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ABSTRACT

Though the use of educational radio has fallen from fashion, for three reasons it deserves reconsideration as a valuable educational tool: 1) it is economical, costing only a fraction of the required expense to deliver the same material via television; 2) the effectiveness of radio-based instruction has been shown to be equal to that of traditional lecture presentations and television broadcasts, and 3) radios are a pervasive possession in households around the world, making it possible to reach an almost universal audience. Innovative programs using instructional radio have been initiated around the world. Of special interest is an elementary mathematics instruction program used in Nicaragua. Broadcast curriculum can be made more interesting to young audiences by introducing such formats as quiz shows and news broadcasts. (EMH)

INSTRUCTIONAL RADIO RECONSIDERED **

An International Perspective

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INSTRUCTIONAL RADIO RECONSIDERED

I've often wondered why people today are wearing suits with wide lapels when only 15 years ago young men wouldn't think of doing so. In 1960 wide lapels signified poor taste, mostly because they were old-fashioned. Maybe today's generation is enough removed from the days of wide lapels to view them objectively, that is, without a negative predisposition.

Although we like to think that decisions about instructional technology are made more rationally than are decisions about fashion, there may be a parallel between the revival of wide lapels and the renewed interest in radio as an instructional tool. Television, the "high fashion" of the past two decades, is losing some of its glamor.

A number of commentators, having put fashion aside, find good reason to commend more extensive use of radio for instruction. After looking at what they have to say, I'd like to do three things: First, present some of the hard evidence supporting the use of radio; second, demonstrate by reviewing current happenings that instructional radio is a vital force around the world; and third, peer into the future to see how radio can be used to best advantage.

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The first authority whose words I will use to support the case for radio is the ubiquitous Wilbur Schramm. This the most prolific writer on media matters stated, "If one were to pick out three types of instructional media that could be recommended for more attention... by all countries that feel themselves in need of rethinking their educational systems, then one might think first of radio." Philip Coombs, another writer on international education, notes that there is a "conspicuous failure in not further exploiting the economic educational potential of radio." Emile McAnany, a media expert at Stanford, says that radio's advantages make it "one of the most promising resources that most countries have" for the development if their rural areas. John Balcomb, after attending a recent UNICEF communication workshop observed, "Everyone agreed that at present radio is the only mass medium worthy of its name in most developing countries."

So there are the testimonials. Now for the evidence. Arguments supporting the use of educational radio fall into three categories: 1) cost, 2) effectiveness, and 3) feasibility. I'll briefly scan the evidence in each category.

Cost. Most people estimate that TV costs 4 to 5 times more than radio. Of course, this assumes comparable audience sizes; this assumption masks the fact that TV sets are scarce whereas radio receivers are everywhere. Niger had grand plans for ITV but never enrolled more than 800 students. The cost per student per year was $1,480 - a horrendous figure when you realize that is exceeds by several times the per capita income in the country. Some radio projects have flopped, but not at

anywhere near this cost.

Of course there is a great range in cost of production. NHK in Japan estimates that they spend $2,000 per hour for TV production and $350 for radio. At one end of the continuum, Sesame Street spends around $75,000 per hour. At the other end, a friend of mine in Indonesia pays less than $60 to produce an hour's English language instruction radio program. That $60 covers fees for professional actors, plenty of sound effects, and a variety of formats.

Some like to compare the costs of radio with teacher-directed classroom instruction. If radio is used in place of teachers, the cost is considerably less than traditional instruction (the amount less depends greatly on the size of the broadcast audience). If radio supplements teachers (which is more often the case), that is, if radio is used to improve the quality of instruction, the total costs of instruction are greater.

Dean Jamison estimates that raising class size from 30 to 35 can offset the cast of 30 min. of radio instruction in two subjects per day. He also says that the increased class size won't affect performance and that evidence suggests that radio will improve performance.

Effectiveness. Most people agree that radio costs less than TV, but there are doubts about its effectiveness. According to Schramm, "There is nothing to indicate broad and general superiority of TV over radio." He goes on to say that what is done within a medium is more

important than what medium you choose.

A number of studies confirm that radio can teach at least as well as traditional instruction. Constantine (1946) found that radio-taught students gained 14 months of science knowledge in a 12 month period. Heron (1946) conducted a study in which students learned as well from radio lectures as from classroom lectures. The Japan Broadcasting Corporation (NHK, 1956) used radio to teach English and music in grades 3, 5, and 7. Radio-mediated learning was as great or greater than non-radio classes. The Wisconsin Research Project in School Radio (1942) supplemented elementary music classes with radio. Two groups were compared. One received 40 minutes of teacher instruction plus 25 minutes of radio instruction. The other received 65 minutes of teacher instruction and no radio instruction. Radio students did better in most tests, and at least as well in all other measures of performance. Lumley (1933) found that the pronunciation of students taught by radio was superior to that of students who received no radio instruction.

