from amateur radio stations, Conrad took to the air with his radiophone transmitter and broadcast phonograph records, talks and baseball and football scores. The primitive broadcasting experimented with in Pittsburgh set the stage for the development of the first pioneer broadcasting stations.

On November 2, 1920, KDKA, as the new station was known by its call letters, went on the air with the Harding-Cox

election returns. On the following day a daily program service was instituted from 8:30 AM to 9:30 PM. A multitude of radio stations began to pop up. The popular philosophy became--"a receiving set in every home, in every hotel room, in every hospital room." The assimilation of this philosophy can be attested to by the recorded radio sales. In 1922, Americans spent \$11 million for radios; \$22.5 million in 1923; and in 1924, \$50 million. In any event, 1920, was the kickoff year for radio broadcasting.¹³

By the time of the late 1920's, radio broadcasts from all origins in the United States were federally licensed. Commercial broadcasts had a definite format, advertisements paid for the costs of the station, and the beginning of educational broadcasts was at hand.

The thirties might well be called "the shortwave decade" as shortwaves made radio more and more international. Ultra-short wave development was also a product of the thirties.

Major Edwin H. Armstrong, a disciple of ultra-shortwaves, tossed a bombshell into the firmament of broadcasting in 1935 when he demonstrated a new system--frequency modulation, popularly called FM--at a meeting of the Institute of Radio Engineers. Superb in tonal excellence, and out of range of atmospheric disturbances as well as other extraneous noises, it was staticless.

Every year throughout the history of radio brought some new development--some fit easily into the existing systems; others more revolutionary came at less frequent intervals. For example, the transistor, a semiconductor non-electron tube device, was developed by scientists of the Bell Laboratories in 1948. It was the key to a new branch of electronic science--solid-state electronics, so called because electrons could be liberated from tiny chips of solid materials such as germanium and other metals. No longer was the electron tube with its heated cathode exclusively essential as a device to free electrons from a placid state and harness them for useful purposes. Now a semiconductor performed the trick with marked simplicity and without generating heat. Rugged and less fragile than a glass bulb, tiny in size and needing little current for operation, the semiconductors opened the way for radically new compact and portable designs for radios.

After twenty-five years of growth and prosperity, radio broadcasting ran into television competition. Since the early twenties, radio met challenge after challenge--always changing, always confronting something new and improved. But television was something bigger. Television, an offspring of radio, offered a new service--sound and sight combined. It offered much that radio did, but with intensified mass appeal.

Television's effect on radio was revolutionary. Radio had to change its ways and concentrate on what service it could perform that television could not--for example, in automobiles and in small portable form. News, spot announcements, and local advertising were its strong forte for survival. The transistor that made radios pocket-sized enhanced its usefulness. Nevertheless, radio broadcasting slipped in the fifties as television gained at radio's expense. The disembodied voice alone found it increasingly difficult to compete with a voice and a smile.

Dire predictions were heard that the impact of television on radio would be like the automobile's effect on the horse-and-buggy. The tests of time and competition had caught up with radio.

While battling to survive against television, AM radio faced another competitor in FM. In the thirties, it was called the inventor's dream, and FM was referred to as the symbol of a frustrated medium. Nevertheless, FM continued to grow, despite the fact that it ran head-on into television in the post-war period. Sales of FM home receivers steadily climbed several million a year.¹⁴

Radio and radio broadcasting has survived the test of time and technological advances. Radio has proved itself to be a flexible media able to adapt to a changing society. Radio sales and advertising are at an all time record high. In 1976, radio broadcasts are reaching over 212 million Americans on more than 401 million radios.

DEVELOPMENT OF THE RADIO STATION

The introduction of a radio station into the secondary level curriculum can be applied to learning and student involvement. One application would involve the radio station serving as an outlet for students who are interested in the intricacies of electronics. The development of a radio station is very complex. However, through the use of modern day technology, it was possible for myself, an electronics instructor, to design a dependable functioning radio station for carrier current applications.

The initial step of designing the radio station would be the only area in which student participation would not be the main objective. Prior to any actual designing of the radio station, I decided to make a survey to determine the student reaction and interest in a school radio station. The survey consisted of questions directed to the field of electronics and its many facets of interest. Such areas of electronics as ham radio, citizens band radio, and commercial broadcasting, to name a few, were surveyed to determine to what extent the students wanted to be involved in electronics. (Appendix A) The surveys were distributed to the electronics classes, at Hazelwood East High School, which consisted of approximately one hundred and thirty students. The survey results indicated that 110 students were in favor of a school radio broadcasting station.

