TEACHERS AND MACHINES

The Classroom Use of Technology Since 1920

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To all the wonderful women in my life:
Barbara, Sondra, Janice, and Anne Smith

Contents

Acknowledgments

This book grows out of a wedding between research and experience. I taught for fourteen years in inner-city high schools and used machines no more frequently than most of the teachers in this study. Nonetheless, I remained intrigued by the possibilities for the use of machines, especially for the use of television. When I became a superintendent, my interest in the impact of television on children deepened considerably, to the point of my chairing a citizens' panel that advised a Washington, D.C., commercial station on its programming.

When I came to Stanford University, I pursued that interest by exploring the history of television use in schools with the help of a grant from the Spencer Foundation. When I completed that study, my training as a historian spurred me to ask whether what I had found with teacher use of television was similar to or different from teacher use of film and radio —two earlier machine technologies. Researching those technologies in the midst of the crescendo of noise surrounding desktop computers, I decided to add a final chapter on the most recent machine to enter classrooms.

To Leslie Taylor, who helped me research the study on instructional television, I extend my thanks for her quiet persistence, diligent follow-through, and insightful suggestions. She was a first-rate research assistant. David Tyack and Decker Walker read portions of the final manuscript, and their comments reflected engagement with the material even though they both disagreed with some of my interpretations. Of course, I hold them blameless for any errors in either fact or interpretation. I do appreciate their seriousness and concern.

In many ways, this book continues my reconstruction of what teachers have done in classrooms over the last century. Determining what tools teachers used and why may help practitioners, researchers, and policymakers understand better the classroom as a workplace.

Introduction

Some images stick in the mind like a thistle to a pant leg. A few years ago, while researching how teachers taught in the 1920s, I came across a 1927 National Archives photograph of a Los Angeles teacher in the midst of a geography lesson in the cabin of an airplane (shown on page 8). Here was an aerial classroom of students viewing urban geography firsthand; this was to demonstrate clearly how progressive education had influenced the city's teacher corps. In the photo, the teacher, standing in the front of the cabin near a small chalkboard, pointed to a globe as she talked to seven children sitting two abreast in desks facing her. The juxtaposition of an aerial classroom, the apex of modern technology in 1927, with a teacher, instructing the class in a totally earthbound, familiar manner, seemed to be a symbolic shorthand for the perennial paradox facing public schools: constancy amidst change.

Over the last century, public schools have modified their governance, programs, curricula, organization, and instruction in varying degrees. Moreover, critics often have pointed out how vulnerable schools have been to shifts in educational fashions. Fads, like changing dress hemlines and suit lapels, have entered and exited schools, yet these very same schools have been the targets of persistent criticism over their rigidity and resistance to reform. "It is easier to put a man on the moon," Massachusetts Institute of Technology professor Jerrold Zachiarias said in 1966, "than to reform public schools."[1] Almost two decades later, retired Admiral Hyman Rickover said, "Changing schools is like moving a graveyard."[2] In the press toward improvement that has characterized most

studies of public schools, few writers have noted that both constancy and change, entangled together, capture the complexity of schooling far better than the usual either/or dichotomy posed by reformers.

Nowhere is this paradox more apparent than in the interplay between the classroom teacher and technology. Since the mid-nineteenth century the classroom has become home to a succession of technologies (e.g., textbook, chalkboard, radio, film, and television) that have been tailored to the dimensions of classroom practice. Yet the teacher has been singled out as inflexibly resistant to "modern" technology, stubbornly engaging in a closed-door policy toward using new mechanical and automated instructional aids.[3]

In trying to understand the anatomy of this paradox, I begin with the classroom as the crucible where conflicting cultural, community, and organizational imperatives mix, creating the elements of the paradox. In the books they use, the curricula they follow, their pedagogical choices, and the goals they pledge to achieve, teachers cope with contradictory social messages. Embedded in the policies, work routines, and expectations signaled by administrators, school boards, media, and parents is a set of contradictory notions:

- Socialize all children, yet nourish each child's individual creativity.
- Teach the best that the past has to offer, but insure that each child possesses practical skills marketable in the community.
- Demand obedience to authority, but encourage individual children to think and question.
- Cultivate cooperation, but prepare children to compete.[4]

Coping with these conflicting messages within the hierarchical structures in which teachers must work drives them to construct a practical pedagogy, permitting them to complete a hectic five-hour instructional day. Reduced to classroom scale, teacher-invented solutions to these contradictions often have concentrated on transferring knowledge, skills, and

values to students through the teacher lecturing and questioning while the student listens and answers, and through reading textbooks and performing chalkboard and other in-class work. This pedagogy worked. It has provided continuity between generations while presumably laying the foundation for individual change in children. Yet shifting public expectations for what schools should achieve (e.g., high test scores) leaves teachers consistently open to attack.[5]

Conveying information highly prized by community decision makers emerged early as a practical solution teachers invented to meet cross-cutting demands placed upon them. What is acquired in classrooms could be verified by community elders and offered by the school as tangible evidence of learning. Passing on knowledge to students is the force that drives the engine of instruction. The question thus becomes *how* to teach information efficiently. Is there any mechanical or electronic device that is less costly than a teacher's voice, with a class of thirty or more?

