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AUTHOR Segalla, Angelo
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ABSTRACT

This paper presents a review of research on the effectiveness of educational television compared to traditional face-to-face instruction. The studies reviewed are presented under seven rubrics: TV as a catalyst for learning; two-way TV; use of commercial TV shows; simulation of a real situation; TV integrated as part of the classroom lecture; TV courses instead of lecture in the classroom; and TV ccurses in the home. The author concludes that while TV has proved effective for teaching basic knowledge, it is deficient for teaching cognitive skills requiring more than "level I" knowledge. A bibliography is appended (the latest reference is to a 1975 publication). (BB)

TELEVISED VERSUS IN-CLASS INSTRUCTION--WHAT THE LITERATURE IMPLIES

Angelo Segalla
Golden West College

At the request of the Social Science Division, we initiated a search into the previous literature of studies done on the effectiveness of educational TV as compared to traditional face-to-face instruction. In reviewing the previous studies, we found that most methods of presenting material to students through the use of educational TV allowed for interaction between students and teachers and/or students and students. There were two studies where students viewed the courses at home, and these provided facilitators for students with questions. There is an interesting variety in the ways educational TV is used. Among these, the literature showed TV used as a catalyst for learning, as an in-class lecture course, and as an at-home viewing course:

1. TV as a catalyst for learning
2. Two-way TV (talk back)
3. Use of commercial TV shows
4. Simulation of a real situation
5. TV integrated as part of the classroom lecture
6. TV courses instead of lecture in the classroom
7. TV courses in the home

TV AS A CATALYST FOR LEARNING

A program was started at the Oxford Hills High School in South Paris, Maine, by Dr. Richard Knudsen. It involved students who were considered "prime" candidates to drop out. Two-thirds had repeated at least one grade before reaching the ninth grade. Most had frequent absences, all had an I.Q. of less than 100, and all had difficulty in communicating. Students in the program broke down into groups of 8 - 12 each; each group was responsible for some aspect of TV production. The roles of the groups rotated so all would have varied experiences. The students researched, wrote, produced, and filmed their own shows; and written dialogue was kept at a minimum to encourage spontaneous verbalization on the part of the students. The video tapes were replayed and critiqued by the students themselves. Through this process, the students learned to work together. Their reading (because of the research done for the scripts) and motivation to read improved, and writing became more prolific and coherent. Tests before and after the program showed that the mean I.Q. (as measured by the Otis Test of Mental Ability) of the experimental group increased 3.9 points whereas that of the control group increased only 0.2 points. The Metropolitan Advanced Reading Test was administered, and reading scores of the experimental group showed an increased 1.27; and the increase for the control group was .56. A marked decrease in the drop-out rate of the school was also noticed. Further, it was felt that beyond measurable improvement the students' self-concept improved, and they gained self-confidence.

The other program of this type is being tried at Jetton Junior High School in Paducah, Kentucky, where the student body is 40% black and 50% of the students come from economically needy homes. "Many of the students come from situations where communication is limited or suppressed. Generally speaking, the students in need of communication skills have rejected a traditional speech class."[1] In this program, the students wrote, produced, and taped their own shows incorporating material from the lectures in class. According to this article, the level of retention had increased because of the combination of lecture and the television experience. "So far the key to unlocking these young minds has been television."[2]

TWO-WAY TV

This method involved the simultaneous televising and broadcasting of lectures to students away from the campus. The area where the lecture is received is equipped with phones that signal the instructor when a student has a question, and both the question and the answer is broadcast to all. This approach is being used by industries where they encourage their professional staff to continue their education, yet, the physical plant may be too far from campus to travel there for a one-hour class. The student, then, has the option of viewing the lecture at the plant or attending it in person. Further, if either the student or the instructor is to be absent, the lecture can be taped and viewed at a later date. This method is also in use at the City University of New York to teach the Talmud as part of the Jewish studies program.

There were no results of the educational effectiveness of this approach in either of the two reports. However, Robert Dubin and R. Alan Hedley (1969) made an analysis of statistics from college-level studies which compared educational TV with the traditional lecture method. The conclusions favored face-to-face instruction until they removed the statistics for two-way television instruction. This led to no significant difference between educational television and face-to-face instruction. The implication is that two-way television is inferior to both one-way educational TV instruction and face-to-face instruction.