This survey was extremely important since the purpose

of creating a project which would apply the technological aspects of the electronic classes was a device to actively involve the students. A majority of the students that enroll in electronics classes show many signs of deviant behavior as defined by Swift and Spivack in their book Alternative Teaching Strategies. One of these behaviors is inattentiveness. Swift and Spivack state that the teacher, in combating inattentiveness, must determine the cause, develop teaching techniques which gain and maintain attention to academic matters, and develop activities which make the inattentive student an active participant.¹⁵ The very origin of the radio station, the survey, served as a tool to communicate to the students that their instructor was relying on them for direction in this project. By this open-solicitation for help, I hoped that maximum attentiveness and involvement could be obtained.

At this point, the radio station was viewed as a method of harnessing student interest into a constructive and educational apparatus for my own field of instruction, as well as an outlet for my own interest or hobbying in electronics and radio broadcasting. Thus, with the students and the instructor both committed to the idea of a radio station, an effective practical curriculum project evolved.

Evolution of the radio station project involved the physical steps of design, component accumulation and fabrication of the station.

Designing of the radio station involved the combination of many sources of information. These sources consisted of Popular Electronics magazines, Audio Cyclopedia, Audio Systems, and Sourcebook of Electronic Circuits, to name a few. The physical layout of the school radio station was fashioned after a radio station I operated at the University of Missouri at Rolla, as an undergraduate at that institution. The layout lent itself to easy operation by one person. This type of layout could encourage individual students to become self-reliant and assured of their own abilities. (Appendix B)

Cost was also a factor to be considered in the design of the radio station. The accumulation and combination of components for the radio station required both time and ingenuity. Reliance on the text Audio Control Handbook for Radio and TV Broadcasting, directed the search for particular components. My limited money supply dictated the condition of repair in which the components were obtained. In most cases, components were obtained in dire need of repair and restoration. Specific major components needed included two turntables, a reel to reel tape recorder, a set of speakers, a transmitter, a modulator, two VU meters, and a cassette recorder. After determining what components were needed and what price was affordable, I enlisted and exhausted every source available. The search for these major components for the radio station went as far as Atlanta, Georgia, for the turntable, to soliciting used and broken equipment from students, friends, and relatives. The

major components and all necessary related material were stockpiled for a period of six months before attempting actual physical layout and construction of the radio station.

During this period of time, I was also gaining the necessary encouragement to attempt such a project as the radio station from the enthusiasm and constant questioning by students as to when "their" radio station would be ready for operation.

The following chart summarizes the major components, price, and condition.

Component	New Price	Used Price	Condition
Turntable (Garrard)	\$ 99.50	\$ 10.00	Very poor shape needed new tone arm
Turntable (P.E.)	\$140.00	\$ 12.00	Poor shape
Speakers	\$ 50.00	donated	Good shape
Reel-to-reel tape recorder	\$150.00	donated	Fair shape
Record Amplifier	\$ 75.00	\$ 3.00	Very poor shape
AM/FM Tuner	\$110.00	\$ 15.00	Very good condition
Transmitter	\$ 90.00	donated	Had to totally rebuild
Modulator	\$100.00	\$ 20.00	Very good condition
VU meters	-----	\$ 16.00	New
Cassette Recorder	\$ 75.00	\$ 5.00	Good condition
Cartridge transports	\$ 50.00	\$ 10.00	Fair Shape

Mechanical and electronic fabrications were the next areas of concentration in developing the radio station. A select group of students from the electricity classes was enlisted to help in the physical fabrication of the radio station. Students were selected on the basis of interest and a willingness to work after school and on weekends. Students helped in mechanical construction of such items as component bases and speaker enclosures. In a radio station with eleven major components, there was an enormous amount of wiring and interconnecting of components that had to be fabricated. This area of construction was extremely intricate and time consuming. A total time of approximately 200 hours was spent on major wiring. Most of it was completed by the author with very little help from the students. The required skills of reading schematics and soldering were covered in the electronics classes. Therefore, the students were able to be involved in the more mechanical aspects of fabrication of circuit boards and rough wiring, needed in this step of development of the radio station. Student selection for participation in this activity required the students to be enrolled in the electricity classes and to have shown an aptitude for electronics. This afforded the student the opportunity to gain first hand knowledge of the electronic principles introduced in electronics classes.

Alfred Whitehead, in criticizing education, states that:

First hand knowledge is the ultimate basis of intellectual life. To a large extent book-learning conveys second-hand information, and as such can never rise to the importance of immediate practice.¹⁰

In building the radio station, students were being allowed to apply their newly-gained skills to a practical project. As the radio station began to take form, students were encouraged to begin planning and organizing themselves into a group involved in utilizing the radio station. I initiated a radio club to fulfill the need of student organization.

The membership of the Radio Club was opened to all students, grades nine through twelve, who showed interest in the subject. Clubs at Hazelwood East High School are chartered by the administration. The aims and objectives of the Radio Club were included in the school charter with the primary objective of the Radio Club being to prepare students for the operation of the radio station. Students have to be Radio Club members in order to operate the radio station. As a club member, the student is informed about the material necessary for study in order to obtain the radio station. The student is introduced to the federal laws governing radio broadcast stations set down by the Federal Communications Commission (FCC).