For years, educators searched for means of communicating knowledge in simple, inexpensive, and timely ways. "The best education," Alfred North Whitehead said, "is to be found in gaining the utmost information from the simplest apparatus."[6] Many educators have dreamed of making instruction both productive and enriching; wishing that children somehow could learn more and faster while teachers taught less. In any list of explanations for the errant passion for technology by educators (but not necessarily teachers), a solid candidate would be this dream of increasing productivity, that is, students acquiring more information with the same or even less teacher effort. This dream has persisted from the invention of the lecture centuries ago to the early decades of this century when reformers sought efficiency through film, radio, and television. The dream persists into the 1980s with promoters boosting desk-top computers for each student. In the insistent quest for increased productivity and efficiency, the lecture, film, radio, television, and microcomputer are first cousins.[7]

Chalk and slate, books and pictures were nineteenth-century media used to expand the sole medium of instruction

—teacher talk—into a broader array of visual tools for conveying facts, skills, and values. More recently, films, radio, tape recorders, television, and computers have entered the teacher's cupboard to be counted as automated and electronic teacher helpers. The promises implied in these aids caught educators' attention: individualized instruction, relief of the tedium of repetitive activities, and presentation of content beyond what was available to a classroom teacher. What I define as useful instructional technology, then, is any device available to teachers for use in instructing students in a more efficient and stimulating manner than the sole use of the teacher's voice. Hardware and software, the tool itself, and the information the tool conveys define the technology (i.e., the book is the hardware, the contents are the software, the radio set is the tool, and the program is software).[8]

There is little that is novel in these assertions or in the narrow definition of instructional technology. The constant search for efficient classroom instruction and the preceding definition of technology merely underscore basic impulses that have entangled professionals in their fickle romance with film, radio, television, and computer-assisted instruction.[9]

Calling the relationship between educators and technology a "fickle romance" attempts to capture the paradox of stability and change in classrooms. What has been written about motion pictures, radio, and television has concentrated primarily upon what the new device could do to revolutionize (a word frequently used by promoters of technology) the classroom. In reviewing the literature on technology in classrooms, I found definite patterns in both academic and popular writings that pursued an unrelenting cycle.

Claims predicting extraordinary changes in teacher practice and student learning, mixed with promotional tactics, dominated the literature in the initial wave of enthusiasm for each new technology. Seldom were these innovations initiated by teachers. As early as the 1920s, one teacher wrote a poem entitled "Antiquated."

> Mr. Edison says
> That the radio will supplant the teacher.
> Already one may learn languages by
> means of Victrola records.
> The moving picture will visualize
> What the radio fails to get across.
> Teachers will be relegated to the backwoods,
> With fire-horses,
> And long-haired women;
> Or, perhaps shown in museums.
> Education will become a matter
> Of pressing the button.
> Perhaps I can get a position at the
> switchboard.[10]

Reformers, more often than not, were foundation executives, educational administrators, and wholesalers who saw solutions to school problems in swift technological advances. Not long after each innovation was introduced came academic studies to demonstrate the effectiveness of the particular teacher aid as compared to conventional instruction. Invariably, the mechanical or electronic device proved as effective as a teacher in conveying information to students. Marring the general favor and scientific credibility enjoyed by the innovation, however, would be scattered complaints from teachers or classroom observers about the logistics of use, technical imperfections, incompatibility with current programs, or similar concerns. At a later point, surveys would document teacher use of the particular tool as disappointingly infrequent. Such surveys would unleash mild to harsh criticism of administrators who left costly machines in closets to gather cobwebs, or stinging rebukes of narrow-minded, stubborn teachers reluctant to use learning tools that studies had shown to be academically effective. Once limited classroom use had been established, teacher-bashing (as the British label it) produced a series of sharp critiques blaming intransigent teachers for blocking improvements through modern technology. Few scholars, policy makers, or practitioners ever questioned the claims of boosters or even asked whether the technology *should* be introduced.

The exhilaration / scientific-credibility / disappointment /

teacher-bashing cycle described here drew its energy from an unswerving, insistent impulse on the part of nonteachers to change classroom practice. Reformers branded stability in teacher practice as inertia or knee-jerk conservatism. They viewed teacher reluctance as an obstacle to overcome. Seldom did investigators try to adopt a teacher's perspective or appreciate the duality of continuity and change that marked both schools and classrooms. Nor did any reformer even raise the disturbing issue that teacher expertise, drawn from a pool of craft wisdom about children and schooling that dances beyond the limited understanding of nonteaching reformers, should be bolstered rather than belittled.

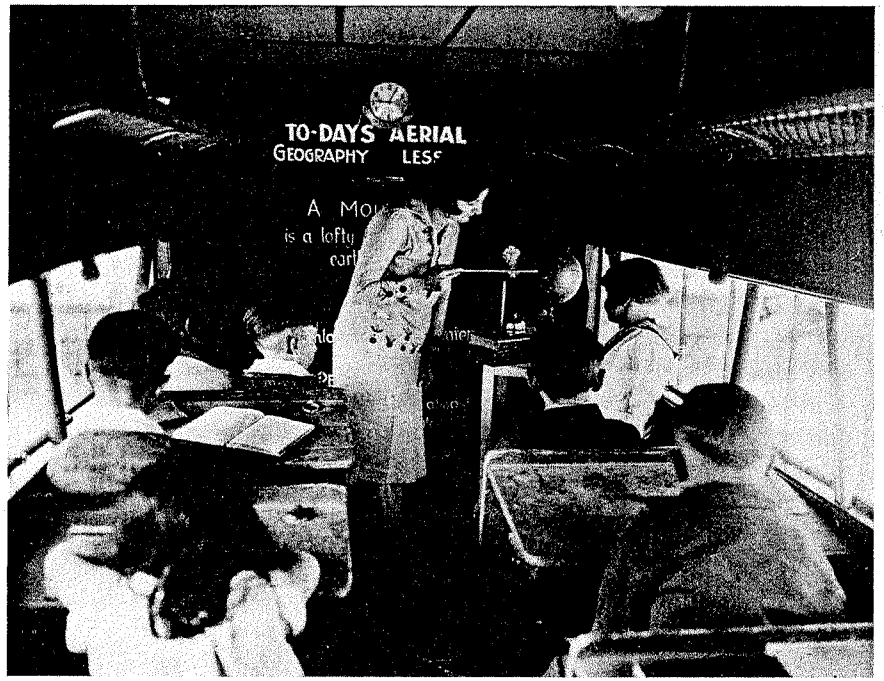
In an effort to understand how teachers responded to three new technological devices touted as panaceas to cure educational ills, I studied the introduction of film and radio in the classroom after 1920. Generally using secondary sources and primary ones where appropriate, I reconstructed the hoopla and actual teacher usage of these media until the introduction of instructional television in the mid-1950s. Then I investigated classroom television, an innovation that now has been used for over three decades in the nation's schools. In examining these technologies, I asked questions that probed why teachers have used radio, film, and television as they have.