USE OF COMMERCIAL TV SHOWS FOR CLASSROOM LECTURE

This method requires that students watch TV shows assigned by instructors for class discussion. Prime-Time School Television is a non-profit company that reviews TV specials in advance of the fall television season. They make up a brochure which is sent out to teachers across the country recommending programs, suggesting discussion topics, and possible research projects for the students. Programs such as "The Hands of Cormac Joyce," "Man and Beast," and "Man Without a Country" have been recommended in the past. A study at Northwestern University showed that Prime-Time School Television did work and that "between 66% and 93% of those teachers who used PTST noticed productive discussions in their classes following the broadcast of programs used in the project."[3]

SIMULATION OF A REAL SITUATION

The use of educational TV in this context is designed to prepare viewers to objectively deal with a controversial subject. In the description of this process, four successive TV programs depicted all aspects of a problem relevant to the area in which they were broadcast. Ficticious places and characters were used, and the public was encouraged to take part in the broadcasts. Not only were they encouraged to view the programs but to also act out the parts. The first program used a "news special" format to give an "in-depth" view of the issue. The second program depicted a town meeting with various civic leaders (mayor, labor leader, representative of the Farming Association, and a representative of the company) speaking on the issue. The program was then opened to the audience for questions. At the end, the audience called in their approval or disapproval as if they were the council members. The third program depicted a stockholders meeting of the company who were to decide on "polution abatement" procedures. The audience then took up the role of stockholders and again called in their preferences to the TV station. The fourth program depicted a hearing before Environmental Improvement Commissioners, and at the end they went off to vote for or against the issue. The viewers then acted as if they were the commissioners and called their votes in to the TV station. The final program related the previous four to the real situation, revealed the public vote, and answered questions for the public. They were also expected to participate in a phone-in question and answer program (the last of the five) where a panel of experts were

ready to answer their questions. This method has several advantages. It can present a "diversified number of learning objectives, remove prejudice on the part of the viewers, to eliminate emotional biases connected with the real situations, allow manipulation of facts to emphasize desired facts, and allow casting of viewers in various roles."[4] Viewers can then get through the emotion-laden issues and get down to arriving at an objective decision.

EDUCATIONAL TV INTEGRATED AS PART OF THE IN-CLASS LEARNING EXPERIENCE

There are a variety of reports included in this category. Educational TV was used in classrooms to accomplish a variety of objectives and was incorporated into the daily lessons of the class. The children viewed a 15- or 30-minute program of instruction and further classroom activities were planned around it (experiments, discussions, etc.).

In this first instance, 2,000 children in 94 classrooms were involved in a study where they viewed 15-minute classroom presentations. The programs were unfinished stories usually concerning an ethical problem, and the students were to discuss what they would have done. The project was evaluated through student and teacher questionnaires, personal interviews, and observations. The conclusions were that the project was unsuccessful in obtaining its objective and was considered successful only in that it acted as a catalyst for discussions. The actual objective was not clearly stated.

This next project had more clearly defined objectives: the stimulation of pupil activity and increasing the teacher's understanding of the subject (science). The subjects were third and fourth grade students and teachers. The programs did not teach science directly; they were only meant to stimulate interest in experimentation and the lesson. Evaluation was accomplished with teacher questionnaires, interviews, and observations of the class; and the students were pre-tested and post-tested. Generally, it was found that the teachers gained confidence in their ability to teach science. However, the tests for the children were invalidated because they were inadvertantly switched and given to the wrong classes.

The following report is a study done in England describing educational TV as a means of stimulating learning in students with poor reading skills. Sixteen schools were used, and the project was evaluated through the use of weekly tests of the children, reports from the teacher, and teacher's opinion of its effectiveness. It was found that "there is statistical evidence that the results for each school (boys and girls) and the total sample of schools and children are very satisfactory"[5] implying that there was an improvement in reading skills.

Another project had as its objective the raising of the caliber of instructors in ghetto schools. It was hypothesized that ghetto schools in Chicago didn't have the same caliber of teacher, equipment, etc. as the other schools. The district was divided into clusters of schools, and the more experienced and better teachers made video tapes of lessons which were viewed in the classroom.