The FCC requires a radio broadcast operator to possess certain licenses. These required licenses are categorized into degrees of knowledge and complexity of material mastered.

The categories are referred to as licenses. The knowledge and complexity of material are referred to as 'elements' and the licenses for radio broadcast are:

Radiotelephone 1st Class Operator's License with a mastery of Elements 1,2,3, and 4.

Radiotelephone 2nd Class Operator's License with a mastery of Elements 1,2, and 3.

Radiotelephone 3rd Class Operator's License with a mastery of Elements 1,2, and 9 with broadcast endorsement.¹⁷

The 3rd class license is the least difficult to obtain and the 1st class license is the most difficult.

The students were supplied with the necessary study materials (Commercial Radio Operator's License Guide), and informed of the procedure which will lead them to operation of the radio station. The procedure was formulated to the individual students' needs and desires. On the most elementary level, a written text was provided to introduce the students to the needed information associated with the laws and electronics involved in operating the radio station. The text provided was a copy of laws and regulations necessary for the 3rd class license. The students were instructed to read the material on their own. Those students having problems interpreting the materials offered in the text were given help in group sessions held during club time.

At the point at which the student felt he had obtained working knowledge or mastery of the prescribed information, a preliminary test was administered. The test was scored and

the results were discussed with the student. (Appendix C)

Mastery at this level means correctly answering thirty-two out of forty questions. Students who passed the test, were entitled to operate the radio station. In reality, students passing my exam had unofficially passed the exam for a third class license.

If the student failed to obtain mastery of the material at this level, several alternatives were available to him. A written study guide could be utilized. The availability of student tutors, who had already obtained mastery of this level, would also be brought to the attention of the student.

On a more advanced level, the students who had mastered the third class license were introduced to the possibilities of obtaining a radio engineer's license, ie; second and first class. The second and first class licenses are difficult to obtain due to the amount and quality of electronic knowledge necessary. Therefore, it is mandatory for the student interested in obtaining the licenses to be successfully enrolled and functioning in both of the electronic classes in the school curriculum. Aside from the necessary enrollment in the electronics classes, the students would work at mastery of their second and first class license in the same manner in which they had mastered their third class license. The students would progress at their own pace with the aid of study materials and group and individual tutoring sessions held with the teacher at designated times arranged during club meetings.

The actual operation of the radio station, upkeep and maintenance of the mechanics and electronics is student centered with faculty supervision. Information necessary for operating and maintaining the radio station has been compiled and organized into several technical manuals developed by the teacher for use by both students and faculty. Technical information necessary for operation of the radio station is available for both the students and the faculty through the use of the Operators Manual. Copies of the Operators Manual are available through the student-librarian of the radio club. The Maintenance Manual was developed as the radio station was under construction. It consists of technical schematics of the various radio station components. The third manual compiled was the Radio Club Manual, which serves as a handbook of information for the rules and prerequisites connected with the radio station operation. Copies of the Radio Club Manual are available for use through the student-librarian of the radio club. Easily accessible written information dealing with the radio station is of significant importance in the totally new facility of Hazelwood East High School.

Having been organized for three years, Hazelwood East High School is a relatively new school. A totally new facility will be used for the first time at the beginning of the 1976 school year. The student body is in need of organization, tradition and identity as a school. The radio station could

be a concrete focal point and synthesizer of student activity in an attempt to generate a positive school spirit. Announcements of school activities, contests and athletic events could be incorporated into the broadcasting schedule.

At the same time that the students are in need of school identity, they are also in need of educational identity. If students are to grow up to be autonomous, and have competence in decision making based on alternatives that they can live with, they must have an opportunity to develop those characteristics which mature members of our society ought to have. One way of allowing students to have this opportunity in school is through the development of instructional media such as the radio station. Lamar P. Miller, in an article entitled "Instructional Media For An Open Society", identifies some of the needs, objectives and goals that the developer of instructional materials must be aware of:

1. Advance the learning and personal development of students.
2. Emphasize an open-ended inquiry approach to learning and represent a balance between the immediate social environment and the larger social world.
3. Be functional. Stress skills necessary for one to cope with life.
4. Take into account new instructional strategies that include a balanced combination of written, visual, and new technological development.
5. Stress the dignity and worth of the individual.
6. Assist students in identifying with the educational process.
7. Seek to motivate students to examine their own attitudes and behaviors and to comprehend their own duties and responsibilities as citizens.