Three questions guided this investigation:

1. Once the new technology was adopted by school districts as appropriate for children, to what degree did teachers use film, radio, and instructional television?
2. What explains the degree of teacher use of these technologies since the 1920s?
3. Based upon patterns in teacher use of film, radio, and classroom television, what is the likely level of teacher use of computers in the 1980s, and what is the potential influence of this technology?[11]

In answering these questions, however tentative such answers may be, I offer a view from the classroom rather than from the school board or superintendent's office. I do so consciously in

an effort to correct an unhealthy imbalance in most writing about classroom reform, which ignores the teacher's perspective. Furthermore, I wish to underscore the persistent interplay between constancy and change in the nation's classrooms. In this process, perhaps respect can be restored for the notion that stability in teaching practice and the craft of instruction are positive forces in schools, maintaining a delicate balance amidst swiftly changing public expectations.



New York Times *No. 306-NT-520A-6 in National Archives*

"To-day's Aerial Geography Lesson"

1/ Film and Radio

The Promise of Bringing the World into the Classroom

> *I believe that the motion picture is destined to revolutionize our educational system and that in a few years it will supplant largely, if not entirely, the use of textbooks.*
>
> *I should say that on the average we get about two percent efficiency out of schoolbooks as they are written today. The education of the future, as I see it, will be conducted through the medium of the motion picture . . . where it should be possible to obtain one hundred percent efficiency.*
>
> THOMAS EDISON, 1922

TEACHING AT THE TURN OF THE CENTURY

By 1900, public schools had established organizational and classroom practices that would be familiar to present-day observers. Schools usually were divided into grades and separate classrooms, one to a teacher. Rows of desks bolted to the floor faced a chalkboard and teacher's desk (portable desks were installed in the early 1900s but did not become common until the 1930s). Courses of study set the boundaries and expectations for what had to be taught and when. Report cards, homework, textbooks, teacher lectures, and student recitation were standard features of urban classrooms at the turn of the century.

What did teachers do in their classrooms? According to critics, instruction was regimented, mechanical, and mindless. Teachers, according to one researcher, told students "when they should sit, when they should stand, where they

should hang their coats, when they should turn their heads." Students entered and exited classrooms, rose and sat, wrote and spoke—as one.[1]

Photographs of elementary school classrooms in these years typically show rows of children with hands folded atop their desks staring into the camera with a teacher standing nearby. One photo of a Washington, D.C. class shows twenty-seven children sitting at their desks, cheeks puffed up, ready for the teacher's command to blow on pinwheels held in their hands.[2]

Evidence drawn from various sources documents classrooms taught in a uniform manner. "Passive, routine, clerical," a school superintendent reported in his visit to fifty Portland (Oregon) elementary classrooms in 1913, "are the terms that most fittingly describe the attitude of principals and grammar grade teachers toward their work."[3] A Teachers College researcher visited 100 high school academic classes between 1907 and 1911 to study the use of teacher questions. Using a stopwatch and transcription of teacher-student exchanges, she found that teachers asked an average of two to three questions per minute. "The teacher," she commented, "who has acquired the habit of conducting recitations at the rate of 100 to 200 questions and answers per classroom period of forty-five minutes, has truly assumed the pace that kills." Teachers, she found, talked 64 percent of the time. Of the remainder that belonged to student talk, much of it was one-word or short-sentence responses.[4]

Progressivism challenged the formal, mechanical, and lifeless instruction described by critics in so many classrooms. Pedagogical progressives called for instruction that built upon student interests, that opened up classroom windows to the larger world, and that plunged students into activities that had intellectual and social outcomes. The teacher's role was to be coach and adviser, not drill sergeant. Classroom activities embraced projects that students and teachers jointly determined and explored; there was to be much interplay among students and much physical movement in the room.[5]

But there was also another branch to the progressive

movement anxious to alter schooling. Anchored in the enthusiasm for scientific management at the turn of the century, adherents of Frederick Taylor entered schools in quest of efficiency. Professors and efficiency engineers undertook time-and-motion studies. They applied especially constructed score cards filled with quantitative measures for school districts hungry to embrace current innovations targeted at cutting costs while boosting productivity. Was teaching Latin more efficient than home economics? Did memorizing equations produce more student knowledge than homework? Were gang toilets more efficient than a bathroom in each elementary classroom? Such were the questions that educational engineers asked.[6]

These efficiency-minded progressives, along with their pedagogical cousins, left their footprints on school districts across the nation. The work of such child-centered reformers as John Dewey and William H. Kilpatrick and dozens of progressives interested in productivity had launched a movement in the early decades of this century that, according to *Time* magazine in 1938, "had touched every school in the U.S."[7]