One of the most important tests of radio's effectiveness is in Thailand; important because of the massive scale on which that country uses radio for instruction. Each week over one million students receive at least one lesson by radio, in either social studies, music, or English. The objective of the social studies curriculum is to help pupils develop attitudes and values desirable in Thai culture. In 26 of the 28 items on the test of attitudes for grade 3, the radio students scored higher than the non-radio students (Schramm, 1973). The objective of the

music curriculum is to teach students to identify songs and musical instruments and to sing. Radio classes were superior to non-radio classes in all measures. Also, performance in the radio groups was more uniform, suggesting that less able students were helped relatively more. Listening comprehension was the objective of the English curriculum. There were no differences between the radio and non-radio groups. The results reported here are from a study first conducted in 1969, the study was repeated in 1972 with basically the same findings.

Although one can find counter evidence, especially in studies that compare TV and radio, we can conclude that students can learn as well from radio as from conventional instruction and in most cases as well as from TV.

Feasibility. The next category of evidence supporting the use of radio for education is feasibility. By feasibility I mean the ease in implementing radio projects or in increasing their reach.

My estimate of the number of radio transmitters in the world, which is an average of other people's, is 15,000. These transmitters broadcast about 300,000 hours of programming per week, of which about 2 or 3 percent could be classified as educational. These broadcast are received by more than a billion radio sets located in virtually every corner of the globe. In the past ten years, the number of sets in Latin America has doubled, in Africa it has tripled, and in Asia it has quadrupled. Most people would agree that MAN'S MOST UNIVERSAL MEDIUM OF COMMUNICATION IS RADIO.

Obviously, the proliferation of receivers makes radio a feasible approach to reach huge numbers of people. The large number of widely scattered transmitters means that radio can easily accommodate the great diversity of language found in many countries.

Radio leaps over apparent technological prerequisites such as electricity and educational prerequisites such as literacy. In Uganda, a survey found 88% of the rural families of Uganda without electricity, 87% have radios. TV cannot hope to reach the rural masses within a decade; radio has already done it.

This concludes my review of evidence supporting the use of educational radio. Radio is apparently a feasible, cost-effective instructional mode.

Country Capsules. Now that we've seen why radio makes sense, let's look at what its actually doing today. For the most part I want to give you a feeling for the extent of radio instruction. So as to not wholly ignore substance, I will at the end of our world tour, describe in some detail an important experiment in Nicaragua.

First, let me say that a complete survey of instructional radio around the world would be impossible. Many projects are small and cannot afford the luxury of documenting their work. Also, you would find a complete list tedious. I should mention that my review is of instructional radio as it is used in classrooms. I am here not considering the vast amount of broadcasting for adult and nonformal education. For a review of radio as it is used in non-classroom settings I suggest you read Emile McAnany's booklet, "Radio's Role in Development," which is

available from the Academy for Educational Development in Washington, D.C.

Let me start my survey with that is happening in a few African countries. Zambia broadcasts 3 hours of radio per day nationally to grades 5 - 12. Fifteen minute programs are used to enrich English, social studies, history, geography and science classes. The Central African Republic is making extensive use of radiovision. Kenya beams 20 hours per week in virtually all primary and secondary subjects. Teachers are free to tune in to programs announced in an elaborate program schedule. Tanzania uses radio in 60% of its primary schools.

In Mexico a Jesuit mission has been using radio to serve the Taramuhara Indians. Until recently, broadcasts were unimaginative: textbooks were read over the air. They are now in the midst of a curricular revolution. Many of the staff favor using the methods of Paulo Freire, a radical Brazilian educator. They hope to make the curriculum relevant to the needs and culture of the listeners and are doing a study to see how this should be done. Some there feel that radio should be used less for instruction and more as a vehicle of cultural unification.

Also in Mexico is the Radioprimaria project, begun in 1970 in the state of San Luis Potosi. The project is designed to provide instruction in grades 4 - 6 for schools that previously housed only grades 1 - 3. Only 1/4 of Mexico's rural primary schools have the full complement of 6 grades. The idea of the project is to save money by using only one teacher to monitor the broadcasts for all three grades, thus eliminating the expense of two teacher salaries for each school. Problems in re-

reception and supervision have developed due to lack of adequate funds.