Introduction of the radio station into the curriculum as a teaching aid, has direct application to the needs, objectives and goals outlined by Miller. The learning and personal development of the students is advanced by the success experiences encountered by the students when they master their operator's licenses. Exposure to the radio station may bring immediate gratification and also open up new ideas as to a future in radio broadcasting for some students. Inquiry is very much a part of the radio station and its application to the high school curriculum. All programming and topic selection and development is student centered and student and faculty originated. Since the students help to determine topics, the topics aired on the radio station and the information transmitted can be carried over into everyday life experiences of the students. Technical development of the radio as a mass media and the use of the radio station as a teaching aid reflects Miller's fourth objective. The dignity and worth of the individual is stressed by the use of the radio station as a teaching aid in several applications. For example, the students may feel that they had direct input into the entire radio station project through the use of the initial survey taken to poll their interests and desires. The variety and intensity of involvement with the radio station is left up to the decision of the individual student. The radio station is a positive force

for student success achievement. The radio station provides a wide variety of activities in which the student can excel or master or participate. The students are directly involved in the learning process connected with the radio station as they are individually mastering the materials necessary for the operation of the radio station. The student is placed in a position of responsibility when he is in charge of operating, programming, scheduling or any other duty necessary for running of the radio station. Interaction between the students and the radio station not only achieves the objectives of Miller, but also serves to reinforce what Dewey states:

Experience has shown that when children have a chance at physical activities which bring their natural impulses into play, going to school is a joy, management is less of a burden, and learning is easier.

One purpose of the radio station is to facilitate an interdisciplinary approach to learning. In preparing instructional materials for these interdisciplinary radio programs, the needs, as defined by Miller, served as a central focus.

If educators are truly concerned with making the learning environment more reflective of life, and thus more relevant to the needs of students, they will begin to encourage holistic approaches to learning. When students

begin to see that knowledge can flow freely between classes and into life, they will assess the schooling experience as being meaningful and valuable. One such holistic approach is the development of an interdisciplinary learning experience.

The introduction of a radio station into the curriculum of Hazelwood East High School was one way of facilitating an interdisciplinary approach at the secondary level. In an attempt to introduce the radio station as a tool or vehicle for interdisciplinary learning, a week's programming was planned by representatives from four different departments at the high school. The departments involved were the Communication Skills Department, the Fine Arts Department, the Social Studies Department, and the Practical Arts Department. After careful consideration as to what topic might involve the most students and to what would be most beneficial to classes in these departments, a theme emerged. The theme concerned the topic of Reality vs Fantasy. Having selected a theme, the committee then decided on what type of programming each department would be responsible for and the specific tasks for each. It was decided at this time that each department would plan a day's programming. The committee then decided that the culminating day would be an analysis and synthesis of the experiences encountered in the week's programming. Thus, students representing each of the departments participated in the last program.

Within the thematic context of Reality vs Fantasy, there

are possibilities. Various classes from different departments would work on the topic based on their area of study. The following classes could be slated for participation in this interdisciplinary endeavor.

1. Drama Classes - These students could be doing cuttings from various plays. This could afford them the opportunity to present their efforts through a different media. It would also make the learning more concrete and experimental and could serve as a means for students to evaluate their own performance.
2. Advanced Composition Classes - These classes could be reading texts like "The Glass Menagerie" and could be exploring the theme of escape from reality. They could write a critical review of the performance. The radio programming would allow them to focus more sharply on the fantasy versus reality theme and an opportunity to present their critical reviews to an audience.
3. Responsible Decision Making Classes - The purpose of this class is to encourage students to face the reality of decisions. Involvement in this radio series would give them the opportunity to apply socio-drama techniques and a model for problem solving in order to solve a value-based problem.
4. Human Behavior Classes - During the course of the semester, this class devotes much time to the study of dreams and the relationship of dreams as a key to understanding the human behavior of man. Thus, this topic could give the students the opportunity to share and clarify some of the theories that they have learned.
5. Practical Arts Department - Unless otherwise stated, in all such interdisciplinary activities the Practical Arts Department would be involved through the capacity of the Radio Club. The Radio Club members would be involved through the responsibility of presenting the programs provided and for coordinating the various interdisciplinary participants.

In this sample of interdisciplinary programming, many of Miller's objectives are present. Through the cooperation of the various departments, the students have benefited by being exposed to a multitude of views dealing with a selected topic. By using the radio station, the students would become involved in the learning process, and the learning process would also become more reflective of life.

Conversion of the radio station from carrier current operation to on the air transmission, would aid in making the radio station project more reflective of life or more professional. On the air transmission would involve acquisition of a type accepted transmitter, a transmitting antenna authorized by the FCC, and an engineer would be needed to layout a propagation chart necessary for a license along with the license application. These additional procedures and equipment would cost approximately three thousand dollars. An expense such as this would have to be absorbed by the school district in order to fulfill this goal. The conversion of the radio station to on the air transmission would be beneficial because it would increase the broadcasting area, improve the audio quality, and bring a more professional opportunity for the students involved in operating the radio station. Conversion of the radio station to on the air transmission would change the necessary requirements for student participation. Students would be required to pass an official 3rd class license administered by the FCC. In addition, the

students would be required to exhibit a working knowledge of correct grammar and a knowledge of public speaking, when broadcasting over the radio station. Their broadcasting performances would be evaluated and improvements would be offered by both the radio club sponsors and the communication skills teachers.