FILM USE IN THE CLASSROOM

History

Thomas Edison's enthusiasm for films began earlier than the 1922 quote that begins this chapter. "Books will soon be obsolete in the schools," he said in 1913. "Scholars will soon be instructed through the eye. It is possible to touch every branch of human knowledge with the motion picture."[8]

Because the film was viewed as real and concrete, a medium for breathing reality into the spoken and printed word that stirred emotions and interest while taking up far less instructional time, promoters and school officials joined progressive reformers in introducing motion pictures into classrooms. To do so, films had to be created, catalogued, evaluated, and made available (along with equipment) to

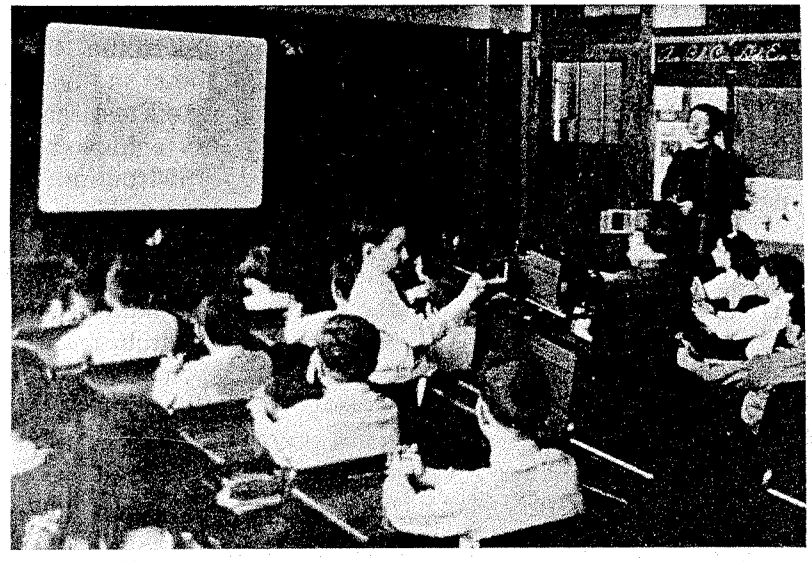
school districts. Silent commercial films entered American culture in the late 1890s and early 1900s. Films for classrooms, both commercial and noncommercial, were produced in the first decade of this century. As early as 1910, George Kleine published a 336-page *Catalogue of Educational Motion Pictures*, listing over 1,000 film titles that could be rented by schools. The Young Men's Christian Association published a catalogue in 1914. An early rental library holding films was owned by Thomas Edison.[9]

Because of cost, limited access to prints of films, unreliable projectors, and other hardware difficulties, individual teachers seldom secured films. The earliest use of film in the classroom was a novelty with no organizational support behind it. School boards and superintendents decided whether or not to introduce film in a district by allocating equipment funds and assigning administrative personnel to handle the function. Hence, city school districts—organizations with larger pools of available dollars and people—tended to be the first places to decide to use this technological innovation.

According to Paul Saettler, the first school use of motion pictures was in 1910, by the Rochester, New York public schools, whose school board adopted films for regular instructional use. In 1917, the Chicago schools organized a "visual education" department. In the years following World War I, many city school districts established similar bureaus. By 1931, twenty-five states had units in their departments of education devoted to films and related media. Early textbooks in the use of motion pictures furthered the influence of film, as did film-oriented college courses for teachers, which appeared in the 1920s.[10]

Classroom use of films became a symbol of progressive teaching approaches, just as the microcomputer is today. In the 1920s and 1930s, the black window shades, silver screen, and 16mm projector lent an aura of modernity and innovativeness to classrooms.

The tangled history of how silent films gave way to sound, of mechanical glitches slowing classroom use of motion pictures, of frequent squabbles over the quality of



Reprinted from Working Together (A Ten Year Report): Districts 23 and 24 *(New York, 1937).*

"Proud to Manage the Machines"

commercial films for classroom use, and of bitter competition among educational film businesses has been told elsewhere. What I will do is concentrate upon the early research findings on classroom use.[11]

Effectiveness and Frequency of Use

Academic research on film use has focused on the effectiveness of the technological innovation when compared to conventional instruction. Research designs in the early decades of this century invariably included the use of an "experimental" group and a "control" group. The experimental group or class was shown a film on a topic covered by both sets of classes, while the control group did not see the film. The outcome measurement was an achievement test. Without entering into the familiar debate concerning the substantial weaknesses of this particular methodology as applied to classroom research (a point I raise again in the

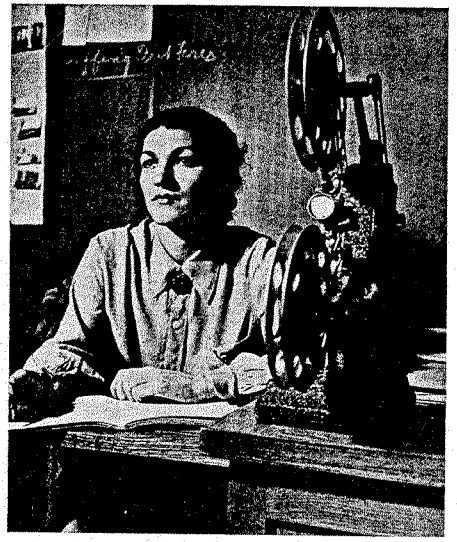
research undertaken after instructional television was launched), the results are that numerous studies in the 1920s and 1930s proclaimed consistently that films motivated students to learn. Experimental classes registered test scores that were either superior or equal to results achieved by classes where films were absent from teacher instruction.[12]

Whether or not the methodology was flawed or the correlational findings were converted too quickly into cause-effect relationships is of less importance than observing that in the 1920s and 1930s researchers, policy makers, and informed practitioners *believed* that the research demonstrated the motion picture's superiority as a teaching tool. Did these beliefs influence teacher use?