In Brazil, the SACI Project has 3 radio transmitters and one TV Transmitter for 500 schools. The introduction of education technology has opened the opportunity for substantial curriculum revision. Systematic feedback from the classrooms is being used to shape the new curriculum. Radio and TV are also used for teacher re-training.

In the Dominican Republic, Radio Santa Maria is generating lots of excitement. Reports on their work will be available soon.

Paraguay is expecting to receive a $600,000 grant from AID to adapt the recently revised grade 4 - 6 curriculum for radio instruction. As in the Radioprimaria Project, radio will carry the major share of instruction. Unpaid monitors will supervise learning in language, social studies, math, and health. The project will use sophisticated techniques for pre-testing lessons and will conduct a study of audience learning characteristics. In the pilot stage, 70 schools or learning centers will receive radio instruction. Plans are already underway for country-wide expansion.

In the Philippines between 10 and 15% of the schools receive 15-20 hours per week of radio instruction. Tests show that radio students learn English much better than non-radio students.

Japan beams radio to nearly 80% of its K-6 schools and 30% of it 7 - 12 schools. 30 hours per week are broadcast nationally.

Korea wants to improve the quality of classroom instruction by introducing TV and radio. They started in one region last year and plan to broadcast to all schools soon.

Papua New Guinea has a well-developed broadcasting system in cooperation with the Australian Broadcasting Commission. The government found that the commercially produced receivers were not suited to conditions in their schools. They gave specifications to a manufacturer who custom produced a set. The new receivers have a big, separate loudspeaker, sturdier construction, and no handle (one less thing to break).

Thailand began radio broadcasting in 1958 with 286 selected schools. Today, over one million students in 6,500 schools receive instruction by radio. Two 15 minute social studies programs are broadcast each week to each grade level. One music program plus one English program are also produced. The government estimates that for 2¢ per student listening hour they broadcast 8 million student listening hours per year.

Indonesia, having benefitted from a recent UNESCO study is planning a national system for radio and TV instruction.

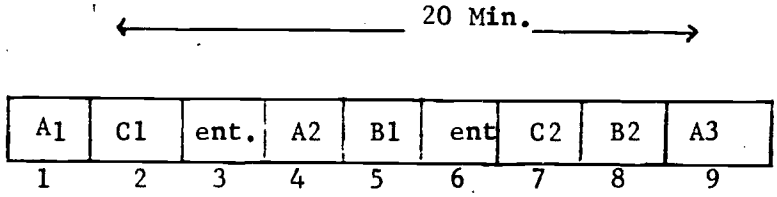
In the UK about 90% of all schools use radio for some subject. 79% use TV. The famed BBC provides a wealth of interesting program material.

Elementary Math by Radio. I hope these country capsules give you a feeling for the great extent to which radio is employed throughout the world. I mentioned at the outset that near the end of this whirlwind tour we would linger in Nicaragua where an important experiment in instructional radio is underway.

In Masaya, Nicaragua,AID is supporting a radio curriculum development project for arithmetic classes in grades 1 - 3. The daily radio lessons are characterized by a high degree of student activity. In a typical lesson students will respond to the radio teacher 50 times; by counting aloud, holding up fingers, writing on a worksheet, clapping hands, grouping bottle caps, and so on. Barbara Searle, the project director from Stanford University, describes the lessons as a cross between computer assisted instruction and Sesame Street. They resemble Sesame Street by the use of brief (2-3 min.) independent segments. Any one of the 8 or so segments that compose a lesson differs in content and response mode from the previous and subsequent segments. The idea is to keep students active and to provide plenty of veriety. The lessons resemble computer instruction and differ from Sesame Street in two ways: 1) sequential instruction is provided, and 2) students are not free to listen passively to the broadcasts - they must make frequent responses to the radio teacher's instructions.

You may wonder how it is possible simultaneously to have independent segments, variety in content, and sequential instruction. Here's how they do it. Each learning objective (e.g. counting to ten) is broken into its components or sub-objectives (e.g. counting to three). Each (2 min.) segment deals with a sub-objective. It is not necessary for sub-objective A-2 to come before B-1. (It may be that A-1 must come before M-1, but this is not a problem. M-1 can come in a later lesson, while B-1 provides sufficient variety in the earlier lesson.)

OBJECTIVE	SUB-OBJECTIVE
A	1, 2, 3
B	1, 2, 3
C	1, 2



As you can see in the chart, no "A" segment is preceeded or succeeded by another "A"; same with "B" and "C". In addition to the content variation, each segment requires that the children perform a different physical activity (response mode). Segment #1 might involve oral response; thus segment #2 will require something different (e.g. writing or clapping).