On the air broadcasting would expand the length of broadcasting time and the type of broadcasting available for the radio station. The radio station broadcasts would also be transmitted into the community. Current Carrier broadcasting is limited to school hours only, whereas, on the air broadcasting could be expanded to night time transmission. With the addition of time and the broadening of the audience to include the surrounding community, the radio station programming might be increased and widened to include such programs as: sporting events, public debates, town meetings, 'Meet Your Mayor', and community service type broadcasts. The radio station broadcast selections would be directed by the students, faculty and community interest shown in any particular programs. This interest could be tested through the use of surveys, phone polls, and letters received and conducted by the radio club.

SAMPLE SCHEDULING OF RADIO STATION PROGRAMMING

Utilization of the radio station programming time is determined by the needs and desires of both the radio club members and the various departments within the curriculum. The radio club members are responsible for development and organization of regularly scheduled programs throughout the broadcasting day. Operated by the radio club members, the radio station would be broadcasting a variety of scheduled programs at any given time during the school day. The programming would be flexible enough to include or incorporate any special needs of the various departments within the curriculum. The following is a suggested daily program schedule for the radio station broadcasts:

8:15 to 8:30	GOOD MORNING EHS
8:30 to 9:30	OPEN PROGRAM
9:30 to 10:00	OPEN PROGRAM
10:00 to 10:30	COMMUNITY AND SCHOOL NEWS
10:30 to 11:30	OPEN PROGRAM & PEER ADVISOR
11:30 to 1:00	LUNCH MUSIC & ISSUES AND ANSWERS
1:00 to 2:00	OPEN PROGRAM
2:00 to 3:00	OPEN PROGRAM & ACTIVITY WRAP-UP AND ANNOUNCEMENTS
3:00 to 3:15	HAVE A GOOD DAY EHS

GOOD MORNING EHS--Morning music to accompany the arrival of the students and faculty.

COMMUNITY AND SCHOOL NEWS--An update of happenings important to the student body in their school and community. An emphasis will be placed on direct interviews of persons involved in the news.

PEER ADVISOR--Radio club members will attempt to answer letters from other students involving concerns the students might have in their personal life.

ISSUES AND ANSWERS--Topics for this program will arise from current questions, problems or concerns the students might have. The program will be of a flexible format in order to adapt to the topic covered.

ACTIVITY WRAP-UP AND ANNOUNCEMENTS--Extra-curricular activity schedules will be announced and any other important announcements will be made at this time.

HAVE A GOOD DAY EHS--Afternoon music to accompany the departure of the students and faculty.

Whenever OPEN PROGRAM TIME exists, radio club members will have an opportunity to broadcast their own individual programs. Individual programs may consist of any format that the student chooses, as long as the format meets the legal requirements of broadcasting. The students will be encouraged to be consistent in their broadcasts in order to build a listening audience for their programs. A priority will be given to interdisciplinary programs developed by various departments within the curriculum, during OPEN PROGRAM TIME.

SUBJECT: Solar Saves

DEPARTMENT AND COURSES: Industrial Arts--Electricity, Woodworking,
Metals
Social Studies--Our Precarious Habitat,
Whats' Happening Now
Communication Skills--Seminar and Ideas
Science--General Science

OBJECTIVES: Industrial Arts-- Students will be able to list and identify various energies and their sources. Students will be able to show knowledge of how solar energy can be harnessed to work for man.
Social Studies-- Students will be able to identify the various arguments for and against the use of solar energy.
Science-- Students will be able to apply their knowledge of solar energy to simple demonstrations of its applications.
Communication Skills-- Students will be able to formulate thesis statements and supporting arguments as a result of investigating this topic.

SUGGESTED LEARNING EXPERIENCES: Any or all of the following activities could be completed in class by individual students or small groups of students and aired over the school radio station for entire classes or select groups.

1. After listening to a program on solar energy the students could make lists of all items and activities in their daily life that involve the use of public utilities: cars, radios, hairdryers, lights, ect.
2. Students will do readings on articles in current perodicals about solar energy. They could give reports.
3. Students will do interviews of leading local authorities on environment and solar energy. They could report their findings.

SUBJECT: What Is In Your Future

DEPARTMENT AND COURSES: Industrial Arts-- Trades and Industry
Business--COOP
Social Studies--Careers
Guidance

OBJECTIVES: Students will become familiar with the vast variety of jobs open to them at the present and in their future.

SUGGESTED LEARNING EXPERIENCES: Any of all of the following activities could be completed in class by individual students or small groups of students and aired over the school radio station for entire classes or select groups.