Finding out how many teachers used films in their classrooms, for what purposes, and how often is most difficult. For example, use is linked to accessibility. How many movie projectors are in the building, where they are stored, what condition they are in, and film availability all shape the degree of teacher use. Even when accessibility can be determined, frequency of film use cannot. Few studies before World War II sought such information. When researchers did pursue such questions, then and since 1945, most often they asked superintendents or principals about the kinds of films teachers used and how often they were used. Seldom did researchers ask teachers. Thus, in reconstructing patterns of use, I have sought multiple sources of direct and indirect evidence that I believe captures at least a rough portrait of teacher use of films over the past half a century.

The earliest survey of teacher use that I could locate was done in 1933 by the National Elementary Principals' Association, an affiliate of the National Education Association (NEA). The survey was mailed to elementary principals. Slightly over 7 percent of the members replied. They reported that teachers used silent films in 52 percent of the 366 elementary schools that responded. Only 3 percent reported using sound films, an innovation barely five years old in the commercial market.[13]

In 1946, the NEA conducted a formal survey of more than 1,000 urban and rural school districts, or about one-fifth of



Reprinted from the Thirty-ninth Annual Report of the Superintendent of Schools, 1936–1937 *(New York, 1937), p. 42.*

The Film Lesson

the nation's total student population. They sent the instrument to superintendents, who either responded themselves or gave it to the director of visual education or someone else assigned to the task by the school chief. Forty percent of the districts sent the surveys back; the highest number responding (67 percent) came from districts with populations of 100,000 or more. The results shown in table 1.1 use combined reports from the largest districts because of their highest rate of return. The table shows that estimated use was highest in elementary school and declined sharply as students moved into secondary school.[14]

Eight years later, in 1954, NEA tried again. This time they sent surveys only to urban superintendents and asked them to have the adminstrator in charge of audiovisual programs complete the questionnaire. While 78 percent of the largest districts replied, only 34 percent of all urban districts answered the NEA request. Table 1.2 shows the results from the largest districts only.[15]

TABLE 1.1 Estimated Teacher Use of Films by Level, 1946

	Frequently	*Occasionally*	*Never*
Elementary	37.5%	32.1%	35.5%
Junior High	34.9%	24.3%	39.0%
Senior High	20.7%	29.2%	56.0%

Source: Based on data from the National Education Association, "Audio-Visual Education in City School Systems," *Research Bulletin* 24 (December 1946): pp. 146–148.

Note: According to researchers, these percentages will not add up to 100 because "the reports were compiled in the form of frequency distributions. . . . Subject to the accuracy of the estimates submitted, the medians of these percent distributions indicate the relative frequency of use for motion picture films" (p. 146).

TABLE 1.2 Estimated Teacher Use of Films by Level, 1954

	Frequently	*Occasionally*	*Never*
Elementary	42%	33%	11%
Secondary	23%	33%	19%

Source: Based on data from the National Education Association, "Audio-Visual Education in Urban School Districts, 1953–54," *Research Bulletin* 33 (October 1955): p. 114.

Note: In this second study, there was one category for "two or three times a year," which was less than "occasional" and more than "never." I excluded this percentage. I attribute the sharp decrease in "never" between 1946 and 1954 to the insertion of this category. It also explains why the percentages total less than 100.

Edgar Dale,[16] an advocate of increased teacher use of technological aids, summarizes data he collected from across the country in 1954. He found that Georgia teachers at all levels used about one film per month, per teacher. Thirty-two percent of Georgia teachers reported they never used a film. He also reports a time-and-motion study of 189 secondary school teachers in Michigan, where it was found that "the equivalent of a one-reel film about every four weeks" was used.

Another piece of evidence that I find compelling, given the fragmentary data, is the records kept by the director of audiovisual education in New Haven, Connecticut. In a 1953 study of the effectiveness of films in teaching reading, the

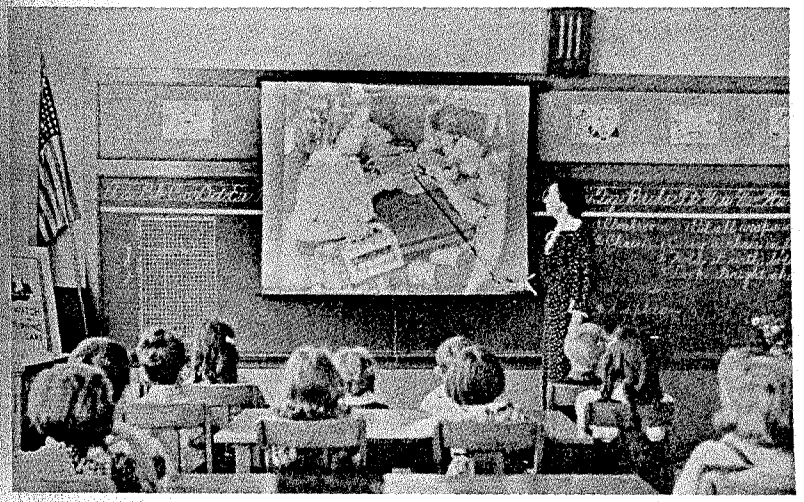
records of film orders from 175 teachers in grades three, five, and seven were examined. Just over 1,500 films and filmstrips were ordered in one year by teachers in the three grades. Two-thirds of the orders came from 14 percent of the teachers. The twenty-five heavy users (14 percent) were distributed as follows: eleven in the third grade; twelve in the fifth; and two in the seventh.[17]