You'll notice that two of the segments don't have content objectives. The curriculum developers felt that some of the radio time should be devoted to entertainment as a means of maintaining student interest. The researchers were surprised to learn, however, that the students found unembellished mathmatical exercises more engaging than the stories and songs of the entertainment segments. Apparently, mathematics instruction can be more like the cake in need of icing than an unsavory pill in need of coating. The Stanford project forces us to reexamine what we mean by "entertainment".

I'm describing the Nicaraguan experiment in more detail than the others because of its potential for application in other settings and because of the significant role that radio plays in the curriculum. In many radio projects, broadcasting is for enrichment only.

Before moving on to my concluding remarks about the future of radio

education, I want to discuss the process of curriculum revision being used in Nicaragua. It is in the area of formative evaluation that I think the Stanford people are making some breakthroughs.

Curriculum developers in Nicaragua receive feedback from three sources: 1) classroom observation, 2) daily student worksheets, and 3) weekly performance tests. Classroom observations have proved especially useful in determining how much time the radio teacher should allow for the students to respond to direction. For example if the observer notes that a sizable number of the students are still writing the number "28" when the radio has already directed them to begin writing "29, the radio teacher will change the pacing in radio lessons for the following week.

Daily student worksheets tell the curriculum writers whether the number of segments covering a certain concept is appropriate to the background of the children. Let me give an example of that. The project staff had produced twenty segments to teach the concept "more or less". On the first segment dealing with this concept, the performance level on the worksheet was 98% correct. Hence, in next year's lessons, 4 segments instead of 20 will teach "more or less".

The third source of feedback, weekly performance tests, are used to measure long-term retention of the material. If performance is low on certain objectives, the curriculum writers can either add more practice (drill) segments, or revise the method of presentation.

One reason I have tried to pique your interest in the Nicaraguan project is because further information is readily available. Write to

Barbara Searle at Ventura Hall, Stanford, California, 94305.

This concludes our tour of the world. As we have seen, radio is providing thousands of hours of instruction each day. Experiments planned and underway bode well for the future.

The Future. On the horizon, however, I see a challenger to radio which poses a greater threat than TV; that challenger is the audio cassette. The cassette offers the teacher greater control over schduling, more dependable sound, more opportunity to preview program content, and easier coordination with visual materials. From a purely pedagogical standpoint it makes more sense to me to combine repeatable print materials with repeatable tapes. Non-repeatable, ephemeral radio should be used on its own. This may not be economical however. In any given situation one must compare the costs of transmission with the costs of providing tapes. Obviously, transmission (radio) is cheaper than cassette when the target area is large or when transportation (i.e. distribution of tapes) is difficult.

This argument could be further developed, but I'd rather spend time discussing a few ways in which educators might capitalize on the unique strengths or radio: its ability to move quickly and widely.

I propose that live programs can have tremendous appeal to students. In my area, the news is broadcast live at 7:00PM and rebroadcast at 11:00PM. Even if I miss the earlier broadcast, I find myself usually unwilling to watch the later broadcast. Why? Something is lost in those

four hours. That something is the elusive quality of immediacy.

So what are some ways to bring live radio into the classroom? Let me suggest two unconventional ideas. If your school is too traditional to accomodate these ideas, I'm sure you can dream up schemes suited to your situation.

The first is the educational quiz show. My recent research, which you can read about in the January, 1975 issue of Educational Technology shows that students can learn more from listening to a quiz show than from listening to a lecture dealing with identical subject matter. Quiz competition between classrooms, between schools, and between regions could be broadcast live to eager classroom listeners. The quiz programs' questions and answers could be derived from the texbooks used in the schools and thus provide an entertaining way of reviewing class material.

Producing a quiz show is surprisingly easy. I would be glad to send you a script and instructions for doing so. Simply write to me at the Center for International Education, Hills House South, University of Massachusetts, Amherst, Massachusetts 01002 (Tele: 413-545-0465).

My second idea for live broadcast that does not require supporting visual material is to conduct a non-monetary lottery. Assign each child a number and tell him what that number is. At the end of every day or week or whatever announce over radio the number that is drawn. This person then receives some prize or privilege.

You may be wondering how this serves an instructional purpose.

Here's how: The school subject to be taught by this scheme is foreign language. This can be done by making the announcement of the winning number in a foreign language taught at the school(s). To increase the amount of learning, the winning number should not be read in a straightforward way. Instead, a fifteen minute story should be read which has clues about the winning number. I predict that students will try very hard to understand the radio story if the reward for doing so is finding out who the lottery winner is.

So there are two ideas for live school radio. I invite you to suggest other possibilities. With the exercise of imagination, instructional radio will continue to play a vital role in the world.