1. Interview and have panel discussions by people involved with T & I and COOP.
2. After listening to a program on 'careers' students in classes could categorize jobs as to such areas as educational needed, opportunities in the field, pay and criteria.
3. A demonstration of how to apply for a job could be written and aired by students.

SUBJECT: Meremac Dam Project

DEPARTMENTS & COURSES: Social Studies--Our Precarious Habitat
Communication Skills--American Dream;
Justice For All
Science--General Science; Biology

OBJECTIVES: Students will show knowledge and understanding about the construction of the Meremac Dam and its possible rammification on the environment. Students will be able to analyse the conttoversy over the building of the Meremac Dam and take a personal stand on the issue.

SUGGESTED LEARNING EXPERIENCES: Any or all of the following activities could be completed in classes by individuals or in small groups of students and aired ober the school radio station for entire classes or select groups.

1. Interview a Corp of Engineer's representative along with a representative from one of the groups against the dam.
2. Have a debate over the issue of the dam.

SUBJECT: Your Radio Station

DEPARTMENT AND COURSES: Radio Club and Faculty Advisors from all departments.

OBJECTIVES: Students will become aware of the existence of the radio station and utilization of the radio station for their own purposes.

SUGGESTED LEARNING EXPERIENCES: Any or all of the following activities could be completed in classes by individuals or in small groups of students and aired over the school radio station for entire classes or select groups.

1. Faculty members from each department will be given a tour of the radio station along with a written guide and schedule of potentially available broadcast hours.
2. Each department will make test programs of their choosing to be used to introduce the radio station to their students.
3. Radio Club members will present informational broadcasts about the operation of the radio station.

SUBJECT: 1976 Presidential Candidates

DEPARTMENT AND COURSES: Social Studies--Politics USA; What's
Happening Now
Communication Skills--Modern Media;
Journalism; Basic Composition

OBJECTIVES: Social Studies-- Students can identify and explain
the platforms of the Presidential candidates.
Communication Skills-- Students will be able to
identify and demonstrate the techniques of
persuasive language as used by the presidential
candidates in their campaign speeches.

SUGGESTED LEARNING EXPERIENCES: Any or all of the following
activities could be completed in class by indivi-
dual students or small groups of students and
aired over the school radio station for entire
classes or select groups.

1. After listening to the speeches the student could
analyse the acceptance speeches of the major
presidential candidates.
2. Have students choose their candidate for president
and have a formal debate on 'Why their candidate
should win the election'.
3. Interview area campaign chairpersons.
4. Write a 'Paid Political Announcement'.

SUBJECT: Lasers Are for Everyone

DEPARTMENT AND COURSES: Industrial Arts--Electronics, Metals
Science--Physics
Communication Skills--Science Fiction

OBJECTIVES: Industrial Arts-- Students will understand the physical and the electronic make up of lasers. Students will be able to recognize and formulate practical applications of laser beams.
Science-- Students will be able to recognize the applications of coherent light in relationship to lasers.
Communication Skills-- Students will be able to realize the present and future technical advances were in many cases the science fiction of yesterday.

SUGGESTED LEARNING EXPERIENCES: Any or all of the following activities could be completed in class by individual students or small groups of students and aired over the school radio station for entire classes or select groups.

1. Broadcast excerpts from H.G. Well's War of the Worlds describing the 'powerful beam of light' which was fiction of the time but reality now.
2. Interview a Bell Telephone representative asking questions on industrial uses and practical uses of lasers.
3. Have small groups of students do readings on laser beams and share their information in a panel discussion.

SUBJECT: Highlights of The New School

DEPARTMENTS & COURSES: All Departments included in the curriculum would take part in the project; including the clubs, classes, personnel and services available for student and faculty use.

OBJECTIVES: Students would become familiar with their new school and the opportunities available to their scholastic, athletic, esthetic and social lives as participating individuals at Hazelwood East High School.

SUGGESTED LEARNING EXPERIENCES: Any or all of the following activities could be completed in classes by individuals or in small groups of students and aired over the school radio station for entire classes or select groups.

1. Officers of the Student Government Organization and officers of the various classes would introduce their organizations and the chief purposes of their groups.
2. Students could set up informational booths in the Commons Area to inform students of their clubs and their activities. These booths could be publicized over the air.
3. Students will organize and run campaign drives to get students to join their clubs and organizations.

Much time and effort has been spent trying to discover the best way to teach. The results indicate that there is no best approach for all purposes. However, that does not mean trying to find new ways to make teaching more effective should be ignored. The preceding examples have attempted to illustrate the following criteria for effective teaching.

- (1) Good teaching ought to sustain student interest.
- (2) Good teaching ought to be economical in terms of time and resources.
- (3) Good teaching should fit the personality and capacity of the teacher.
- (4) Good teaching ought to enable the learner to achieve the instructional objective.