An indirect way of determining use is simply to find out how many film projectors were available in schools. The NEA surveys provide little direct information on this measure. The closest they came to such figures was in 1954, when they developed a national projector/student ratio of one projector to 415 students. That figure is not very helpful, however. Those who boosted audiovisual instruction did suggest standards for purchasing equipment, in order to "meet listed frequency of average use." I would expect that such a standard probably would exceed what exists in schools, since it is proposed by believers in the technology. In 1948, one group of professionals recommended one projector for every ten secondary teachers, based on an estimated use by those teachers of one film every ten class periods, or twice a month.[18]

After almost forty years of experience with motion pictures in schools, the evidence, as flawed as it is, suggests that most teachers used films infrequently in classrooms. Films took up a bare fraction of the instructional day. As a new classroom tool, film may have entered the teacher's repertoire, but, for any number of reasons, teachers used it hardly at all. Serious users among those who chose to show films were elementary teachers, while the higher percentages of casual users and nonusers clustered in the secondary schools, especially the high schools. If the fragmentary and indirect evidence is to be believed, one must wonder why teachers used film so infrequently.

Reasons for Infrequent Use

The obstacles to frequent use surfaced in the literature on film usage at about the same time as the claims for its



Courtesy Cleveland Board of Education

"Seeing and Hearing the Safety Lesson"

effectiveness. Invariably, the following reasons turned up on lists of obstacles blocking increased film use in classrooms:

- Teachers' lack of skills in using equipment and film
- Cost of films, equipment, and upkeep
- Inaccessibility of equipment when it is needed
- Finding and fitting the right film to the class[19]

Advocates promoted solutions that would eliminate these hardware and software obstacles: courses in teacher education curricula, increasing the supply of films and refining their distribution in schools, increasing the budget allocations for audiovisual education, and similar suggestions.

Thus, on the eve of the introduction of instructional television to public schools in the early 1950s, teacher use of film, while still infrequent after almost four decades of availability, was still the dream of pedagogical and administrative progressives who wanted to make the classroom both an interesting and productive place for learning.

RADIO IN THE CLASSROOM: THE ASSISTANT TEACHER

Benjamin Darrow, founder and first director of the Ohio School of the Air and tireless promoter of radio in classrooms, spoke and wrote frequently about the magic of radio expanding the child's universe. In his 1932 book, *Radio: The Assistant Teacher*, Darrow proclaimed, "The central and dominant aim of education by radio is to bring the world to the classroom, to make universally available the services of the finest teachers, the inspiration of the greatest leaders . . . and unfolding world events which through the radio may come as a vibrant and challenging textbook of the air."[20]

"Textbooks of the air"—that was the dream of scores of enthusiasts, including Darrow, and his successor in later decades, William Levenson, who wrote in 1945, "The time may come when a portable radio receiver will be as common in the classroom as is the blackboard. Radio instruction will be integrated into school life as an accepted educational medium."[21]

Beginning in 1920 when the Radio Division of the U.S. Department of Commerce began licensing commercial and educational stations, classroom broadcasting to enhance instruction spread rapidly in the decades before World War II. The full, tangled story includes problems with federal regulation, commercial development of the airwaves, and uncertainty among educators of which policy routes to pursue. I will concentrate here on the application of radio to classroom instruction and teacher use of this once-novel technology.[22]

Haaren High School in New York City is generally credited as the first public school to use radio to teach a class. Its faculty broadcast lessons to accounting classes in 1923. The Board of Education persuaded WJZ, a commercial station, to allot half an hour each day for educational programs beamed to classrooms and homes across the city. At about the same time in other cities, classroom broadcasting got underway. Dr. Virgil Dickson of the Oakland, California schools began a series of lessons on subjects such as penmanship,

arithmetic, and history. Fifty-six lessons lasting twenty minutes each went into classrooms between 1924 and 1925. Chicago station WLS in 1924 began the weekly program "Little Red Schoolhouse." Children and teachers prepared talks on automobiles, farming, science programs, and other topics. Parents supplied schools with receivers. By 1942, in an incomplete survey of school districts across the country, Carroll Atkinson found twenty-nine systems in seventeen states that provided broadcasts at one time or another to classrooms. Of these, Cleveland and Chicago had developed the most elaborate stations, broadcasting schedules, and aids to teachers.[23]

The enthusiasm for radio as a medium of instruction should not obscure the early hardware problems. The principal of Upton High School in Upton, Massachusetts surveyed high schools around the state in 1927 and found that 53 of the 253 schools had radio receivers, of which 29 had been made in the schools. Elsewhere, public schools in Atlanta, Georgia, for example, in 1926 received from a local tradesman one Atwater Kent radio set for each school, "white and colored," in the district. That fall, school opened with morning programs in music for teachers and children. By 1929, however, radio instruction had ceased in the Atlanta schools. The Atwater Kent receivers' batteries needed maintenance during the summer and had gotten none. Students went to the auditorium, but listening proved to be difficult. Almost a decade later, radio programs were reestablished in Atlanta classrooms, this time with battery-less receivers.[24]

By the late 1930s, many of the equipment problems had been resolved, or at least improved. Prices fell sufficiently, so securing sturdy receivers for each school and in some instances for each classroom posed few problems. In 1941, 55 percent of the schools in Ohio had sets.[25] In California, a graduate student surveyed 1,900 schools across the state and found that 66 percent owned one or more sets.[26] Generally, this survey found that rural counties had fewer sets, while city school districts had more.