The less experienced instructors had the benefit of seeing how a more experienced teacher presented a concept, and the children had the benefit of a more skillful teacher. An information sheet was prepared each day giving the program for the day and the materials the students would need. Pre-tests and post-tests given the students showed "marked improvement" in attitudes and learning. Teachers' performance also improved resulting in an "increased interest in professional growth."[6]

Next, a nationwide study was conducted with the objective of improving reading skills by viewing "The Electric Company" in the classrooms. The study showed that the 8,000 students involved "made significant gains in the reading skills the program was designed to teach."[7] The target audience was composed of second grade students working below grade level as determined by standardized reading test scores. However, children in grades from first through fourth viewed the programs and the programs "had a significant impact"[8] on them.

The conclusion was that "the program was an effective instructional supplement for children who were beginning to experience reading difficulty."[9] All of the preceding projects using educational television in the classroom were effective in some way even if it was just for the stimulation of discussions.

INSTRUCTIONAL TV
(IN LIEU OF AN INSTRUCTOR PRESENT IN THE CLASSROOM)

This is a situation where the student views a televised lecture in the classroom without an instructor present. Only facilitators are available to answer questions.

At Oregon State University a program was instituted using two TV channels, one for the university and one for the local community. Two TV lectures per week were offered plus one or two seminars and an on-campus exam. Approximately 60% of the students viewed the courses at home even though there were 1/2 dozen viewing areas on campus.

> In earlier years, each of these courses was offered simultaneously in conventional classrooms and in televised form giving students a choice between the two. Because students tended to select the televised offerings, these courses are now carried only on TV.[10]

(see appendix, page) Further, "On the basis of student performance in television courses to date, there is no evidence to suggest that significant quality differences exist."[11] Contrasting the Oregon State experience is that the University of Oregon where no courses are televised except materials supplemental to the classroom instruction. It was suggested that the University of Oregon did not use educational television because: 1) It was thought that liberal arts are not suitable to television, and 2) opposition of the faculty.

Another report described a study conducted by E. Wayne Bundy at the University of Detroit which compared educational TV with traditional lecture techniques in teaching basic Spanish verb concepts. "The primary independent variable was presentational technique, and the primary dependent variable was academic achievement."[12]

The same material was presented by the same instructor taking the same length of time per concept. Two sections of a Spanish I course at the University of Detroit were used and statistics showed no significant difference between the two techniques. As Jamison, Suppes, and Wells comment in "The Effectiveness of Alternative Media: A Survey,"

> It should perhaps be noted that when highly stringent controls are imposed on a study, the nature of the controls tend to force the methods of presentation into such similar formats that one can only expect the no significant differences that are in fact found.[13]

Dr. Bundy makes the statement that, "It is unrealistic to expect to find dramatic differences in any comparison of teaching methods or technique when academic achievement is the criterion."[14] (see appendix, page) He quotes a 1932 study by Longstaff as stating,

> The experimental evidence submitted to the present time tends to support the general conclusion that there is little difference in achievement in large and small classes and also that it makes little difference as to what method of presentation of materials of the course is used.[15]

Television courses could be considered a large class.

In the same report, Hideya Kumata reported on results of two experiments involving an advertising course. In the first experiment, the statistics favored face-to-face instruction. This was thought to have been because:

1. Color is very important to advertising, and the lessons were televised in black and white.

2. The attendance of students in the TV courses was not checked, and they were thought to have a high rate of absences.

The follow-up experiment resulted in no significant difference and this was thought to have been accomplished by a) clear monitoring of student attendance, and b) "an effort was made to spur motivation of TV students."[16]

Finally, in the same report Kumata reviewed several studies of educational TV and came to the conclusion that there was no significant difference between face-to-face instruction and educational TV.

A further example of the effectiveness of educational TV resulted from a study done in Minnesota which compared a telelecture class with a traditional lecture class for dairymen. The dairymen received information concerning cattle feeding. They were given pre-tests and post-tests, and the statistics showed no significant difference.

A survey conducted by W. J. Mc Keachie resulted in some slightly different findings. He reviewed studies done at Miami University, Purdue University, and New York University. At Miami Univeristy, researchers found that the effectiveness of educational TV diminished with the complexity of the class, that traditional lecture classes produced superior gains in critical thinking (second semester economics), and that large lecture classes did not "produce the inferior results of television instruction in cognitive outcomes."[17]

At Purdue University they found that TV produced students with inferior writing abilities and that traditional lecture classes

were superior particularly for students with lower abilities. Further, mechanical engineering, military science, and calculus students did better with conventional instruction.