An interdisciplinary approach utilizing the radio station may not always be the best approach to teaching but it does present an effective alternative form of instruction not usually found in the secondary schools.

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APPENDIX A

1. List the names of your members.

2. If you could choose to have only one of the below in operation,

at your school, which one would you want?

_____ a. Chess Club

_____ b. Glee Club

_____ c. Student Government

_____ d. Sports Club

_____ e. Other

APPENDIX A

ELECTRONICS SURVEY

Place an X in front of your answer:

If you could choose to have only one of the below in operation as Hazelwood East High School, which item would you want:

- 1. Radio Amateurs Club
- 2. Citizens Band Club
- 3. Radio Broadcast Station Club
- 4. Electronics Club
- 5. Other _____

The main structure of the radio station in the three sections,
is made up of the following parts:

- 1. Right cartridge
- 2. Cartridge (left) amplifier [2]
- 3. Right speaker
- 4. Right battery module
- 5. Left speaker
- 6. Left (left) tape recorder
- 7. Left amplifier
- 8. Right module
- 9. Battery bank
- 10. Record/play amplifier
- 11. Addition speaker

APPENDIX B

The main structure of the radio station is the three sections.

On these three sections are the following parts:

1. Right turntable
2. Cartridge tape machines (2)
3. Right speaker
4. Main control console
5. Left speaker
6. Reel-to-reel tape recorder
7. Left turntable
8. AM/FM tuner
9. Microphone
10. Record/Play amplifier
11. Audition speaker

EXAM QUESTIONS

If an operator receives a message that his license is suspended,

- a. he should
- b. he should
- c. he should
- d. he should

Clear about the

- a. he should be glad
- b. he should be over and I expect a response
- c. he should be over and I do not expect a response
- d. he should be over and I do not expect a response

The station license number is

- a. the station number
- b. the station number
- c. the station number
- d. the station number

A pilot speaking over a public language on the air without

- a. the pilot speaks
- b. the pilot speaks
- c. the pilot speaks
- d. the pilot speaks

APPENDIX C

The station license is for a period of

- a. 1 year
- b. 2 years
- c. 3 years
- d. 4 years

After what period of time is it impossible to receive an

- a. 1 year
- b. 2 years
- c. 3 years
- d. 4 years

If an operator loses the license, he should

- a. forget it
- b. wait until the end of his 5 year period and try to renew it
- c. write his congressman
- d. apply for a duplicate and post a copy of the application

Experienced or necessary signals

- a. all of the above
- b. are universal
- c. are international
- d. all of the above

RADIO EXAMINATION

1. If an operator receives a notice that his license is suspended, he has _____ days to reply.
 - a. 10
 - b. 15
 - c. 30
 - d. 360

2. Clear means that:
 - a. the weather is good
 - b. my transmission is over and I expect a response.
 - c. my transmission is over and I do not expect a response.
 - d. I will comply with your request.

3. The second priority message is
 - a. an urgent message
 - b. a government message
 - c. an EBS test message
 - d. a distress message

4. A guest speaker uses profane language on the air without warning the operator. Who is responsible?
 - a. the guest speaker
 - b. the first class operator
 - c. the program director
 - d. the operator on duty

5. The maximum penalty for breaking an FCC rule is:
 - a. \$500 a day during which the offense occurred
 - b. \$10,000
 - c. imprisonment for one year
 - d. \$10,000 and imprisonment for one year

6. After what period of time is it impossible to renew an expired license?
 - a. 2 years
 - b. 5 years
 - c. 1 year
 - d. none of the above

7. If an operator loses his license, he should:
 - a. forget it
 - b. wait until the end of his 5 year period and try to renew it
 - c. write his congressman
 - d. apply for a duplicate and post a copy of the application

8. Superfluous or unnecessary signals
 - a. tie up the channel
 - b. are unlawful
 - c. are unprofessional
 - d. all of the above

9. During a continuous program such as a play or religious service, if it would interrupt the program to make the ID, the operator should:
- interrupt the program
 - give the ID at the first interruption or logical opportunity
 - call the first class operator.
 - remove the station from the air
10. If a transmitter remote control unit malfunctions, the operator:
- should log the previous readings
 - should ignore it
 - should notify the first class operator
 - should shut the transmitter off, notify the first class operator, and commence operation from the transmitter
11. When separating parts of a message, the operator says:
- period
 - out
 - break
 - over
12. When using a microphone in a noisy location, the operator should:
- shout into the microphone
 - turn the microphone gain up
 - not worry about it
 - cup his hands over the microphone
13. A third class operator may:
- turn the transmitter on
 - turn the transmitter off
 - make minor power variation corrections
 - all of the above
14. "Daytime" is
- local sunrise to local sunset
 - 6 a.m. to 6 p.m.
 - 5 a.m. to 5 p.m.
 - not defined
15. When taking a meter reading, the operator finds the plate current a little high, he should:
- reduce the current to the proper value and take the reading and log the reading
 - take the reading, log it, then reduce the current to the proper value
 - increase the modulation
 - ignore the meter reading
16. In order to broadcast Subsidiary Communications consisting of FM background music for subscribers, you must:
- have an SCA authorization from the FCC
 - keep a brief log describing the material transmitted and when turned on
 - both of the above
 - none of the above