Local commercial stations and, eventually, national networks provided classroom programs. In 1928, the National Broadcasting Company began the weekly "Music Appreciation Hour" series with Walter Damrosch, former conductor of the New York Symphony. Lasting until 1942, the program became one of the best known of those produced by commercial networks. The American School of the Air, a program produced by the Columbia Broadcasting System, broadcast its initial program in 1930. Offered twice a week, historical biographies, book discussions, civics lessons, dramas, and current events filled the agenda aimed at both elementary and secondary students. Although controlled by CBS, educational organizations sponsored programs. The Progressive Education Association, for example, supported "Frontiers of Democracy" broadcasts between 1939 and 1940.[27]

State Departments of Education sponsored radio use both directly and indirectly. In the first survey taken in 1932, nine states reported regular broadcasting of short weekly and monthly programs on education. California, Massachusetts, Nebraska, New York, Ohio, and Oregon carried on broadcasting throughout the decade, with only a few interruptions. Except for Ohio, Puerto Rico, Wisconsin, and Wyoming, states that did air instructional programs, most states' activity concentrated on providing information to the public about school curricula, programs, and tests.[28]

Universities entered the arena also. The oldest educational radio station was WHA, owned by the state of Wisconsin and operated by the University of Wisconsin since 1917, when it began broadcasting music programs. By the early 1940s, Wisconsin School of the Air was a fixture in the Midwest. Its eleven series of instructional programs for 1943–1944, shown in table 1.3, suggest the range and audience. The University of Minnesota also produced and aired programs, mostly aimed at high-school students, on its Minnesota School of the Air.[29]

Thus, by 1945, many commercial stations, school districts, state departments of education and universities produced and aired programs for teachers to use in their classrooms. To what degree did teachers use radio? Hardware availability

TABLE 1.3 Wisconsin School of the Air Program Series, 1943–1944

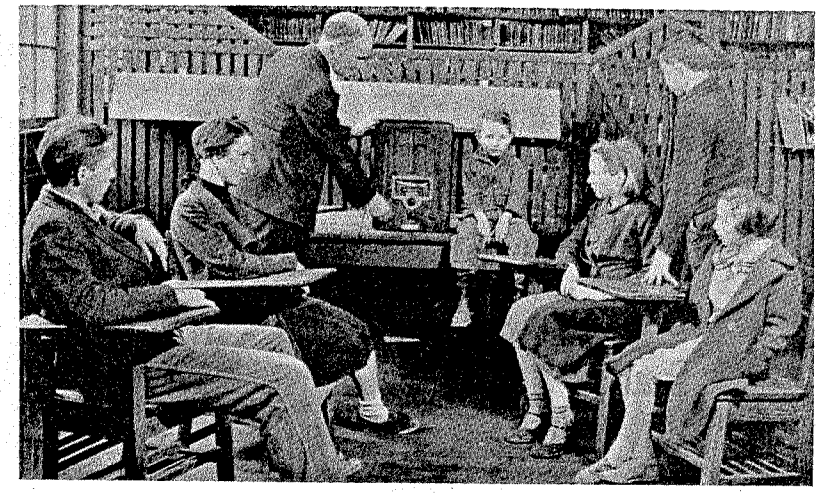
Day and Hour		Series Title	Grades
Monday	9:30 A.M.	Afield with Ranger Mac	5–8
	1:30 P.M.	Exploring the News	5–8
Tuesday	9:30 A.M.	Story Book Land	1–3
	1:30 P.M.	Let's Draw	5–8
Wednesday	9:30 A.M.	Let's Find Out	2–4
	10:45 A.M.	Young Experimenters	5–8
Thursday	9:30 A.M.	Music Enjoyment	1–4
	1:30 P.M.	Men of Freedom	5–8
Friday	9:30 A.M.	Rhythm and Games	K–3
	1:30 P.M.	Book Trails	4–6

Source: Norman Woelfel and Keith Tyler, *Radio and the School* (Yonkers-on-the-Hudson, NY: World Book Co., 1945), pp. 80–81.

suggests far more accessibility to radio programs than film, although no one can suggest that the ultimate in technological saturation that promoters dreamed of—having a receiver in each classroom—was ever reached, except in the rare instance of an occasional affluent district with a school board and superintendent eager for a "radio textbook." Also, the nature of radio programming—half-hour or hour-long broadcasts once a day or a few times a week—destined radio usage to be viewed, at best, as a supplement to teacher instruction.

In determining classroom usage of radio, there are certain problems similar to those encountered with film and others that are unique to radio. As with surveys on film usage, it was common practice for superintendents or their designees to answer the questionnaires. Few surveys ever asked *teachers* what programs they used. The studies that did ask teachers to report use seldom had high rates of return.

Unique to radio, however, was the fact that the size of audience was crucial to commercial success; so many of the surveys were attempts to gauge the number of listeners. In the 1930s and 1940s, this was done by counting either the number of hours aired by the station or the number of students in those schools that had radio sets (thereby assuming that the set was turned on when the program was aired). Hence, estimates of classroom audiences numbered in



Courtesy University of Kentucky Libraries

"With Radio the Underprivileged School Becomes the Privileged One"

the millions. The CBS American School of the Air estimates ran between 8 million and 10 million students listening to its weekly programs. Yet a survey taken of classroom audiences in the year 1940–1941 in Ohio, a state far ahead of others in using radio, found that the American School of the Air was used "regularly" (a term not defined in the survey) by one or more teachers in 3 percent of rural schools, 18 percent of urban schools, 8 percent of elementary schools, and 5 percent of secondary schools. These figures shrank the estimates of classroom audiences to 500,000 to 1 million.[30]

Given these caveats regarding listener estimates, consider the following surveys. In 1937, Carroll Atkinson received a 98 percent return on a survey sent to superintendents in 1,227 districts across the country. He asked: "Do any of your schools use broadcasted features as part of the classroom work?" Just over 7 percent answered that "all" of their schools used radio programs in classes; 17 percent answered "many"; 51 percent marked "few"; and 22 percent said "none."[31] An Ohio survey found that, in the year 1940–1941, 15 percent of the schools "regularly" used radio broadcasts in classrooms.[32] Note that these are responses for *school* use, not

for classrooms. If one teacher turned on the receiver in a school of thirty faculty, the school was counted.