At New York University similar results were found in that traditional lecture classes produced students with greater writing ability as "measured by theme writing" (without the intitial differenees in ability levels). It seems that when more is required than level I knowledge, educational TV is not as effective.

TV COURSES IN THE HOME

In this model, courses are offered on TV for viewing in the home for academic credit. The Chicago TV college has approximately 5,000 students. They have the same examination schedule as classroom course students. Papers are turned in and returned with comments and instructors schedule two hours per week for telephone conferences or appointments.

> At the outset of the planning, heavy investment in evaluation of the educational effectiveness of TV college established the fact that at-home TV students were apt to do as well or better than their classroom contemporaries in any given class.[18]

The study found that the students were "highly motivated, ambitious, serious, and career conscious."[19] The students' average age was 29 years; the average I.Q. was between 110-120 and was composed of 75% women.

The only other at-home TV instruction program viewed concerned students in northern Virginia. Courses were offered over cable TV

to prepare students to take the GED test. They had seminars available to them, workbook, and tutors for those who were unable to get to the seminars. The program was considered quite successful.

In assessing educational TV perhaps more has to be taken into account than academic achievement. In the majority of comparative studies done to date; the comparison has been on the basis of academic achievement and surveys of the literature have shown no significant difference between educational TV and traditional face-to-face lecture. Dr. David W. Stickell conducted a study which reviewed the previous studies done and outlined criteria to determine what data would be interpretable. These were:

1. "The subjects must have been randomly assigned to treatments.
2. The experimental and control subjects must have been taught by the same instructor.
3. The number of subjects in the experimental and in the control groups must have been at least 25.
4. The control groups must have been of a preferred type (two instructors alternated in teaching the experimental and control classes.)"
5. The statistical assumptions required by the analysis used must have been tested and found tenable.
6. There must have been reasonable assurance that there was no important non-random difference between the experimental and control groups, other than the difference in mode of instruction.

7. The criterion instrument must have been judged adequate in terms of validity and reliability."[20]

There were 250 comparisons drawn from 31 reports of research. Using his criteria, He judged 10 of the 250 comparisons to be interpretable; all 10 showed no significant difference. Twenty-three comparisons were considered partially interpretable, and of the twenty-three, twenty showed no significant differences, and the other three favored television taught classes. Godwin Chu and Wilber Schramm conducted a review of the literature, Learning From Television: What the Research Says (1967), and their findings were that "television instruction is apt to be more effective in teaching primary and secondary school students than college students."[21] However, they state that "so far as we can tell from available research evidence, there is no general area where television cannot be used efficiently to teach the students."[22] However, the above reports compared only results of the studies. Niven (1958) compared college-level studies and classified the criterion instruments used according to Bloom's taxonomy. He came to the conclusion that, "The instructional television research that has been done to date has been largely at the basic level of subject matter information or knowledge."[23] Of those he reviewed, four were extended over two semesters or more and showed that television was an effective teaching medium. The analysis involved some of the same studies Stickell used. Since Niven determined that the studies tested level I knowledge and Stickell found no significant differences in them seem probable that when testing knowledge one will find no significant differences. As Dr. Stickell himself says,

> It is important to remember that the comparisons analyzed here were made almost exclusively on the basis of paper and pencil achievement tests. There are serious limitations to that kind of comparison study. If decisions to use or not use certain instructional techniques are influenced solely or even primarily by the results of comparison studies of achievement, there is a strong possibility that the attainment of other important educational objectives and would be hampered.[24]

Our research has shown that educational TV is effective when teaching knowledge. It cannot only supplement material presented in the classroom, it can actually be used as the sole source of lecture material for students. However, studies have also shown it to be deficient when teaching cognitive skills that require more than level I knowledge as shown by the studies conducted at Miami, Purdue, and New York universities. These studies are inconclusive because there is not enough data on testing these cognitive skills.

FOOTNOTES

1. Joe D. Dallas, "Tune in TV: Turn on the Pupils," The Clearinghouse, September, 1972., p. 56.

2. Ibid., p. 57.

3. Sandra Pisman, "Prime Time Television," PTA Magazine, December, 1972., p. 35.

4. Erik Van de Bogart, "North of the Nanaskeag: A Case Study in Viewer-Active Television," Audiovisual Instruction, September, 1972, p. 44.

5. K. V. Bailey, "Evaluating School Radio and Television: Some Problems and Methods," Educational Broadcasting International, March, 1973, p. 23.