7. The time when the transmitter just begins supplying power to the antenna should be entered in the:
 - a. maintenance log
 - b. program log
 - c. operating log
 - d. none of the above

8. If the operator at the remote control point cannot adjust the antenna current for the correct operating power by adjusting the plate voltage or plate current, it should:
 - a. discontinue operation by remote control and operate from the transmitter
 - b. lower the audio signal level thereby decreasing the modulation
 - c. notify the FAA by telephone
 - d. monitor the modulation with an oscilloscope

9. If the antenna current is 5 amperes and the antenna resistance is 40 ohms, the power of the AM transmitter as computed from the formula antenna current squared times the antenna resistance is:
 - a. 1,000 watts
 - b. 200 watts
 - c. 8,000 watts
 - d. 1,600 watts

10. The maximum penalty for violating a provision of the Communications Act:
 - a. \$500 a day during which the offense occurred
 - b. \$10,000
 - c. imprisonment for 1 year
 - d. \$10,000 and imprisonment for 1 year

1. Radio stations are inspected by the:
 - a. FAA
 - b. EBS
 - c. FCC
 - d. EAN

2. To rebroadcast a message which was received from another station the rebroadcasting station must have:
 - a. a good lawyer
 - b. a taperecorder, permission is not needed
 - c. an EBS monitoring receiver
 - d. the permission of the originating station

3. Errors in the station logs should normally be corrected by:
 - a. the person owning the station
 - b. one of the secretaries
 - c. the first class operator
 - d. the one who made the error

4. Shouting in the microphone will:
 - a. give a clearer signal
 - b. give a louder, clearer signal
 - c. make up for a noisy location of the microphone
 - d. distort the signal badly

5. A third class radio operator may make transmitter repairs and frequency adjustments:
 - a. if the first class operator is not available
 - b. if the station licenses has given his permission
 - c. under no circumstances
 - d. when he is by himself

6. When in doubt on anything regarding technical matters:
 - a. go to the station licenses
 - b. do whatever seems best to you
 - c. go to the first class operator of the FCC rules
 - d. send a telegram to the FCC

7. An AM station can broadcast FM:
 - a. during nighttime hours
 - b. during emergencies only
 - c. during no circumstances
 - d. during an EBS alert

8. If an operator receives a notice that he has violated an FCC rule, he had ____ days to reply.
 - a. 10
 - b. 15
 - c. 30
 - d. 90

9. The radio operator's license is issued for:
 - a. 1 year
 - b. 5 years
 - c. 10 years
 - d. indefinitely

10. The top priority message is:
 - a. an urgent message
 - b. a government message
 - c. an EBS test message
 - d. a distress message

11. Obstruction marking and lighting details for a tower of a station are found in the
 - a. operating log
 - b. station authorization license papers
 - c. third class operators permit
 - d. proof of performance papers

32. During an emergency, a radio operator may violate certain rules and terms of the station license:
- in order to broadcast commercial announcements
 - to give emergency notification to the public
 - to make routine newscasts
 - none of the above
33. The operator should post his license:
- at the studio location
 - at the transmitter location
 - in the room where the transmitter is actually controlled
 - none of the above
34. The station ID, which is given at the beginning and ending of operation, and hourly should contain:
- the call letters and the frequency
 - the city and the name of the license
 - the city immediately followed by the call letters
 - the call letters immediately followed by the location
35. A correction to the log is accomplished by:
- completely covering it up
 - neatly erasing it
 - putting one line through the error, initialing and dating it.
 - pasting the correct reading on top of the error.
36. If the automatic device for turning on the tower lights malfunctions, the tower lights should:
- be turned on when it gets dark
 - be flashed on and off by hand
 - be left off until the trouble is corrected
 - removed
37. Which is not one of the three generally kept station logs?
- operating log
 - maintenance log
 - commercial log
 - program log
38. In order to comply with the EBS requirements, the operator should:
- keep the EBS receiver turned to an assigned station to receive an alert
 - make an entry in the log of all alerts received
 - broadcast a test alert once each week
 - all of the above
39. The requirement that the transmitter or remote control equipment be in view of and accessible to the operator is to:
- prevent operation of the equipment by unauthorized personnel
 - be available to note any failure of the equipment
 - provide continuous monitoring of the transmitted signal
 - all of the above

40. If the operator believes that any piece of equipment is not working properly, he should:
- a. pretend he did not notice it
 - b. log it using the value it should be
 - c. write the details to the FCC
 - d. call the first class operator immediately