In a Wisconsin study of radio use in schools, teachers were invited to have their classes listen to programs. Almost 3,000 teachers asked to be included in the study, received teacher's manuals for the programs, and gave the required tests. Of that number, a sample of elementary teachers was contacted, one-quarter of whom reported their program use to the researchers. Teachers turned on the Wisconsin School of the Air, on the average, three times a week. About three-fourths of the teachers responding to the questionnaire said they used school broadcasts consistently.[33]

Cited as the leader in school broadcasting, Cleveland Board of Education's station, WBOE, offered regular and comprehensive broadcasts covering the entire curriculum in the 1930s and 1940s. William Levenson, in his textbook *Teaching Through Radio*, uses frequent examples of WBOE programming and classroom use, yet in the entire volume he cites only one teacher-use survey, conducted by WBOE staff to determine what elementary-school classes were using the arithmetic program.[34] In that survey the Cleveland school children were grouped into high-, middle-, and low-ability classes. The survey of 115 teachers in ninety-one schools showed that three-quarters of the listeners were in the middle group. Few of the bright or low-ability students (as measured by I.Q. tests) heard the program. Levenson does not tell us whether the 115 teachers were regular users or simply a sample. Elsewhere in his textbook he does claim that, nationally, "nine out of ten American families listen regularly to the radio. Only one out of twenty classrooms do likewise."[35]

Finally, a six-year, foundation-supported study sponsored by the Federal Communications Commission and carried out by the Bureau of Educational Research at Ohio State University evaluating radio broadcasts in the nation's classrooms concluded in 1943 that "radio has not been accepted as a full-fledged member of the educational family." The authors observe that radio spread rapidly in homes but "remains a stepchild of education."[36]

The data are fragmentary. When the studies just cited are connected to data about equipment availability and length of radio broadcasts (half an hour, for the most part), then a faint pattern of limited instructional use emerges. Considered within the context of the six- to seven-hour instructional day, the amount of time spent listening to radio in classrooms before the advent of television is infinitessimal.

Flawed as the evidence is, assuming that it points in the direction of limited classroom use, why did so few teachers use the new technology? A survey of almost 2,000 Ohio principals, conducted in 1941, produced the following list of reasons cited for lack of classroom radio use and the percentage of respondents who gave each reason:[37]

No radio-receiving equipment	50%
School schedule difficulties	23%
Unsatisfactory radio equipment	19%
Lack of information	14%
Poor radio reception	11%
Programs not related to curriculum	11%
Classwork more valuable	10%
Teachers not interested	7%

When the results are broken down, the problems of money and hardware (no or poor equipment, poor reception) pinched elementary schools slightly more than upper-grade teachers, while program content and scheduling blocked secondary-school teachers' use considerably more than their colleagues in the lower grades. These reasons correspond generally to those offered to explain limited film use in classrooms.

Classroom radio promoters, however, were dissatisfied by such reasons for the "widespread neglect of radio in public education" by the end of World War II. The cost of radio receivers, for example, dropped dramatically as they became mass produced in the 1930s and 1940s, so the notion that equipment was too costly for a school district—except for the most impoverished rural ones—is less convincing as a reason for little use. So critics pointed to deeper, more pervasive explanations. Woelfel and Tyler pointed to educators'

"indifference and lethargy, even antagonism, toward this revolutionary means of communication." Related to, and perhaps the cause of, this indifference, is the slowness of schools to respond to technological changes in the society. "Radio grew from childhood through adolescence into maturity," they wrote, "too rapidly for organized education, with its fixed courses of study and rules of conduct, to keep pace."[38]

By 1945, radio sets had failed to become "as common in the classroom as is the blackboard." Nor had they achieved this by the 1950s, when the enthusiasm for television kindled the dreams of another generation of school reformers. By then, research and journal articles on radio in the classrooms had virtually disappeared. Few commercial radio networks and stations retained their school broadcasts. The promise of radio as a teaching tool, where "the roof of the classroom has been blown off and the walls have been set on the circumference of the globe," failed to materialize by the time instructional television gripped the imagination of policy makers and educators. Many promoters of radio as a classroom tool, looking forward to television as "radio with its eyes open,"[39] echoed Ben Darrow's prediction: "When the eye and the ear have been remarried in television then we shall indeed be challenged to open wide the school door. There will be no 'blindness gap' to be bridged."[40]

2/ The Use of Instructional Television
1954–1983

THE BEGINNINGS

Many accounts of the origin of classroom television mark May 25, 1953 as the red-letter day when KUHT in Houston, Texas began broadcasting. Other accounts point to the initial programs that commercial broadcasters beamed into homes early in the morning, such as "Continental Classroom." Or one could go back further and note the closed-circuit broadcasts that the Philadelphia public schools began in 1947 or the Los Angeles high school that experimented with classroom use of television in 1939. These and similar events are just external markers for a number of impulses generated years earlier. These impulses came from veteran radio broadcasters concerned about the number of available television channels being allocated to commercial interests by the Federal Communications Commission (FCC), from impassioned educators who saw much promise offered by the new medium, and from foundation executives concerned about mounting pressures on the public schools from anti-progressive critics of life-adjustment curricula in the 1940s, and from escalating student enrollments.[1]

As so often happens, the impulses that produced the FCC decisions in 1953 to allocate 242 channels for educational purposes were not necessarily the factors that accounted for the subsequent accelerated trajectory in television activity.