6. Rudy Bretz, Television and Ghetto Education: The Chicago Schools Approach, Rand Corporation, June, 1969.

7. "Effectiveness of the Electric Company," Intellect, February, 1974, p. 284.

8. Ibid.

9. Ibid.

10. Leland J. Johnson, Cable Television and Higher Education: Two Contrasting Experiences, September, 1971.

11. Ibid.

12. Wayne E. Bundy, "Television and the Learning of Spanish Verbs," (edited by Wilbur Schramm), The Impact of Educational Television, 1969, p. 125.

13. Jamison, Dean, and Others, The Effectiveness of Alternative Instructional Media: A Survey, p. 28.

14. Ibid., p. 134.

15. Ibid.

16. Hideya Kumata, "Two Studies in Classroom Teaching by Television," (edited by Wilbur Schramm), The Impact of Educational Television, 1960, p. 125.

17. Rudy Bretz, Three Models for Home-Based Instructional System Using TV, Rand Corporation, October, 1972.

18. W. J. McKeachie, Research on Teaching at the College and University Level, p. 1,151.

19. Rudy Bretz, Three Models for Home-Based Instructional Systems Using TV, Rand Corporation, October, 1972.

20. D. Stickell, A Critical Review of the Methodology and Results of Research Comparing. . ., 1963, p. 39.

21. Goodwin Chu and Wilbur Schramm, Learning from Television: What the Research Says, 1967, p. 7.

22. Ibid., p. 8.

23. Harold Franklin Niven, Instructional Television as a Medium of Teaching in Higher Education, 1958, p. 2.

24. D. Stickell, A Critical Review of the Methodology and Results of Research Comparing. . ., 1963, p. 68.

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APPENDIX

Table 1

OREGON STATE UNIVERSITY CLASSROOM TV LESSONS TELECAST OVER CHANNEL 5 OF THE CORVALLIS CABLE COMPANY, SPRING QUARTER, 1971

Hour	Monday	Tuesday	Wednesday	Thursday	Friday
8 a.m.	Psychology 200	Psychology 202	Psychology 200	Psychology 202	--
9	General Science 103	Black History Experimental College	General Science 103	Black History Experimental College	--
10	Black History Experimental College	General Science 103	Black History Experimental College	General Science 103	--
11	Mathematics 163	Economics 115	Mathematics 163	Economics 115	Mathematics 163
12	--	--	--	--	--
1 p.m.	Psychology 200	Economics 115	Psychology 200	Economics 115	--
2	Mathematics 163	General Science 103	Mathematics 163	General Science 103	Mathematics 163
3	Mathematics 162	Economics 115	Mathematics 162	Economics 115	Mathematics 162
4	--	--	--	--	--
7	General Science 103	Psychology 200	General Science 103	Psychology 200	--
8	Mathematics 163	--	Mathematics 163	Mathematics 163	--
9	Black History Experimental College	--	Black History Experimental College	--	--

Table 2

OREGON STATE UNIVERSITY ENROLLMENTS IN TELEVISED COURSES, ACADEMIC YEARS 1957-1970

Academic Year	Television Facilities	Student Enrollment
1957-1958	KOAC-TV	554
1958-1959	KOAC-TV	787
1959-1960	KOAC-TV	1,265
1960-1961	KOAC-TV	2,440
1961-1962	KOAC-TV	4,319
1962-1963	KOAC-TV	4,095
1963-1964	KOAC-TV	4,256
1964-1965	Limited closed-circuit plus KOAC-TV	5,186
1965-1966	Limited closed-circuit plus KOAC-TV	6,479
1966-1967	Completed closed-circuit facilities	7,549
1967-1968	Closed-circuit	8,300
1968-1969	Closed-circuit	8,400
1969-1970	Closed-circuit	8,500

Table 3

ESTIMATED ANNUAL COST SAVINGS GENERATED BY TELEVISED INSTRUCTION, OREGON STATE UNIVERSITY
(8,500 students total annual enrollment)

		Number of Students Per Class in Absence of Television		
		25	50	100
Faculty Salaries Without Television		$192,000	$96,000	$48,000
Less Faculty Salaries with Television	$18,000			
Television Center - Annual Operating Expenses	35,000			
Amortization of Capital	11,000			
		64,000	64,000	64,000
Net Savings		$128,000	$32,000	$-16,000